REPORT OF THE
VIRGINIA DEPARTMENT OF EDUCATION

Study of Dyslexia Screening for Kindergartners (SJR 87, 2010)

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

SENATE DOCUMENT NO. 4

COMMONWEALTH OF VIRGINIA
RICHMOND
2011

COMMONWEALTH of VIRGINIA

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January 13, 2011

The Honorable Robert F. McDonnell
Governor of Virginia
P.O. Box 1475
Richmond, Virginia 23218

Dear Governor McDonnell:

I am pleased to present to you the Department of Education's Study of Dyslexia Screening for Kindergartners, pursuant to Senate Joint Resolution 87 passed by the 2010 General Assembly. This resolution states the following:

RESOLVED by the Senate, the House of Delegates concurring, That the Department of Education be requested to study dyslexia screening for kindergarteners.

In conducting its study, the Department shall (i) examine available scientific data on the success of early screening for dyslexia, (ii) consider the cost effectiveness of such strategy, and (iii) make recommendations as to whether such screening is advisable and, if so, the particular method that is most effective.

All agencies of the Commonwealth shall provide assistance to the Department for this study, upon request.

The Department of Education shall complete its meetings by November 30, 2010, and shall submit to the Governor and the General Assembly an executive summary and a report of its findings and recommendations for publication as a House or Senate document. The executive summary and report shall be submitted as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents and reports no later than the first day of the 2011 Regular Session of the General Assembly and shall be posted on the General Assembly's website.

This report contains both an executive summary and recommendations from the Department. If you have questions or require additional information, please do not hesitate to contact me or Anne D. Wescott, assistant superintendent for policy and communications, at (804) 225-2403, or by e-mail at Anne.Wescott@doe.virginia.gov.

Sincerely,

Patricia I. Wright, Ed.D.
Superintendent of Public Instruction

PIW/MMV/kfg

Enclosure

c: The Honorable Jill Holtzman Vogel
Senate of Virginia

Virginia Department of Education

Report

STUDY OF DYSLEXIA SCREENING FOR KINDERGARTNERS

PRESENTED TO

THE HONORABLE ROBERT F. MCDONNELL
GOVERNOR OF VIRGINIA
AND
VIRGINIA GENERAL ASSEMBLY

January 2011

PREFACE

The 2010 General Assembly passed Senate Joint Resolution 87 requesting the Virginia Department of Education to study dyslexia screening for kindergartners. This resolution requires that "in conducting its study, the Department shall:

a) examine available scientific data on the success of early screening for dyslexia;

b) consider the cost effectiveness of such strategy; and

c) make recommendations as to whether such screening is advisable and, if so, the particular method that is most effective."

The Virginia Department of Education assembled a team of professionals with expertise in reading, psychology, language development, learning disabilities, and assessment practices. This committee reviewed the literature on screening tools for dyslexia as well as literature and screening tools for early reading difficulty. Members of the committee identified experts from the literature and conducted interviews with these experts. Guidance documents from various states and outcomes were also reviewed.

The Department of Education would like to acknowledge the following individuals for their work on the study committee.

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AUTHORITY FOR REPORT

2010 SESSION

SENATE JOINT RESOLUTION NO. 87

Requesting the Department of Education to study dyslexia screening for kindergarteners. Report.

Agreed to by the Senate, February 16, 2010
Agreed to by the House of Delegates, March 9, 2010

WHEREAS, difficulty in learning to read can discourage young students and have a substantial impact on their subsequent school success; and

WHEREAS, some researchers now claim to be able to screen for pre-dyslexia in students as early as kindergarten; and

WHEREAS, such early intervention could allow students to learn to cope with this condition before they become labeled as low achievers or students with special needs and avoid needless stigmatization; and

WHEREAS, the Commonwealth has a great interest in determining whether such early screening is a cost effective and scientifically meaningful method of intervention; now, therefore, be it

RESOLVED by the Senate, the House of Delegates concurring, That the Department of Education be requested to study dyslexia screening for kindergarteners.

In conducting its study, the Department shall (i) examine available scientific data on the success of early screening for dyslexia, (ii) consider the cost effectiveness of such strategy, and (iii) make recommendations as to whether such screening is advisable and, if so, the particular method that is most effective.

All agencies of the Commonwealth shall provide assistance to the Department for this study, upon request.

The Department of Education shall complete its meetings by November 30, 2010, and shall submit to the Governor and the General Assembly an executive summary and a report of its findings and recommendations for publication as a House or Senate document. The executive summary and report shall be submitted as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents and reports no later than the first day of the 2011 Regular Session of the General Assembly and shall be posted on the General Assembly's website.

EXECUTIVE SUMMARY

Background

Virginia has a well-documented history of requiring kindergarten students to participate in a screening process upon entering school. The Virginia School Health Guidelines outline specific screenings, mandated by the *Code of Virginia* § 22.1-214 and Board of Education *Regulations Governing Special Education Programs for Children with Disabilities in Virginia* (8 VAC 20-81), which identify when any student shows signs of a significant impairment that requires follow up by a professional. These mandated screenings provide information to teachers and parents regarding irregularities in vision or hearing and delays in development of speech, language, and motor skills. The screenings are administered according to procedures developed locally.

In addition to the screenings required by the Virginia School Health Guidelines, in 1997 the Virginia General Assembly established the Early Intervention Reading Initiative (EIRI). The EIRI was instituted to reduce the number of children with reading problems through early screening and diagnosis and through acceleration of their acquisition of research-identified early reading skills by the end of each grade level, kindergarten through third-grade. The Phonological Awareness and Literacy Screening-Kindergarten (PALS-K) was developed as part of this effort. Ninety-eight percent of all school divisions in Virginia use PALS-K to screen kindergarten students with nearly a quarter-of-a-million children screened annually.

School divisions using the PALS-K as the literacy screening instrument are required to conduct a fall and spring screening during the kindergarten year and spring screenings during the first- and second-grade years. All necessary forms for fall and spring are currently provided to schools at no charge. An optional mid-year screening, using existing materials, is also available to all school divisions.

2010 Legislative Responsibility

In 2010, the General Assembly passed Senate Joint Resolution 87. This resolution required that the Virginia Department of Education study dyslexia screening for kindergartners. Dyslexia is a language-based learning disability that impacts a student in the area of reading. In conducting this study, the department is required to:

1. Examine available scientific data on the success of early screening for dyslexia,
2. Consider the cost effectiveness of such a strategy, and
3. Recommend whether such screening is advisable and, if so, the particular method that is most effective.

In response to this resolution, the department formed a committee that undertook a literature review of screening processes and screening tools for dyslexia/reading disabilities. The results of the literature review are:

1. There is no scientific data on the success of early screening for dyslexia. Only one tool, "Dyslexia Early Screening Test" was identified in the literature as a "dyslexia screener." Established test evaluation professionals do not consider it to be a reliable or valid instrument

2. Due to lack of available research and the availability of an early dyslexia screening tool, it would not be cost effective nor advisable to implement a screening process for dyslexia in Virginia's public schools.

The committee acknowledges that there is scientific data to support the universal screening for identifying at-risk readers and Virginia's current PALS-K screening tool is a successful, valid, and reliable instrument. However, as documented in the literature review, screening tools are not designed to diagnose a specific disability (Badian, 2000). If the severity of the reading weakness is such that a disability is suspected, a referral for a comprehensive evaluation to determine if the child has a disability should be made and the procedures outlined in the Virginia Board of Education's *Regulations Governing Special Education Programs for Children with Disabilities in Virginia* (8 VAC 20-81) should be followed.

Recommendations

The committee recommends the following:

1. Through Virginia's Early Intervention Reading Initiative, public schools should continue screening kindergarten students using the PALS-K or an alternate screening instrument. After extensive literature review, interviews with experts in the field of dyslexia/early screening for reading disabilities, and technical review of reports by testing evaluation committees consisting of national experts and professionals in the field, it has been determined that the PALS-K has been shown to be a reliable and valid instrument for the identification of students with reading problems**.** According to experts in the field, a screening tool that includes the research-based predictors of reading difficulty (phonological awareness and alphabet knowledge) will identify students who are at risk for learning to read and in need of intervention (Jenkins et al., 2002).

2. Virginia public school divisions should continue use of PALS-K data to strengthen instruction and intervention.

3. Virginia public school divisions should not add an additional screening for dyslexia since those students at risk for dyslexia are included among those identified with reading weaknesses using the PALS-K. No reliable and valid screening instrument for dyslexia has been identified. The International Dyslexia Association's (IDA) fact sheet supports and encourages schools to begin screening children in kindergarten to identify any child who exhibits the early signs of reading difficulties, but they also acknowledge that

individualized, in-depth, formal testing of reading, language, and writing skills is the only way to confirm a diagnosis of suspected dyslexia. If there is a need for additional screening for dyslexia, a mid-year PALS screening could be considered to ensure students with borderline scores continue to develop early literacy skills at an appropriate pace, assuming that a school division has sufficient resources for this screening. (Compton et al., 2006; Jenkins et al., 2007)

INTRODUCTION

The International Dyslexia Association (IDA), the oldest nonprofit, scientific, and educational organization dedicated to the study and treatment of the specific learning disability of dyslexia, as well as related language-based learning differences, defines dyslexia as "a specific learning disability that is neurological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge." Retrieved www.interdys.org

The intervention strategies used for dyslexia and some other types of early reading difficulties are the same (Vellutino, 2010). Appendix A provides a glossary of terms related to reading and dyslexia, including defining the types of reading disabilities. According to IDA, a poor reader may appear to "fit the profile" of dyslexia, however, if the learner responds quickly to appropriate intervention, the source of the reading problem is more likely related to earlier educational opportunity than to problems in the child's physical makeup that limit the ability to learn from the instruction provided, and in young beginning readers, this is more difficult to determine.

In the Virginia Board of Education's *Regulations Governing Special Education Programs for Students with Disabilities in Virginia (8 VAC 20-81),* dyslexia is recognized as one of the conditions that may be considered under the specific learning disability category. This definition is consistent with the definition recognized by the IDA. Currently, approximately six to seven percent of the total school-age population is identified as having a learning disability. However, due to specific criteria for the identification of a student with a specific learning disability, not all students who have reading difficulties will be found eligible for special education. The IDA indicates that 15 to 20 percent of the population has some of the symptoms of dyslexia, including slow or inaccurate reading, poor spelling, poor writing, or mixing up similar words. As a result, according to its dyslexia fact sheet, the IDA supports and encourages schools to begin screening children in kindergarten to identify any child who exhibits the early signs of potential reading difficulties, but the IDA has also taken the position that formal testing of reading, language, and writing skills is the only way to confirm a diagnosis of suspected dyslexia.

LITERATURE REVIEW

This study began with a focused search and review of literature from books, peer reviewed and refereed journals, and research databases to examine available scientific data on early screening for dyslexia. In the review of literature, only one research article identified an assessment as a "dyslexia screener." In the article, *Early Identification and Intervention for Young Children with Reading/Learning Disabilities*, Jenkins and O'Connor (2003) introduced the Dyslexia Early Screening Test (DEST). It was described as a set of screening measures with cutoff scores that were widely used in the United Kingdom at school entry. The discussion surrounding the DEST screener was brief and addressed the screener's relationship to prediction errors. The review of the assessment identified several issues including concerns with the cut scores and the possibility of under prediction of reading difficulties.

To gather additional information on the DEST, a search for a review of the instrument by the Buros Institute of Mental Measurements was obtained. The Buros Institute of Mental Measurements is considered the best known and largest test evaluation center in the world providing more than 70 years of professional assistance, expertise, and information to users of commercially published tests.

According to Buros, the DEST utilized a limited sample, and lacked information on the representativeness of the sample. In addition, it is viewed as having poor reliability and validity. The authors of DEST state that it cannot be used for diagnostic purposes, yet references to dyslexia identification were frequently made in DEST materials. The reviewers concluded that the DEST does not offer much more than an experienced teacher could gain from documentation through informal and classroom means (Buros, 2004). Additional information on the DEST is provided in Appendix B.

Because of the poor reliability and validity of the only dyslexia screener identified (DEST), the focus of this study and literature review was broadened from dyslexia to reading disabilities. A second review of the literature revealed a considerable amount of research on universal screeners for the early identification of potential reading disabilities.

According to the National Center on Response to Intervention, a screener is defined as a brief assessment that is valid, reliable, and evidence-based. Screenings are conducted with all students or targeted groups of students to identify those who are at risk of academic failure and likely need additional or alternative forms of instruction to supplement the conventional general education instructional approach.

The research and scientific data on universal screeners for the early identification of reading disabilities included the following topics:

- Research on early identification of reading disabilities;
- Screener selection and implementation process;
- Psychometric components of effective reading screeners;
- The advantages and disadvantages of screening; and

- Most frequently recommended screeners.

RESEARCH ON EARLY IDENTIFICATION OF READING DISABILITIES

The goal of early identification of students with reading difficulties is to increase their likelihood for developing adequate academic competence. The most frequently used method and a component of the response to intervention framework is to identify at-risk readers by screening all students, also referred to as *universal screening***.** According to Jenkins (2003) and the members of the *What Works Clearinghouse* reading panel, the first step to ensuring that early elementary-aged students learn to read is to screen all students and regularly monitor students who have an elevated risk of reading problems.

Jenkins (2003) indicates that early identification may be the first step to reducing the incidence or severity of the reading disability. Screening procedures should do no harm, avoid inequitable treatment, not consume resources that could be put to better use, and be linked to effective interventions. The three criteria for screening Jenkins identified in his article, *Candidate Measures for Screening At-Risk Students (2003)*, were:

1. Tools must have appropriate sensitivity and specificity, or the ability to accurately distinguish individuals that require intervention (students at-risk) from those who do not;
2. Tools must be practical, brief, and simple enough to be implemented reliably on wide scale under normal circumstances by normal people; and
3. Tools must have a positive net effect from implementation (consequential validity).

The purpose of screening, according to Badian (2000), is to identify students thought to be at risk, to provide them with extra intensive instruction, and to conduct additional assessment for more specific identification if the students lag behind peers. Screening is neither a comprehensive nor complete process and does not, in itself, constitute the diagnostic process. To be useful, it should be followed by teachers' ongoing formative evaluation with supplemental intensive instruction and by diagnostic assessment if the evaluation shows a child's progress continuing to lag behind peers.

According to Invernizzi et al, (2004), early identification provides a mechanism for identifying those students who are: a) at risk for reading failure; b) in need of a more thorough and detailed assessment; and c) in need of targeted intervention for improving literacy skills and reading acquisition so they do not fail. In addition, Fuch et al. (2007) recommended identifying the "risk pool" early in kindergarten and first grade to allow participation in prevention services before the onset of substantial academic deficits.

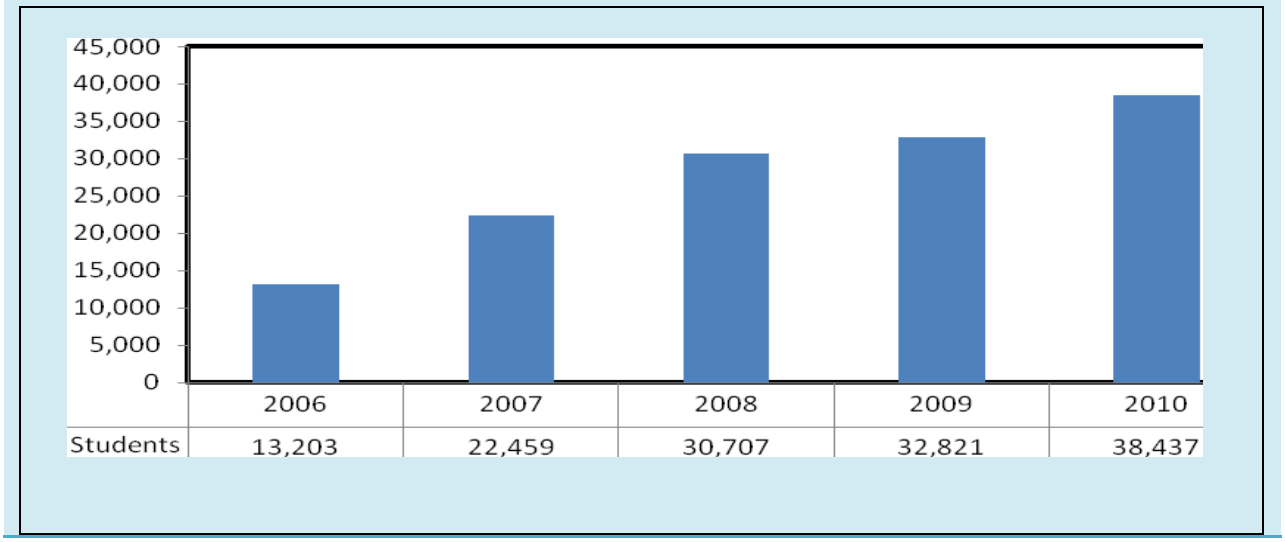
SCREENING IMPLEMENTATION

The research branch of the U.S. Department of Education, Institute of Education Sciences' panel on screening, was convened to identify evidence-based practices that work and to improve

educational outcomes for all students, particularly those at risk of failure. This panel recommends that all students be screened for potential reading problems at the beginning of kindergarten and again in the middle of the year (Jenkins 2003). Beginning and mid-year screenings were supported by experts interviewed during the course of the study.[1] According to Rathvon (2004), the longer screening is delayed, the more entrenched reading problems become and the more likely the problems are to have adverse effects on cognitive and language development.

Mid-year screening is encouraged, especially for students who are slightly above the cut-score for the identification of at-risk students (Jenkins et al., 2002; O'Connor et al. 1999; Scarborough, 1998; Torgesen, 2002; Badian, 1994; Catts, 1991; Felton, 1992). Multiple researchers have found that a second screening given mid-year produces more valid results (Compton et al., 2006; Jenkins et al., 2007). While participating in the national Reading First program, all Virginia Reading First schools were required to provide mid-year screenings for students in grades K through 2. The additional screening is no longer required; however, because of its value to educators, the use of mid-year screenings has steadily increased in Virginia (Figure 1.)

Figure 1. Number of Virginia kindergarten students screened at mid-year from 2006 and 2010



Some researchers believe that screening in preschool, the summer prior to entrance in kindergarten, or at the beginning of kindergarten is likely to reduce the predictive accuracy of a screening instrument. Two issues cited are:

[1]Interviews: Torgesen, personal communication, June 9, 2010; Vellutino, personal communication, July 6, 2010; and Invernizzi, personal communication, July 22, 2010)

1. Children may score poorly if they are tested too early because of a lack of language and literacy experiences, and

2. Children who have not adapted to the classroom setting may have poor performance on the measure because of problems with behavior, attention, and task motivation (Rathvon, 2004; Scarborough, 1998).

COMPONENTS OF READING SCREENINGS

There are specific components that accurately identify reading weaknesses/disabilities and are predictive of future reading achievement. Four core literacy skills are considered the most predictive of children's reading achievement (Justice et al., 2002). According to many experts, an early literacy screening tool for preschool and kindergarten-age children must examine the following four core literacy skills:

1. Phonological awareness or ability to identify and manipulate sounds[2];
2. Alphabet knowledge or awareness of individual letters and letter names;
3. Concept of word or ability to segment spoken sentences/phrases into words and to match spoken words to text; and
4. Grapheme-phoneme correspondence or ability to identify correspondence between letters and sounds.

Of these four skills, research shows that phonemic awareness (specifically phoneme identification) and alphabet knowledge are the two best predictors of early reading difficulty (Invernezzi, personal communication, July 22, 2010). Jenkins et al. (2002) confirm the importance of these core skills.

Foorman et al. (1998) proposed the use of various combinations of tasks including letter naming fluency, letter sound identification, sound blending, onset-rhymes, phonemic segmentation and sound repetition tasks in kindergarten measures. Schatschneider, et al. (2004) found that letter name and letter sound knowledge, naming speed and phonological awareness are good predictors of multiple reading outcomes in grades 1 and 2. In addition, a study by Torgesen et al. (1996) used measures of phonological awareness, rapid naming, and letter knowledge in kindergarten and first grade to predict beginning second-grade reading ability.

Screening tools found most frequently in the literature are included in Table 1 and information regarding how these tools address the four core literacy areas is included. Screening tools that

[2] National Institute for Literacy (2000), describes as broader than the definition of ability to identify and manipulate sounds and is not the same as phonemic awareness. While the focus of phonemic awareness is narrow, identifying and manipulating the individual sounds in words, the focus of phonological awareness includes identifying and manipulating larger parts of spoken language, such as words, syllables, and onsets and rhymes—as well as phonemes. It also encompasses awareness of other aspects of sound, such as rhyming, alliteration, and intonation.

list sub skills of phonological awareness, such as beginning sound awareness and rhyme awareness, are described as including a phonological awareness component. References to diagnostic assessment tools, such as Woodcock Reading Mastery Text-Revised (WRMT-R), Comprehensive Test of Phonological Processing (CTOPP) and the Woodcock-Johnson-Psycho-Educational Battery-III (WJ-III), designed for in-depth assessment of individual students were found in the literature. However, these diagnostic tools were not included in the comparison because they are designed for individual student assessment. In Virginia, this type of individualized assessment is done only in accordance with appropriate procedures outlined in state and federal regulations when a suspicion of a disability is noted.

Table 1. Inclusion of Four Core Literacy Skills in the Dyslexia Early Screening Test (DEST) and Other Reading Screenings

	Alphabet Knowledge	**Concept of Word**	**Letter Naming and Letter Sounds**	**Phonological Awareness**
Dyslexia Early Screening Test (DEST)			✓	✓
Dynamic Indicators of Basic Early Literacy Skills (DIBELS)			✓	✓
Florida Assessment of Instructional Reading (FAIR)				✓
Phonological Awareness Literacy Screening (PALS)	✓	✓	✓	✓
Predictive Assessment of Reading (PAR)			✓	✓
Texas Primary Reading Inventory (TPRI)			✓	✓

*The sources of the information on characteristics documented in the table above were based on a summary of early screeners compiled by the RtI Action Network article, "Screening for Reading Problems in Preschool and Kindergarten: An Overview of Select Measures" (Pool, 2004) and the Summary of Pre-kindergarten and Kindergarten emergent Literacy Skills Assessments compiled by the Florida Center for Reading Research. Because the FAIR is a recently developed assessment, it was not included in the summaries. However, a review of the FAIR was provided to the committee by Dr. Torgesen (June 9, 2010). In addition, the DEST was not included in the RtI Action Network nor the Florida Center for Reading Research summaries. The characteristics included in the table for the DEST were based on Buros Institute's evaluation and information included in the Early Reading Assessment: A Practitioner's Handbook (Rathvon, 2004)

An examination of Table 1, demonstrates that not all screening instruments assess students in each of the four core areas identified as the best predictors of reading achievement (Jenkins et al., 2002).

EFFECTIVENESS OF READING SCREENERS

The literature reviewed identified several criteria that are necessary for effective screeners. *The What Works Clearinghouse* reading panel (Jenkins, 2003) identifies three characteristics: reliability, predictive validity, and cost, to examine when selecting screening measures.

Additionally, multiple researchers state that screening tools must be sensitive, efficiently and easily administered, and meet minimum standards of technical adequacy for validity and reliability (Invernizzi et al., 2004/2005; Jenkins et al., 2007; Justice et al., 2002).

Jenkins (2003) suggests that reducing the number of false positives for students with scores below the cutoff who would eventually become good readers even without any additional help must be addressed. False positives or over-identification can be costly and may lead to the expense of additional testing and provision of services to students who do not need them. Also, false positives tend to impact children from low socioeconomic status and language minority families. These children are especially likely to be over-identified in kindergarten screening programs.

Rathvon (2004) cautions educators about under identification, which leads to missed opportunities to provide early intervention. This often happens to kindergarten students who are older than their grade peers and/or those students who come from literacy-rich environments.

Effective screening processes and tools, according to Foorman (2003), should also identify students whose future performance is at grade-level or better. It should identify students who would develop reading disabilities and should fit within the coherent, comprehensive reading instructional plan within the school.

Finally, the IDA states that a screening tool developed by researchers for the purpose of locating those students who are "at risk" for reading difficulty should be utilized and preventive intervention should begin immediately. In most cases, how the child responds to supplementary instruction will help determine if special education referral is necessary. According to Rathvon (2004), there is an emerging consensus among researchers that diagnostic assessments be delayed until a period of intervention has been provided.

The VDOE study committee reviewed the literature to identify the criteria for effective screeners including screener reliability, validity, predictive validity, and efficiency. Three screening instruments listed in Table 1 were eliminated from further study. The DEST was eliminated because it did not meet the criteria for effective screening. The Texas Primary Reading Inventory (TPRI) and Florida Assessment of Instructional Reading (FAIR) were eliminated because state-based screeners are designed to be predictors of student performance on state assessments and are aligned with state content. It should be noted the PALS-K is aligned with the Virginia Standards of Learning and was designed as predictor of student performance on state assessments.

The results of the second annual review of research studies on screening tools, conducted by the National Center on Response to Intervention, are provided in Table 2, for the three remaining instruments: 1)PALS-K; 2) PAR; and 3) DIBELS. The results from the National Center on Response to Intervention Center's Technical Review Committee on Screening were cross-checked against results from the Florida Center for Reading Research site for reading assessment, the Southwest Educational Development Laboratory database on assessment, The Buros Mental Measurements Center Yearbook, Early Reading Assessment: a practitioner's handbook, and the RtI Action Network article, "Screening for Reading Problems in Preschool and Kindergarten: An Overview of Select Measures" (Pool, 2004).

A summary of the National Center on Response to Intervention's findings for the PALS-K, PAR, and DIBELS are provided in Table 2. [For students in kindergarten, DIBELS requires administration of three subtests (Letter Naming, Nonsense Word, and Phoneme Segmentation)].

Table 2. Summary of National Center on Response to Intervention Second Annual Review of Research Studies on Selected Screening Tools

	Sub Test	Classification Accuracy	Generalizability	Reliability	Validity	Efficiency			
						Administration	Administration and Scoring	Scoring Key	Benchmarks / Norms
PALS-K*		●	Mod. High	●	●	Individual /Group	23-43 min.	Yes	Yes
PAR		●	Broad	●	●	Individual	16 Min.	No	Yes
DIBELS	Letter Naming	○	Mod. Low	●	◐	Individual	2 Min.	Yes	Yes
	Nonsense Word	◐	Mod. Low	●	◐	Individual	2 Min.	Yes	Yes
	Phoneme Segmentation	○	Mod. Low	◐	○	Individual	2 Min.	Yes	Yes

Chart Legend:

● Convincing Evidence | ◐ Partially Convincing Evidence | ○ Unconvincing Evidence | — No Evidence Submitted

* PALS-K ratings reflect third annual review data provided to University of Virginia by National Center for Response to Intervention (Invernezzi, personal correspondence, July 22, 2010)

Table 2 illustrates the relative strengths and weaknesses of the three screening tools. For additional information on the National Center for Response to Intervention's evaluation process, visit www.rti4success.org .

COST OF SCREENING IMPLEMENTATION

In addition to the technical information provided, the National Center on Response to Intervention also provides a summary of cost in dollars and additional resources including staff and materials required for administration. This information is provided in Table 3. When comparing costs, PALS-K has the lowest cost for screening materials compared to the PAR and DIBELS.

Table 3. National Center on Response to Intervention Summary of Cost and Resources required for Selected Screening Tools

		Cost per Student	**Resources: Staff and Materials**
PALS-K		Cost per student for K: $3.80 to $6.04 (all materials plus Online Score Entry and Reporting System)	Internet access is required for full use of product services. Testers will require less than 1 hour of training. Developer strongly recommends that teachers screen their own students, though others (e.g., paraprofessional) can administer the test.
PAR		Cost per student for K-3: $4.00 to $9.17 (depending on volume).	Internet access is required for full use of product services. Testers will require 1-4 hours of training. Paraprofessionals can administer the test.
DIBELS	Letter Naming Fluency (LNF)Cost	Free to download and photocopy from the DIBELS Web site OR $1.64 per student (minimum 25 students) for Sopris West materials.	Internet access is required for full use of product services. Testers will require 1-4 hours of training. Professionals or paraprofessionals can administer the test.
	Nonsense Word Fluency (NWF) Cost	Free to download and photocopy from the DIBELS Web site OR $2.90 per student (minimum 25 students) for Sopris West materials.	Internet access is required for full use of product services. Testers will require 1-4 hours of training. Professionals or paraprofessionals can administer the test.
	Phoneme Segmentation Fluency (PSF)	Free to download and photocopy from the DIBELS Web site OR $2.90 per student (minimum 25 students) for Sopris West materials.	Internet access is required for full use of product services. Testers will require 1-4 hours of training. Professionals or paraprofessionals can administer the test.

When considering the technical information on reliability and validity (Table 2) and dollar cost, and resources required (Table 3), the PALS-K appears to have a lower per student cost compared to the PAR and DIBELS. Funding for the PALS-K screening tool is provided through EIRI. Additional information about the current cost for development and implementation of PALS can be found in Appendix C.

ADDITIONAL INFORMATION ON READING DISABILITIES AND SCREENING TOOLS

Three nationally recognized experts in the fields of reading, psychology and dyslexia were interviewed during the course of this study. They are researchers, authors of multiple books and articles, grant recipients, and they have served on panels and/or in leadership positions with the United States Department of Education, as well as various state agencies and organizations across the country. Summaries of individual curriculum vitas are included in Appendix D. The following four questions were asked:

1. What screening tools are available to screen for dyslexia in kindergartners?
2. What is your familiarity with Virginia's existing pre-K through 3rd- grade screening for reading problems and early intervention needs?
3. Are there tools that would serve Virginia better than the PALS-K?
4. Is there anything they would recommend to enhance the Virginia PALS-K screening protocol?

Follow-up questions and discussion with each expert focused on screeners for dyslexia and early identification of reading difficulties, information on remediation of dyslexia and reading difficulties, impressions of Virginia's current screening system and possible improvements for Virginia's current system. Each expert provided additional materials to support the positions offered during the interview. A summary of their interviews can be found below:

EXPERT INTERVIEWS

Interview 1: Joseph Torgesen, Ph.D , Director Emeritus: Florida Reading Research Center. Dr. Torgesen is widely recognized for his research on the prevention and remediation of reading difficulties.

Dr. Torgesen acknowledged the limited number of screeners currently available who could be used to screen for dyslexia/reading disability. He indicated that there were less than five screening tools that had sufficient research. When asked to compare the PALS-K assessment to other screeners, he indicated that it was sufficient to identify students with reading difficulty. Dr. Torgesen suggested a possible mid-year screening for students who were borderline at-risk and the use of an additional component that includes rapid alphabet naming component.

Interview 2: Marcia Invernizzi, Ph.D, Professor and Program Coordinator of Reading Education in the Department of Curriculum, Instruction, and Special Education at the Curry School of Education at the University of Virginia. Dr. Invernizzi serves as the clinical director of the McGuffey Reading Center at the University of Virginia where she teaches the clinical course practica in Reading Diagnosis and Remedial Reading. Dr. Invernizzi was the Principal

Investigator in the development of the *Phonological Awareness Literacy Screening (PALS)* instrument.

Dr. Invernizzi indicated that the top two predictors of reading difficulties are initial phoneme identification and alphabet knowledge. Mid-year administration is suggested to increase the accuracy of screening programs. Virginia's use of mid-year screening is rising and presents no additional costs since materials and software are already available.

Interview 3: Frank Vellutino, Ph.D., Professor of Psychology at State University of New York at Albany. Dr. Vellutino is a cognitive psychologist who has studied literacy development in children for most of his professional career. In 1987, his article on dyslexia was the lead story in the Scientific American; six years ago he authored an article for the Journal of Child Psychology and Psychiatry that highlighted cognitive psychology's 40 year history of studying the specific reading disability dyslexia, and what has been learned from that research.

Dr. Vellutino is very familiar with screening for dyslexia and expressed the belief that Virginia already does an outstanding job of screening for those cognitive and language faculties that left unattended become significant barriers to learning to read. He understands that in any number of children who require intense remediation intervention that the neurological condition of dyslexia is at play. Dr. Vellutino expressed the opinion that "…regardless of the basis for a child's reading difficulty, intervention is the only known 'cure.'" (That would go for simple reading problems or more complex conditions like dyslexia.) Familiarity with all of the tools of the trade used in helping to screen, diagnose, and remediate reading problems, Dr. Vellutino could not think of one that is superior to Virginia's PALS-K. Aware that better medically-grounded scientific diagnosis of dyslexia is on the horizon, his advice was, "Don't screen for dyslexia, screen for kids at risk …."

Summary of Interviews:

All experts supported the practice of universally screening for reading difficulties in kindergarten. Both Dr. Torgesen and Dr. Vellutino were familiar with Virginia's current screening tool, PALS-K and Dr. Invernezzi currently serves as principal investigator for the PALS.

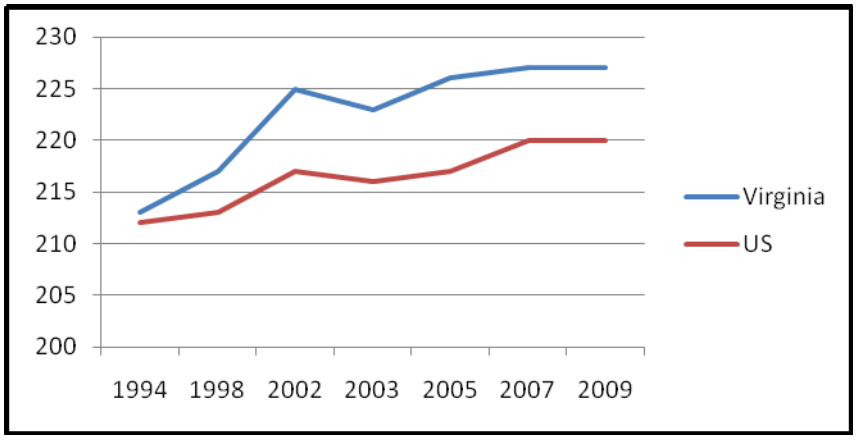
All experts interviewed expressed the opinion that PALS-K screened the areas necessary to identify at-risk readers. The possibility of a required mid-year screening for students who were slightly above the cut score was suggested as a way to increase the accuracy and decrease the potential for under-identification of students who are at risk and require intervention. However, not all school divisions have the administrative capacity to administer mid-year screenings.

CONCLUSION

In summary, the purpose of this study was to examine available scientific data on the success of early screening for dyslexia, consider the cost effectiveness of such a strategy**,** and make

recommendations as to whether such screening is advisable and, if so, the particular method that is most effective. According to the Handbook of Language Literacy (Stone et al. 2004), the purpose of screening in kindergarten and first grade often does not entail designation of a reading disability or learning disability, but identifying those students who are at risk and implementing corrective measures. When reviewing current data trends, Virginia's National Assessment of Educational Progress (NAEP) scores in fourth-grade reading indicate performance above the national average with additional growth noted after the implementation of the EIRI in 1997 (See Figure 2). NAEP, the largest nationally representative and continuing assessment of students in the United States, conducts reading assessments during students' fourth- and eighth-grade years.

Figure 2. Comparison of Virginia and National 4th-grade reading scores from NAEP testing



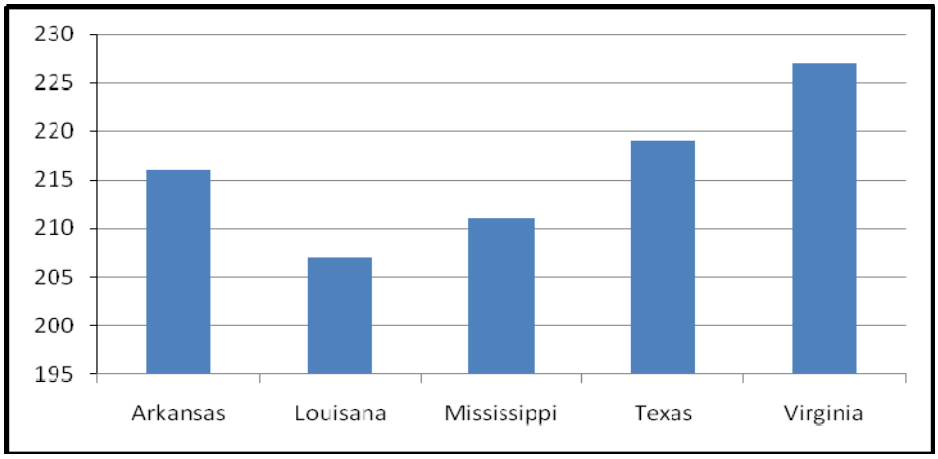
Also, because NAEP assessments are administered across the nation, results can be used for comparison across states. "The assessment stays essentially the same from year to year, with only carefully documented changes and provides a clear picture of student academic progress over time (NAEP, 2010)."

Four states have dyslexia-based legislative initiatives in place. Information on screening tools and NAEP scores from Texas, Mississippi, Louisiana and Arkansas is provided for comparison. The universal screening instrument used varied across the states.[3] Louisiana and Arkansas use Dynamic Indicators of Basic Early Literacy Skills (DIBELS). Texas has developed a screening instrument that is aligned with their state standards and tied to other state initiatives. Mississippi is currently using a universal screener and progress monitoring tool, *Children's Progress*, and a state developed dyslexia checklist to identify students who are at-risk. It should

[3] According to The National Center on Response to Intervention, they do not maintain a list by state of the universal screeners used and indicated that states vary on their stages of implementation. They noted that many states continue to allow the selection of screeners to be a local division decision. Sources of information on the four states included in the chart were state guidance documents from their Web sites and direct contact with state dyslexia coordinators for Mississippi and Texas.

be noted that Virginia's NAEP scores for 2009 are higher than the other states that have mandated screening in place (See Figure 3).

Figure 3. Comparison of NAEP Scores from States with Reading Screening



According to Dr. Torgesen, "We can, using tests currently available, accurately identify students who are likely to struggle with reading starting in preschool or kindergarten. What these tests cannot do this early is to differentiate students with dyslexia from others who will struggle in learning to read for reasons other than dyslexia. The goal of every school should be to provide interventions for all struggling readers that are sufficiently powerful to bring reading skills up to grade level standards. If this is accomplished for all struggling readers, then it will automatically be accomplished for all students with dyslexia."(Florida Center for Research on Reading, 2010)

Therefore, based on this review of literature, analysis of most frequently identified screening tools, and the positive trends in assessment data, the committee concluded that the state's current practice of screening all kindergarten students for reading weaknesses using the PALS-K is an effective method of initially identifying students at-risk for reading disabilities.

The goals of the PALS-K screening program are:

1. To identify children requiring early literacy intervention;
2. To guide teachers' development of classroom-based early literacy enhancement strategies; and
3. To document the effectiveness of early literacy instruction for children identified as needing intervention. If the PALS-K screening process is effectively implemented, students at-risk for reading disabilities, including dyslexia, should be identified.

RECOMMENDATIONS

The VDOE study committee reviewed extensive research, conducted interviews, and compared NAEP scores indicating progress of Virginia students to those from other states that have dyslexia-based legislatives in place. The study committee makes the following recommendations as to whether such screening is advisable and, if so, the particular method that is most effective:

1. Virginia school divisions should continue screening all kindergarten students using the PALS-K. After extensive literature review, interviews with experts in the field of dyslexia/early screening for reading disabilities, and the technical review of reports by testing evaluation committees consisting of national experts and professionals in the field, the PALS-K has been shown to be a reliable and valid instrument for identification of at-risk students. According to experts in the field, a screening tool that includes the research-based predictors of reading difficulty (phonemic awareness and alphabet knowledge) will identify students who are at risk for learning to read and in need of intervention.

2. Virginia school divisions should continue use of PALS-K data to strengthen instruction and intervention.

3. Virginia school divisions should not add an additional screening for dyslexia since those students at risk for dyslexia are included among those identified with reading weaknesses using the PALS-K. No reliable and valid screening instrument for dyslexia has been identified. The International Dyslexia Association's (IDA) fact sheet supports and encourages schools to begin screening children in kindergarten to identify any child, who exhibits the early signs of reading difficulties, but they also acknowledge that individualized, in-depth, formal testing of reading, language, and writing skills is the only way to confirm a diagnosis of suspected dyslexia. If there is a need for additional screening for dyslexia, a mid-year PALS screening could be considered to ensure students with borderline scores continue to develop early literacy skills at an appropriate pace, assuming that a school division has sufficient resources for this screening. (Compton et al., 2006; Jenkins et al., 2007)

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APPENDIX A: GLOSSARY OF TERMS

Alphabet Knowledge – Awareness of letters and their corresponding sounds.

Classification Accuracy or Sensitivity - The extent to which a screening tool is able to accurately classify students into "at risk for reading disability" and "not at risk for reading disability" categories.

Concept of Word - Awareness that spoken words match to printed words in the reading of a text.

Evaluation - An assessment of student skills including both observation and measurement conducted when data from screening and intervention indicates a suspicion of a disability.

Generalizability - The extent to which results generated from one population can be applied to another population. A tool is considered more generalizable if studies have been conducted on larger, more representative samples.

Grapheme - The smallest part of written language that represents a phoneme in the spelling of a word. A grapheme may be just one letter, such as b, d, f, p, s; or several letters such as ch, sh, ck that represent a single sound.

Learning Disability - A disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations, including conditions such as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. (Individuals with Disabilities Education Act, 2004)

Letter Naming – The ability to name upper- and lower-case letters when presented visually.

Literacy - The ability to use written language both actively and passively … the ability to read, write, spell, listen, and speak. (Moats, 2000) The ability to read and write and use numeracy, to handle information, to express ideas and opinions, to make decisions and solve problems, as family members, workers, citizens and lifelong learners. (Scotland, Curriculum framework for Adult Literacy)

Phoneme - The smallest part of spoken language that makes a difference in the meaning of words. For example, the word ‘cat’ has 3 phonemes (c-a-t) while the word ‘cash’ also has 3 phonemes (c-a-sh).

Phonemic Awareness - The ability to hear, identify and manipulate the individual sounds-phonemes in spoken words.

Phonological Awareness – A broad term to describe a group of sub skills including phonemic awareness, sound and letter identification, rhymes, and reading of words and syllables.

Predictive Validity - An index of how well the measure provides accurate information on future reading performance of students. Predictive validity should reach an index of 0.60 or higher (What Works Clearinghouse 2010).

Reading Disability – Inorganic Type - A more environmentally influenced disability in which poor readers rely on memory for whole words rather than decoding strategies, leading to persistent difficulties in reading accuracy, reading fluency, and comprehension.

Reading Disability – Organic Type - An inherent type in which poor readers form alternate neural pathways to decode words leading to accurate word recognition.

Reliability - The consistency with which a tool classifies students from one administration to the next. A tool is considered reliable if it produces the same results when administering the test under different conditions, at different times, or using different forms of the test. Reliability should be at least 0.80 (National Center for Response to Intervention 2010).

Screening - A brief assessment that is valid, reliable, and evidence-based, conducted with all students or targeted groups of students to identify those who are at risk of academic failure and likely need additional or alternative forms of instruction to supplement the conventional general education instructional approach.

Sensitivity - A measure of how well the test detects an issue when one exists; a sensitive test has few false negatives.

Validity - The extent to which a tool accurately measures the underlying construct that it is intended to measure. Validity should be .70 or greater (National Center on Response to Intervention 2010).

APPENDIX B: ADDITIONAL INFORMATION ON SCREENING TOOLS

Information compiled by the National Center on Response to Intervention for PALS-K, PAR, and DIBELS. The DEST was not reviewed by this center. DEST information was retrieved from the Buros Mental Measurements Yearbook (2004).

Phonemic Awareness Literacy Screening (PALS-K)

The Phonological Awareness Literacy Screening (PALS) is a criterion-referenced screening, diagnostic, and progress monitoring tool. PALS consist of two instruments (PALS-K and PALS 1-3) that measure young children's knowledge of important literacy fundamentals: phonological awareness, alphabet awareness, letter sound knowledge, spelling, concept of word, word recognition in isolation, and oral passage reading. The major purpose of PALS is to identify students who may be at risk for reading difficulties and who need additional reading instruction beyond what is provided to typically developing readers. The second purpose of PALS is to provide teachers with explicit diagnostic information about what students know and need to know about the fundamental components of literacy that may be used to target instruction to meet students' needs. The third purpose of PALS is to monitor students' progress and determine the effectiveness of instruction or intervention.

PALS-K measures kindergarten students' knowledge of phonological awareness and early literacy skills. The phonological awareness component of the PALS–K instrument is a measure of a young child's ability to identify rhyme units and isolate beginning sounds. The literacy skills component of PALS-K measures a young child's knowledge of: alphabet, letter sounds, phoneme-grapheme correspondences, concept of word, and word recognition. The alphabet letter sound task is not timed, thereby allowing the teacher to assess each of the twenty-six alphabet letters and gain a more complete understanding of what to teach than a timed assessment containing a sampling of letters would provide.

The Predictive Assessment of Reading (PAR)

The Predictive Assessment of Reading (PAR) is a highly accurate, one-on-one, teacher administered, universal screening and diagnostic tool that can be given in 15 minutes or less to children in second semester kindergarten through the beginning of fourth grade. A secure Web generated report includes nine significant indicators of reading deficit problems, as well as reading proficiency. Included are an overall composite score that is highly predictive of a concurrent WJBR score, four standardized subtest scores, a diagnosed remediation priority code and a remediation intensity score, a highly accurate 3rd grade predicted WJBR score and a highly accurate 8th grade GM predicted score. PAR owes its high accuracy to an algorithm derived using a unique combination of four standardized subtest scores for Picture Vocabulary, Phonemic Awareness, Rapid Naming, and Letter-Word calling, each of which is statistically

significant as an independent contributor to the total prediction. Long term longitudinal tracking of control groups provided the basis for the multi-year predictions. Extensive analysis revealed that addition of subtests such as nonword reading, visual perception, memory, or comprehension did not yield any significantly stronger predictions. Compared to all other currently used predictive devices or algorithms, PAR is unique in its inclusion of picture vocabulary as one of its subtests. PAR can be differentiated by its unique ability to provide the teacher with a diagnosis of the single or double deficit that must be corrected before the child will be able to advance. Based upon this global diagnostic profile, PAR provides the teacher with a strategy and a starter set of 20 minute scripted remediation lesson plans.

The Dynamic Indicators of Basic Early Literacy Skills (DIBELS)

Kindergarten Subtests of Letter Naming Fluency (LNF), Nonsense Word Fluency (NWF), and Phoneme Segmentation Fluency (PSF)

DIBELS LNF is a standardized, individually administered test that provides a measure of risk. Students are presented with a page of upper- and lower-case letters arranged in a random order and are asked to name as many letters as they can. The student is allowed 1 minute to produce as many letter names as he/she can.

DIBELS NWF is a standardized, individually administered test of alphabetic principles including letter-sound correspondence and the ability to blend letters into words in which letters represent their most common sounds for students in grades K-2. The student is presented with randomly ordered Vowel-Consonant (e.g., ig, ot) and Consonant-Vowel - Consonant (e.g., sim, tob, lut) nonsense words on an 8.5”x11” sheet of paper and asked to verbally produce the individual letter sound of each letter or verbally produce, or read, the whole nonsense word. For example, if the stimulus word is “vaj” the student could say, /v/ /a/ /j/ or say the word “vaj” to obtain a total of three letter-sounds correct. The student is allowed one minute to produce as many letter-sounds as he/she can, and the final score is the number of letter-sounds produced correctly in one minute.

DIBELS PSF is a standardized, individually administered test of phonological awareness for students in grades K-1. The PSF assesses the student’s ability to segment 3 or 4 phoneme words into their individual phonemes fluently.

The PSF task is administered by the examiner orally presenting words of 3 to 4 phonemes. It requires the student to produce the phonemes for each word. For example, the examiner says “sat” and the student says “/s/ /a/ /t/” to receive 3 possible points for the word.

The Dyslexia Early Screening Test (DEST)

DEST is described as a set of screening measures and cutoff scores widely used in the United Kingdom at school entry. Approximately 1000 students were involved in the norming process. This assessment yields a profile of a student’s current ability across rapid naming, phonological and letter tasks, copying and balance which are summed as a risk index. The DEST assesses five

areas: (1) literacy skills, (2) phonological awareness, (3) verbal memory, (4) motor skills and balance, and (5) auditory processing. A revised version of this test is The DEST-2 and includes two additional subtests, clinical research data, a new 'at risk' category, and scoring software. The new version was not addressed in the literature.

APPENDIX C: CURRENT FUNDING: EARLY READING INTERVENTION (EIRI) PROGRAM

The purpose of the Early Intervention Reading Initiative (EIRI) is to provide early reading intervention services to students in kindergarten through the third grade who demonstrate deficiencies reflected in their performance on a diagnostic literacy screening tool. Local school divisions participating in the program are required to use the state-provided diagnostic screening instrument, Phonological Awareness Literacy Screening (PALS), or a diagnostic screening instrument approved by the Department of Education.

Funding from the EIRI can be used by local school divisions for: 1) special reading teachers [including reading specialists]; 2) trained aides; 3) volunteer tutors under the supervision of a certified teacher; 4) computer-based reading tutorial programs; 5) aides to instruct in class groups while the teacher provides direct instruction to the students who need extra assistance; or 6) extended instructional time in the school day or year for these students.

The Virginia Department of Education contracts with the University of Virginia to develop the PALS instruments, to establish a system that provides data-driven information and instructional resources to school divisions, and to collect statewide data on students' PALS results. Since 2003, the budget for PALS has remained at $950,000.

Direct aid funds are disbursed to school divisions that choose to participate in the EIRI. Funding is based on a ratio of one teacher per five students in kindergarten through third grade at 100 percent of the estimated population for kindergarten and grades 1 and 2, and 25 percent of the estimated population for grade 3. The number of eligible students is based on the percentage of students needing services as determined by the PALS diagnostic or free lunch eligibility in the absence of PALS data. The 5:1 ratio is then applied to the eligible student population and then multiplied by 36 weeks of annual instruction time multiplied by 2 1/2 hours of instruction per week to yield the number of hours of service required and this product is then multiplied by an hourly rate to yield the total cost of funding the EIRI for a school division. The state composite index of ability-to-pay is then applied to this figure to determine the state share of funding. Total EIRI funding for the 2010-2012 biennium is budgeted at approximately $26.4 million in each year of the biennium, with the state share estimated at between $14.7 and $14.8 million in each year.

School divisions have the option to select an alternate diagnostic screening instrument other than the PALS instrument to meet the requirements of the EIRI. Divisions that elect to use a local diagnostic screening instrument for EIRI purposes must submit a proposal to be approved by the Department of Education. Only a limited number of school divisions have requested and

were approved to use a local diagnostic screening instrument in place of PALS in kindergarten through grade three.

APPENDIX D: READING EXPERTS INTERVIEWED

Three experts were interviewed during the course of this study. Information about their current positions and summaries of their extensive curriculum vitas are provided.

MARCIA INVERNIZZI is the Henderson Professor of Reading Education at the Curry School of Education of the University of Virginia. She is Director of the McGuffey Reading Center and was Principal Investigator in the development of the *Phonological Awareness Literacy Screening (PALS)* instrument.

Since 2007, Dr. Invernizzi has co-authored seven books. Her co-authored series of books, Words Their Way, provide a comprehensive look at phonics, spelling, and vocabulary instruction. Since 2000 she has authored or co-authored more than 15 articles in professionally refereed journals. In addition to co-authoring 4 tests over the past 10 years, Dr. Invernizzi has authored chapters in 5 different books. She has provided testimony at congressional hearings on reading.

Included among her honors is recognition as one of the Top 100 Innovators in the initiative "From Academic Research to Real-World Applications" (2008), the Curry School of Education Outstanding Professor Award (2006), the Washington College Alumni Citation for Excellence (2005), and the Henderson Professorship (2004), a distinction she still holds.

JOSEPH TORGESEN is a distinguished Research Professor of Psychology and Education at Florida State University, and the Emeritus Director of the Florida Center for Reading Research. He is a past director of the Center on Instruction (Reading), a federal corporation affiliated with the U.S. Department of Education, and is nationally known for his research on both the prevention and remediation of reading difficulties in young children as well as work on assessment of phonological awareness and reading.

Dr. Torgesen has been conducting research with children who have learning problems for over 30 years, and is the author of over 190 articles, book chapters, books, and tests related to reading and learning disabilities. His professional service includes membership on the editorial boards of six research journals and membership on the professional advisory board for the National Research Center for Learning Disabilities. He is also on the Scientific Advisory Board of the Haan Foundation for Children, a private organization intent on founding a research institute that brings together scientists, educators, and researchers to create a comprehensive understanding of how a child's mind works best and to design programs that enhance various learning styles. Dr. Torgesen was one of a select group of researchers invited by the National Research Center on Learning Disabilities to present at their 2003 Symposium in Kansas City. He

has worked closely with the National Institute of Child Health and Human Development for a good deal of his career and for the past decade he has been working both in Florida and nationally to assist states, districts, and schools in their efforts to improve reading instruction for all students.

Dr. Torgesen is a past recipient of the *Samuel A. Kirk Award* for exemplary research publication from the Division of Learning Disabilities of the Council for Exceptional Children, and is a past recipient of the Orton Award from the International Dyslexia Association. He was appointed by President Bush to serve on the National Board for Education Sciences (2005).

FRANK R. VELLUTINO is a professor of psychology and linguistics at the University at Albany, and the State University of New York, where he is the director of the University's Child Research and Study Center. He has appointments to both the Psychology Department and the Department of Educational and Counseling Psychology.

Dr. Vellutino's research has focused on reading development, the cognitive underpinnings of reading, and the relationship between reading difficulties and various aspects of language and other cognitive functions. His most recent studies have addressed the development of predictive, assessment, and remedial procedures for correcting and preventing long-term reading difficulties in children at risk for early reading difficulties. Among his more noteworthy publications is a book titled, Dyslexia: Theory and Research (MIT Press, 1979) and the lead article in a March 1979 issue of *Scientific American* – "Dyslexia." In 2004 he co-authored an article for the *Journal of Child Psychology and Psychiatry* (45(1):2-40) titled "Specific Reading Disability (Dyslexia): What Have We Learned in the Past Four Decades?" He has authored or co-authored more than 60 research articles and has written chapters in more than 30 different books or monographs.

Dr. Vellutino has been on the editorial board of 10 different journals (including *Reading Research Quarterly, Journal of Learning Disabilities, Journal of the Scientific Study of Reading, Journal of School Psychology*), and has been ad hoc reviewer for more than 20 journals (including *Annals of Dyslexia, Journal of Learning Disabilities, Reading Research Quarterly,* and *Journal of Reading Behavior*). He is a member of the American Psychological Society and the Society for the Scientific Study of Reading. He has delivered more than 125 presentations, nationally and internationally, to conferences of the American Psychological Association, American Educational Research Association, the National Reading Conference, the International Reading Association, the Dutch Dyslexia Society, the New Jersey Chapter of the Orton Dyslexia Society, and the Annual Convention of the Council for Exceptional Children. He was one of a very select number of presenters invited to present at the 2003 Symposium of the National Research Center on Learning Disabilities.

Dr. Vellutino has been a consultant to the U.S. Department of Education and to the Bureau of Education of the Handicapped. He was an appointee to the National Panel of Advisors to the Texas Center for Reading and Language Arts (University of Texas, Austin) and he was a member of the RAND National Reading Study panel. In 1992 he was the recipient of the University at Albany Award for Excellence in Research, and in 1996 he received the Special Education Research Special Interest Group (American Educational Research Association) award for "…important and lasting contributions" to the field of special education.