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# The Utility of the DIBELS Phonemic Segmentation Fluency Assessment in Kindergarten for Establishing a Correlation with Third Grade Reading Performance

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The Utility of the DIBELS Phonemic Segmentation Fluency Assessment in Kindergarten  
for Establishing a Correlation with Third Grade Reading Performance

Jennifer J.S. Lynn

Otterbein University

April 14, 2022

Submitted in partial fulfillment of the requirements for a Master of Arts in Education  
degree.

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KINDERGARTEN PSF & THIRD GRADE READING PERFORMANCE

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By  
Jennifer Lynn  
2022

### ACKNOWLEDGEMENTS

I must acknowledge the enduring patience of my husband, Damon, and children, Calvin and Parker, during the creation of this project. Without their support and patience, I would not have been able to complete this work. They are anxiously awaiting my return to the world of the thriving Lynn family upon its completion, and I am ready to jump back into this world!

## KINDERGARTEN PSF & THIRD GRADE READING PERFORMANCE

### VITA

#### Teaching Experience

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2006-2007	Long-Term Substitute Art Teacher  Indian Run Elementary Dublin City Schools Dublin, Ohio

## KINDERGARTEN PSF & THIRD GRADE READING PERFORMANCE

2005-2006

Art Teacher

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Audubon Public School District

Audubon, NJ

### Education

2015

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Ohio University

Athens, Ohio

2013

Certification: Intervention Specialist for Students with  
Visual Impairments

The Ohio State University

Columbus, Ohio

2004

Certification: Visual Art K-12

Rowan University

Glassboro, NJ

1998

Bachelor of Fine Arts

Columbus College of Art & Design

Columbus, Ohio

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ABSTRACT

The purpose of this study is to investigate whether student scores on the kindergarten DIBELS PSF assessment are correlated with student reading assessment scores in third grade. I chose to examine this correlation because the kindergarten PSF score is used as one of the earliest identifiers of students who are at-risk for reading difficulties. I determined that a small number of those students who scored at-risk in kindergarten remained at-risk in the third grade.

## SECTION ONE

### **Introduction**

In my role as a reading intervention teacher, each year I administered benchmark assessments in the Fall, Winter, and Spring to get a snapshot of how each student is performing. This data is used to ensure that each student is making adequate growth, and it is used to determine which students need instruction that goes beyond the regular classroom (Tier 2 and 3 intervention). There is one assessment I have administered hundreds of times that gives me pause during each benchmark session. This assessment is the Phonemic Segmentation Fluency (PSF) assessment. It is intended to measure a student's level of phonological awareness, a critical factor in learning to read. Phonological awareness has been identified as a strong indicator of later reading ability and great importance has been attached to this concept, both in educational approach and in educational policy backed by federal and state laws. For this study, I examine whether the results of the PSF assessment are giving correlative information for students' eventual performance on third grade reading assessments.

One reason I am interested in looking for a correlation is because many of the kindergarten students I have administered the PSF assessment to are unable to grasp the idea of verbally dividing words into separate sounds as required by the assessment. Many students come to kindergarten with no prior experience in verbal word manipulation and don't do well with this action- I wonder if this means they are unable to distinguish between phonemes or are they unable to perform the verbal task being asked of them for

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this assessment. The question of whether or not the students can understand the task is important, but it is beyond the scope of this present study. However, for those kids who have been found to be deficient in this measure, the school is required to start a “Reading Improvement and Monitoring Plan” and send a RIMP letter home to parents notifying them of this deficient area in their child's academic performance. Much instruction occurs between this initial kindergarten assessment and the next critical measure in third grade relating to the third grade guarantee - making sure every third grader is reading on grade level.

Performance in the third grade is used as a key indicator of a school's and a teacher's ability to adequately prepare students for success in school and later in life. Phonological and phonemic awareness is explicitly referred to in a recent publication detailed in Ohio's Plan to Raise Literacy Achievement and is the basis for the educational guidance contained in the document (Ohio Department of Education, January 2020). There is considerable legislative pressure on school districts to perform: we must teach every kid to read well. These measures carry a lot of weight and examining them closely, making sure we are using a quality, appropriate assessment to measure this high-stakes indicator is justified. I hope to use the information and deeper understanding of phonological awareness I will gather for the benefit of my current and future students, and interaction with parents as I move into the role of intervention specialist.

## SECTION TWO

### **Literature Review**

#### **Introduction**

In this literature review, I will examine the concept of phonological awareness (PA) and the assessment of this skill. First, I will answer the question, why is phonological awareness important and what are the policy implications for educators related to PA? Next, I will explore what makes PA such a critical element of early literacy development. Then, the assessment of PA will be explored, including its timing in terms of developmental appropriateness. This will be followed then by a discussion of previous studies performed that ask a similar question to mine: what is the correlative power of phonological awareness assessments in relation to later reading achievement? In order to clarify the terms related to phonological awareness that are often confused and used interchangeably in error, I'll begin with an explanation of each. *Phonological awareness* is the overall term referring to the understanding that oral language is made of smaller components that can be separated and manipulated. A phoneme is the smallest individual unit of sound in a word and *phonemic awareness* is an auditory and oral-based understanding that the units of sounds in words can be segmented, blended, or changed to make new words. *Phonics* refers to the actions and skills that connect these phonemes to the letters and symbols that represent them in print (Chard & Dickson, 1999).

### **Phonological Awareness is Critical Right Now**

What is the significance of phonological awareness and why are educators and policymakers so interested in this concept right now? The on-going and cyclical debate over whether learning to read must be done with a whole-language approach: learning to read whole words as students encounter them in meaningful texts; or if learning to read can be more efficiently facilitated with teaching decoding separately from comprehension, has produced a field called the *Science of Reading*. Petscher et al. (2020) define the Science of Reading as “the accumulated knowledge about reading, reading development, and best practices for reading instruction obtained by the use of the scientific method” (p. S268). Through this accumulated knowledge, the *Simple View of Reading* (SVR) has emerged, which its creators describe to simplify thinking about learning to read to a combination of two distinct skills, decoding and comprehending. Decoding involves matching sounds to the letters in print to determine the word on the page, *translating print into language* to paraphrase Gough and Tunmer (1986). Comprehension is understanding what is read – attaching meaning to the words on the page. The Simple View of Reading (SVR) distills these two factors to a single equation: the act of Reading is explained as a product of Decoding and Comprehension, or “ $R = D \times C$ ” (Gough & Tunmer, 1986). Phonological awareness is a key component of decoding. If a child struggles with phonological awareness, they will struggle with decoding (Petscher, et al., 2020). Even more strongly stated: “all poor readers have a phonological deficit” (Stanovich, 1988, p. 602).

Not only do we have the “Third Grade Guarantee” which requires third graders to pass the Ohio’s State Test in English Language Arts in order to be promoted to the fourth

grade (this has been waived for the 2019 through 2022 school years due to the Coronavirus pandemic), but the Ohio Department of Education issued a report titled “Ohio’s Plan to Raise Literacy Achievement” in 2020 in which it details updated standards for literacy education. This report relies on the SVR as a framework for its teaching and assessment guidelines. While the SVR is not a new idea, it has been at times more and other times less popular in the 30 years since its inception. The question I pose for this research project takes on added importance when considering how phonological awareness fits into SVR and the guidelines put forth by the state of Ohio. ODE explicitly names the Simple View of Reading as the basis for literacy instruction, including the teaching of phonological & phonemic awareness and phonics as an aspect of word recognition (Ohio Department of Education, 2020).

### *Is a Simple View of Reading Accurate?*

The actual simplicity of the Simple View of Reading has been brought into question recently. Duke, Cartwright, and Kelly (2021) identify several additional elements necessary for successful reading that go beyond and intertwine within decoding and comprehension. One among these is Executive Functioning including:

...the ability to direct attention to particular aspects of text (attentional control), build and maintain a model of text meaning while decoding the words in the text (working memory), suppress distracting information (inhibitory control), shift continuously between key processes (cognitive flexibility), and plan and manage one’s progression toward the goal of a reading task (planning).” (Duke et al., 2021, p. S30)



Another complicating element necessary for reading English is defined by Duke et al. (2021) as “graphophonological-semantic cognitive flexibility (GSF)” (p. S31) which is the idea that not all English letters correspond with a single sound. The reader must remain flexible to several pronunciation options tested in the context of the text to read successfully. Petscher et al. (2020) identify this GSF concept as the idea of “set for variability” (p. S274). They also introduce a new term; rather than the Simple View of Reading, they suggest an “Active View of Reading” (p. S25) to account for the intertwining skills related to decoding and comprehension required for reading success.

After working with kindergarten and early elementary students for the past several years, it became very clear to me that reading was never as simple as *just* decoding and *just* comprehension. It seems obvious that there are emotional, cognitive, and experience-based elements to successful reading. I’m sure I’m not alone in this realization from working with students; educators and researchers are finding that it is important to research, document, and write about what exactly these other elements are so we can take a closer look at them and ensure we are using the best approach for teaching reading. At this point there is, though, a consensus that explicit phonological instruction is beneficial.

### **Phonological Awareness in the Development of Reading Ability**

The Ohio Department of Education’s Plan to Raise Literacy Achievement uses the Simple View of Reading equation ( $R = D \times C$ ) as a framework to identify the areas families and educators need to address. The document mentions phonological awareness eight times, and phonemic awareness eight times. The framework relies on teaching

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phonemic awareness as one tool to improve early literacy skills among Ohio students.

The authors justify this approach with the following:

Student learning is cumulative by nature. Ohio students who enter kindergarten on track in language and literacy are seven times more likely to go on to score proficient on Ohio's third grade English language arts assessment. Students who are not proficient in reading by third grade are three times more likely than their proficient peers to not graduate on time. (Ohio Department of Education, 2020)

This statement maps onto the Matthew Effect in reading identified by Stanovich (1986) which explains that a student who struggles to read will continue to fall behind in reading over time. A struggling reader will read less than their peers due to the sheer amount of time it takes them to read, and the frustration felt while reading less efficiently, resulting in them getting less practice and making less growth in their reading ability. This experience compares to that of their peers who find reading easier. These students will read faster, read more, and make greater progress in reading ability due in part to the extra practice they experience while reading more text. The struggling reader will continue to remain behind their peers in a compounding way without intervention. This will have a profound effect on overall achievement, especially evident in reading-related tasks (Stanovich, 1986).

Phonological awareness is identified by several authors as having a significant link with early literacy skills. In their research, Burns, Maki, Helman, McComas, and Young (2018) specifically link phonological awareness with letter sound fluency which is necessary for developing early literacy skills like sounding out decodable words. As mentioned earlier Stanovich (1988) also found a direct link between phonemic awareness

and reading ability. He studied second through fifth grade students which showed that in lower readers, the lack of phonological sensitivity carried into later elementary grades and continued to be a factor in reading difficulty. This is because, specifically the “lack of phonological sensitivity makes the learning of grapheme-to-phoneme correspondences very difficult” (Stanovich, 1988, p. 601). The research conducted by Burns et al. in 2018 looked more closely at the aspects of phonological sensitivity to identify those tasks that specifically lead to grapheme-phoneme (letter-sound) correspondence. They found that not all phonological tasks are equally important, but that the isolating and blending of phonemes are the two which are most critical for reading to develop (Burns et al., 2018).

### **Assessing Phonological Awareness**

#### ***Are Kindergarten Students Sensitive to Phonemic Principles?***

In addition, Fox & Routh (1975) found that the development of phonemic awareness in children coincides with the age they typically learn to read, so assessments of this developing skill are appropriate for students in kindergarten at age five to six. In their review of previous research pertaining to phonological ability and the development of reading ability, Wagner and Torgesen (1987) also found several studies that support the finding that children develop the ability to segment words at the phonemic level around age five to six, again, just as they are also learning to read (Wagner & Torgesen, 1987). The study performed by Fox and Routh in 1975 found that children as young as three years old are able to segment sentences into words about half of the time, and by age five or six were able to perform this task with near perfection. Segmenting words into syllables followed almost the same pattern. Dividing words into phonemes was much more difficult for three- and four-year-olds, but by age five the children were segmenting

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with about 83% accuracy, peaking at age six with almost 100% accuracy (Fox & Routh, 1975). Similarly, Chard and Dickson (1999) examined the assessment of phonological awareness and compared different measures. These measures included the segmentation of words into onset and rime, and the separation of individual phonemes. They state that onset-rime separation develops during kindergarten and individual phoneme segmentation develops late in kindergarten and into first grade. Therefore, most kindergarten students will have trouble with segmenting words by phonemes, making it in turn, difficult to distinguish between low and high performing students. According to this research, kindergarten is an appropriate time to look at the skills involved in orally expressing phonemic awareness since this is the age when such skills are emerging, but we can expect these students to find this to be a difficult task.

### ***Which Assessments Are Most Useful?***

Now, what are the effective measures we should use to identify students who need explicit intervention to develop this skill? This is where the question of assessments enters. Many studies have been performed examining the measure of phonological awareness of children in the stages of early literacy. Kaminski and Good (1996) measured the reliability, validity, and sensitivity of several measures, including the Dynamic Indicator of Basic Early Literacy Skills (DIBELS) Phonemic Segmentation Fluency (PSF) assessment (Biancarosa, et al., 2018-2020). They found this measure, compared to others including a letter naming fluency, and Picture Naming Fluency (Thomsen, 1982) to be the best predictor for kindergarten literacy skills, but less effective for first graders. They warn that DIBELS should not be the only measure used and noted that their sample size and location of students was limited (Kaminski & Good, 1996).

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Chard & Dickson also found in their study that the timed aspect of the DIBELS PSF makes it sensitive to growth and therefore useful to show improvement over time (Chard & Dickson, 1999).

Other researchers in more recent work have found the opposite to be true – that phonemic segmentation is not a significant predictor of early reading ability at any time in kindergarten when compared to the predictive quality of other measures (Morris, Bloodgood, and Perney, 2003). These findings come from studies performed in the 2000's. There is a distinct difference in the findings of similar studies performed in the 1990's (Chard & Dickson, Kaminsky & Good) and those performed in the following decade. One explanation of this is the shift in classroom instruction to include an aspect of phonological awareness due to the findings of the research from the 1990's. Once phonological awareness becomes a part of the curriculum, the predictive nature of phonological assessments shifts – if every student is receiving some sort of instruction in these skills, many may overcome any early deficit measured in kindergarten. Alternatively, Morris, Bloodgood, and Perney (2003) found that using measures connected to alphabet knowledge makes more sense since all reading is dependent on alphabet recognition. They found that:

Oral segmentation of three-phoneme words, even when measured using a straightforward assessment ... is an abstract and artificial task for a prereading kindergartner. Nowhere in his or her past has the child been asked to think about speech in such a decontextualized manner. (p. 103)

Having performed hundreds of phonemic segmentation fluency assessments with kindergarten students, I can attest to the truth of this statement. Many (though not all)

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young faces look at me with utter confusion when I read the standardized instructions meant to explain this odd task I am asking them to perform in just one minute. Yopp (1988) further criticized using phonemic segmentation as an early reading assessment because it is a compound assessment, requiring the use of memory while the student works to produce the sounds in succession. However, their findings did support the predictive power of PSF: “That these tests have predictive validity lends support to the hypothesis of a causal link between phonemic awareness and reading acquisition” (p.174). The researchers found that this predictive validity relates only to initial reading development, though (Yopp, 1988).

Morris et al. (2017) compared (timed) Phonemic Segmentation Fluency (PSF) to other measures’ ability to predict achievement on measures through third grade. They found PSF to be predictive, but that a measure of phonemic spelling was a better predictor than PSF. Interestingly, in this study the researchers raised several questions that go beyond deciding which measure is the best to use. First, PSF tries to be a measure of pure phonemic ability (separating words by individual phonemes), but the skill as measured is not used like this in the world of education, and in life – it is a tool to get us to reading and writing. Shouldn’t the measure we use reflect the actual practice? The timed measure is quick and simple to implement so it is more practical but requires fast judgements by the test administrator which can lead to error. Also, PSF allows for elongation of sounds to be counted the same as separation of sounds – is this really the same? They call for a critical look at DIBELS because it is used in thousands of US schools, and its use continues to increase (Morris, et al., 2017).

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The assessment of phonemic awareness I will be examining is the Dynamic Indicator of Basic Early Literacy Skills (DIBELS) Phonemic Segmentation Fluency (PSF) (Biancarosa, et al., 2018-2020). Several researchers have examined this assessment as well, but some used a variation of the measure that didn't limit the student to one minute, as did the one I will examine. DIBELS PSF was designed to be used as an initial measure of phonemic awareness as well as a measure of progress over time. The one-minute-timed aspect of PSF allows for this duality. The assessments used by other researchers did not require the element of being able to monitor progress, and the measure they used was not measured with time but with accuracy: correct percentage of a whole set. Despite this difference, the findings are relevant to the questions I pose determining the predictive validity of the PSF. One study compared DIBELS scores from assessments given in first grade to standardized test scores from second and third grades. The authors found that Oral Reading Fluency (ORF) was the best predictor of performance on both the TerraNova in second grade, and the PSSA in third grade, and PSF scores from first grade were not found to be as useful as predictors of scores on either the second or third grade assessments (Goffreda, Diperna, & Pederson, 2009). The fact that oral reading fluency was the best predictor in this study makes sense since the TerraNova and PSSA involve the assessment of reading. However, in the current study I analyze the prereading assessment given to kindergarteners (not first graders).

Elliott, Lee, and Tollefson (2001) studied the use of four of the DIBELS assessments to find kindergarten students who are in the at-risk category during early reading development, like what I intend to do. They used phonemic segmentation assessment (PSA) as well as letter naming fluency, letter sound fluency, and initial

phoneme ability. Their phonemic segmentation measure is untimed, hence the use of the term “assessment” rather than “fluency,” so it also differs from the one I will examine.

Unlike Kaminski and Good (1996) who found Letter naming Fluency (LNF) and PSA to be the best predictors of reading achievement, Elliott et al. (2001) found Letter Naming Fluency and Letter Sound Fluency to be the best predictors. The comparison assessments they used were all administered in the kindergarten year, so, again they were looking at a short window of time. It is notable, however, that there is variability in different researchers’ findings of the predictive ability of phonemic segmentation tasks.

### **Predictive Power of Phonemic Segmentation Assessment**

The findings I have discussed so far give a glimpse of the research done using phonemic segmentation as a predictor of early literacy. How useful is it as a predictor of long-term reading ability? I keep coming back to the statement I’ve heard before, that phonological awareness is (was?) the best predictor of reading ability. My review of the literature adds a caveat to that statement: when looking at early literacy skills, in comparison to other factors such as socioeconomic status. In my research I did not find a study that makes this statement without other conditions added into the mix. Many researchers suggest that it is a strong predictor among other measures, but my overall impression is that the declaration of phonological awareness as the most important foundational skill for reading has been oversimplified. I agree. In the district where I have been teaching, we make some critical decisions about RTI instruction based in part on DIBELS measures, it is well worth taking an in-depth look at its value.

Using phonemic awareness measures results in sometimes extreme variability of results. (Please note, I am intentionally using the term “phonemic awareness” now to



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indicate the specific focus of the PSF assessment of segmenting words into individual phonemes.) Verbally segmenting words is an unfamiliar task to most kindergarten students and can be difficult. This difficulty can reveal students who may struggle with reading, compared to second grade performance (Snider, 1997). Paige et al. (2019) also found that more familiar assessments connected to letters and letter-sound knowledge were good indicators of third grade reading achievement. Is waiting for that letter-sound knowledge to develop waiting too long, though, to assess a student's early reading skills? This brings the idea of the Matthew Effect into play again. The longer we wait to intervene, the more severe the effects of the deficit (Stanovich, 1986). Stanley, Petscher, and Catts (2018) found that oral reading fluency and other measures tied to print were better predictors of later reading comprehension by comparing several kindergarten measures with the performance of those students in tenth grade. One question they raise, though, is whether waiting for a student to be able to perform on a print-based assessment makes the student miss out on critical instruction time. In this sense, phonemic segmentation assessments can be very valuable in identifying students who need extra support at the pre-reading level in kindergarten, and even first grade. PSF assessments give educators a measure that allows a student to show growth before even attaching the print concepts necessary for reading with text. Phonemic awareness can be measured in prereaders, and it is something that teachers can influence. Despite the imperfection in its predictive ability and administering assessments, it is a potentially useful measure. Even though we don't really speak by articulating words as isolated phonemes in the way required for a PSF assessment, it is still a good approximation that provides valuable data

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(Lane, Pullen, Eisele, & Jordan, 2002). Plus, this is a naturally developing skill in five- and six-year-olds (Wagner & Torgesen, 1987).

Though it may be imperfect, the timed fluency aspect of the DIBELS PSF allows educators to measure growth in students. False alarms may be indicated by the PSF measure (Schilling, Carlisle, & Zeng, 2007) but is it better to identify more students for intensive instruction who may not need it than to under-identify, or wait to identify students? That may be the question for another project, but it appears that providing support early is valuable for reducing the Matthew Effect of compounding gaps in achievement over time (Stanovich, 1986). How the PSF relates to reading achievement in the third grade in a population of students from very recent years can reveal what progress we have made with instructing overall Phonological Awareness and its impact on creating proficient readers by grade three.

Research shows the importance of teaching phonemic awareness and decoding (Petscher et al., 2020, Gough & Tunmer, 1986, Stanovich, 1988, Burns et al., 2018, ODE, 2020). In addition, measuring this skill with kindergarten-age children is developmentally appropriate (Lane et al., 2002, Anthony & Francis, 2005, Fox & Routh, 1975, Wagner & Torgesen, 1987). Ultimately, PSF may be a measure uniquely valuable in the kindergarten year as an early indicator of reading ability, for identifying a student who may struggle with learning to read, or one who may not develop strong reading skills later (Kaminski & Good, 1996, Chard & Dickson, 1999, Morris, 2003, Yopp, 1988, Goffreda et al., 2009, Elliott et al., 2001, Morris, 2017, Snider, 1997, Paige et al. 2019, Lane et al., 2002, Schilling et al., 2007). Considering the information gathered from literature, upon analysis of the data I have gathered, I hope to determine the utility of the

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kindergarten PSF assessment for correlating with third grade reading achievement.

Kindergarten is when we begin to assess students in order to implement literacy interventions, I would like to consider if there is a fundamental connection between this very early assessment and the critical level of reading in the third grade deemed necessary for continued achievement in school.

### SECTION THREE

#### **Research Design and Method**

##### **Introduction**

In the previous section, I examined the literature regarding the correlative nature of phonological assessments and later reading achievement, and the validity of phonological assessments in kindergarten and early elementary school. In this section I will describe the research method, setting, and participants in this study.

##### **Method**

This study analyzes longitudinal data from former students with whom I have worked. The data selected has been analyzed using Spearman's correlative analysis to determine the amount of correlation between the kindergarten score and a third grade score. Spearman's correlation was used because this is ordinal data (Lund & Lund, 2020).

Dichotomous data was used to determine the relationship between meeting/not meeting a benchmark score on the kindergarten PSF assessment, reaching/not reaching

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the third grade benchmark reading-level, and achieving a passing/not passing score on the third grade OST. A McNemar's test was run to confirm this relationship and reveal the amount of change between the students meeting benchmark in kindergarten, and the students meeting benchmark in third grade (Lund & Lund, 2020) (Mertler, 2015).

### **Setting**

The data for this study was gathered from a central Ohio suburban public school district. The building includes preschool through fourth grade with enrollment averaging 360 students. Due to rapid growth in the community, the school has undergone several rounds of redistricting as well as a high rate of new students moving in, resulting in fluctuating enrollment, and the removal of preschool classes in the last several years. Among the students in the district, reported demographics include 10% students with a disability, 86% White, 4% Black, 5% multiracial, and 17% at an economic disadvantage.

The key set of scores included in the data I analyzed was from the kindergarten DIBELS Phonemic Segmentation Fluency assessment (Biancarosa, et al., 2018-2020). This assessment was administered during the winter benchmark window in the early weeks of December. This is a one-on-one assessment and was given by me and other teachers who all received training on its administration. The third grade scores include the Star Reading assessment score: a computer-based test that yields a percentile rank and scaled score (Renaissance Learning Inc, 2022). This assessment is delivered in a group setting for most students, but some students who struggle to perform well in this setting are pulled out to a small group in a separate classroom. This assessment is given at least three times per year in second, third, and fourth grades, and for some students as often as once per month. The students' reading level score was measured using Fountas &

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Pinnel's Baseline Assessment System, a one-on-one teacher-administered reading assessment that measures oral reading accuracy and verbal comprehension (Fountas & Pinnell, 2008). The other teachers and I giving this assessment are trained in its administration and none of us were novices. Every student is given this assessment three times per year, and others may receive it more often as needed. The student reads aloud from a short text, then verbally answers questions related to the content. Their responses are then scored using a standard set of criteria. The Ohio's State Test in English Language Arts (OST) score was gathered from the fall administration of the assessment which occurred in October. This is the assessment that every third grader in Ohio completes. It is computer-based and administered in a group setting. Just as for the Star assessment, some students are placed in a small group setting for this test.

The scores that I chose for kindergarten were selected because they are the earliest assessment of phonemic awareness given to students. There was no formal school-wide phonics program in place at this time, so the amount of phonics instruction the students received before the assessment varied according to which classroom the student was placed in. The three third grade scores I chose were selected because each takes a slightly different approach to measuring a student's reading ability, and the OST is a state requirement.

### **Participants**

Forty-one students' scores were used for this study. The selection criterion for these students was primarily to include those who attended this school in both their kindergarten and third grade years. This criterion resulted in a range of student abilities, though it may have a skewed socioeconomic element. The fact that they attended the

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same school for four consecutive years implies that there may be a more stable home environment for these students than a student who hadn't remained in the same school for the four years spanning kindergarten through third grade. Ten of the kindergarten students attended a half-day program, and thirty-one attended the full day program. This group includes students with an IEP, behavior plan, non-White ethnicity, and students with gifted identification.

### SECTION FOUR

#### **Data Results**

##### **Correlation Results**

All four sets of scores were analyzed by the SPSS program using Spearman's Correlation. This comparison used the actual ordinal numerical scores students received on their PSF, OST, and Star Reading assessments. The reading level scores were originally recorded as letters, which were converted to numbers (e.g. A=1, B=2, C=3) in order to use them in this numerical calculation. Table 1 includes each student's scores sorted from lowest to highest according to the kindergarten measure. The scores highlighted in yellow fall below the benchmark for that assessment.

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**Table 1**

*Student Scores Sorted by Kindergarten Phonemic Segmentation Fluency (PSF)*

Student Number	Kindergarten PSF	3rd Grade Star Reading	3rd Grade Reading Level	3rd Grade OST*
16	7	375	14	640
29	7	398	14	696
25	9	364	14	656
15	10	376	14	720
24	11	286	15	672
23	13	584	16	708
5	13	469	18	708
20	14	564	16	640
1	15	554	17	663
31	16	477	21	708
26	17	461	19	677
8	17	495	17	720
14	20	412	16	702
18	21	511	20	714
9	23	188	14	621
3	23	490	20	696
27	23	498	18	727
2	23	593	21	727
13	24	512	17	656
37	24	510	16	708
34	24	801	17	714
6	25	440	17	683
32	25	636	21	733
17	26	311	14	640
12	26	485	19	677
39	26	510	16	708
30	26	519	26	753
22	26	868	26	753

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**Table 1 (continued)**

7	26	971	26	775
28	26	993	25	784
40	29	515	25	702
35	31	1026	25	792
11	33	531	19	714
41	37	592	21	727
36	39	491	14	696
33	41	560	21	768
19	43	454	17	690
38	44	662	21	708
10	45	907	22	822
21	49	932	26	739
4	50	490	21	760

**Key** Highlight indicates a score below benchmark.

\*OST: Ohio's State Test in English Language Arts

When comparing Kindergarten PSF scores with third grade reading level scores, there was a strong correlation (.580). Kindergarten PSF scores compared to OST scores showed a lower (.490) but still a strong correlation. The PSF scores compared to third grade Star Reading scores also showed a lesser, but still strong correlation of .500.

**Table 2**

## *Correlations Between Kindergarten and Third Grade Scores*

	Reading Level	OST Score	Star Reading Score
PSF Correlation	.580***	.490**	.500**

\*\*=  $p < .01$  \*\*\* =  $p < .001$



### **Additional Statistical Analysis**

These correlations do not consider the key factor that there is a benchmark for each assessment that determines the actions the teachers and administrators must take in response. Out of the thirty-one students who didn't reach benchmark in kindergarten falling into the category of at-risk for reading failure, only five of them also failed to meet benchmark on any of the three third grade assessments included in this study. In order to analyze this phenomenon, I also converted the kindergarten PSF and the third grade scores to a 1 or 0; 1 meaning that the benchmark was met, and 0 meaning that it was not, to examine any correlation between meeting the benchmark in kindergarten and meeting the reading benchmark in third grade. These were analyzed using an exact McNemar's test to determine whether the change between the two could be attributed to chance. Ten of the 41 kindergarten students met the benchmark for the PSF, which is 24% of the students. By third grade, the number had increased significantly, 33 of the 41 students had met the benchmark reading level as well as for the OST, or 80%. Thirty-five of the 41 students (85%) met the benchmark score for the Star Reading assessment.

**Table 3**

#### ***Number and Percent at Benchmark***

<b>Grade/ Assessment</b>	<b>Number at Benchmark</b>	<b>Percent at Benchmark</b>
Kindergarten PSF	10	24%
3rd Grade Star Reading	35	85%
3rd Grade Reading Level	33	80%
3rd Grade OST	33	80%

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The results determined that the difference in the number of students who had not met the benchmark in kindergarten and those who had met the benchmark in third grade was statistically significant,  $p < .0005$ . The McNemar's test shows the opposite effect of the Spearman's correlation analysis. Spearman's showed a strong correlation between the kindergarten and third grade scores, but McNemar's shows a significant change in meeting benchmark levels. There was a significant change in scores between kindergarten and third grade when looking at whether students met benchmark which isn't apparent when examining the correlation alone. I will examine this difference in the next section.

## SECTION FIVE

### **Discussion and Analysis**

#### **Comparison of Results**

In my literature review, I reported that Morris et al. (2017), Snider (1997), and Paige et al. (2019) found that the phonemic segmentation assessment is predictive of later achievement, but each found that assessments that are connected to letters (not just oral manipulation of sounds) were a better predictor of third grade reading achievement. Snider noted that the wide range of scores students earned on the phonemic segmentation task suggested a vulnerability of this assessment. They hinted at the conclusion I came to with the statement "The practical significance of these results is less straightforward than the statistical significance" (Paige et al., 2019, p. 206). Although we both found a

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statistical correlation, translating that correlation into something a teacher, parent, and administrator can use is a different task. I also found that there is a correlation between the PSF in kindergarten and reading achievement in third grade. This led me to the two different correlative calculations I used for this study.

### **Discussion of Spearman Correlation**

The Spearman correlation I performed did show a statistically significant correlation between the kindergarten PSF scores and each of the third grade reading scores. Whether this is a causal correlation cannot be determined by my study, but students who scored in the lower range in kindergarten also tended to score in the lower range in third grade. Similarly, students who scored in the higher range in kindergarten also tended to score in the higher range in third grade. I just didn't feel like this was the end of the story with this data, though. The range of scores and locations where benchmarks fall is very different between the four assessments. Figures 1, 2, and 3 below show the distribution of scores of the kindergarten PSF assessment compared with each third grade measure. The red line on each graph shows where benchmark falls, illustrating how many students are above and below that number.

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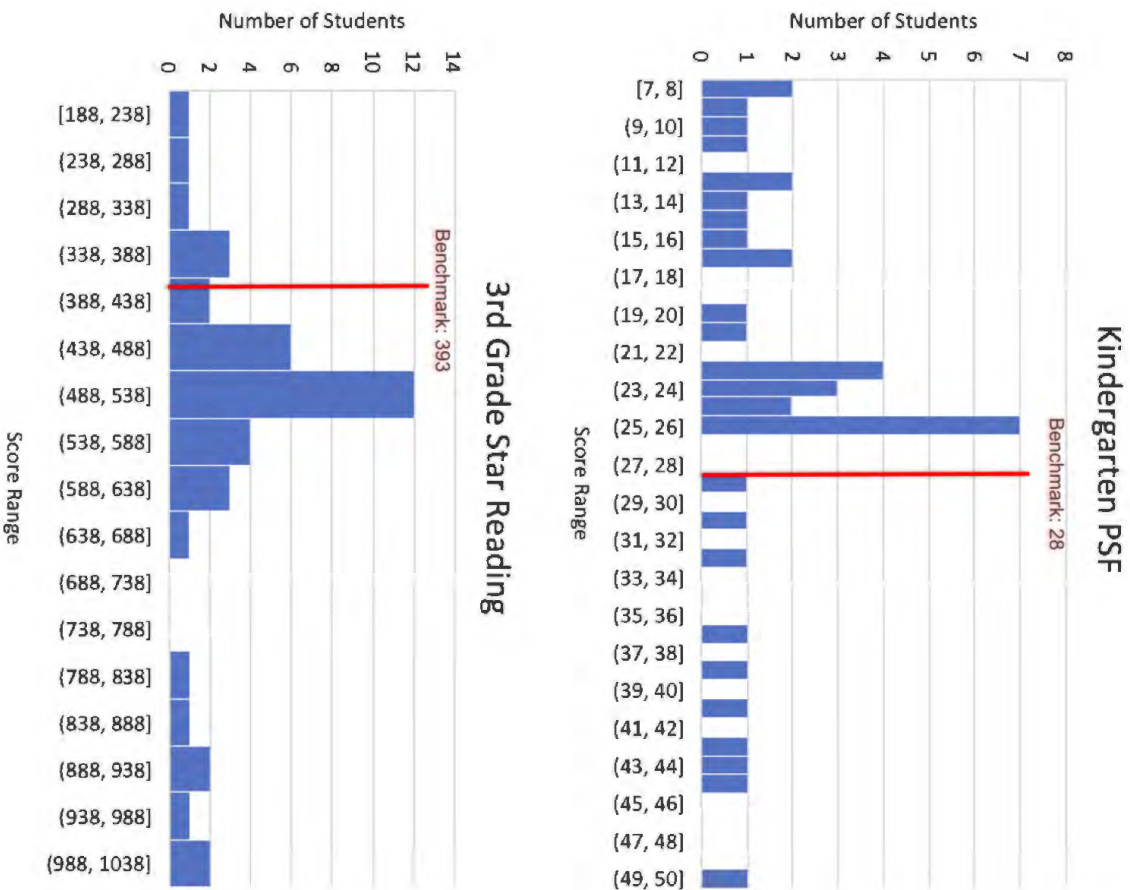
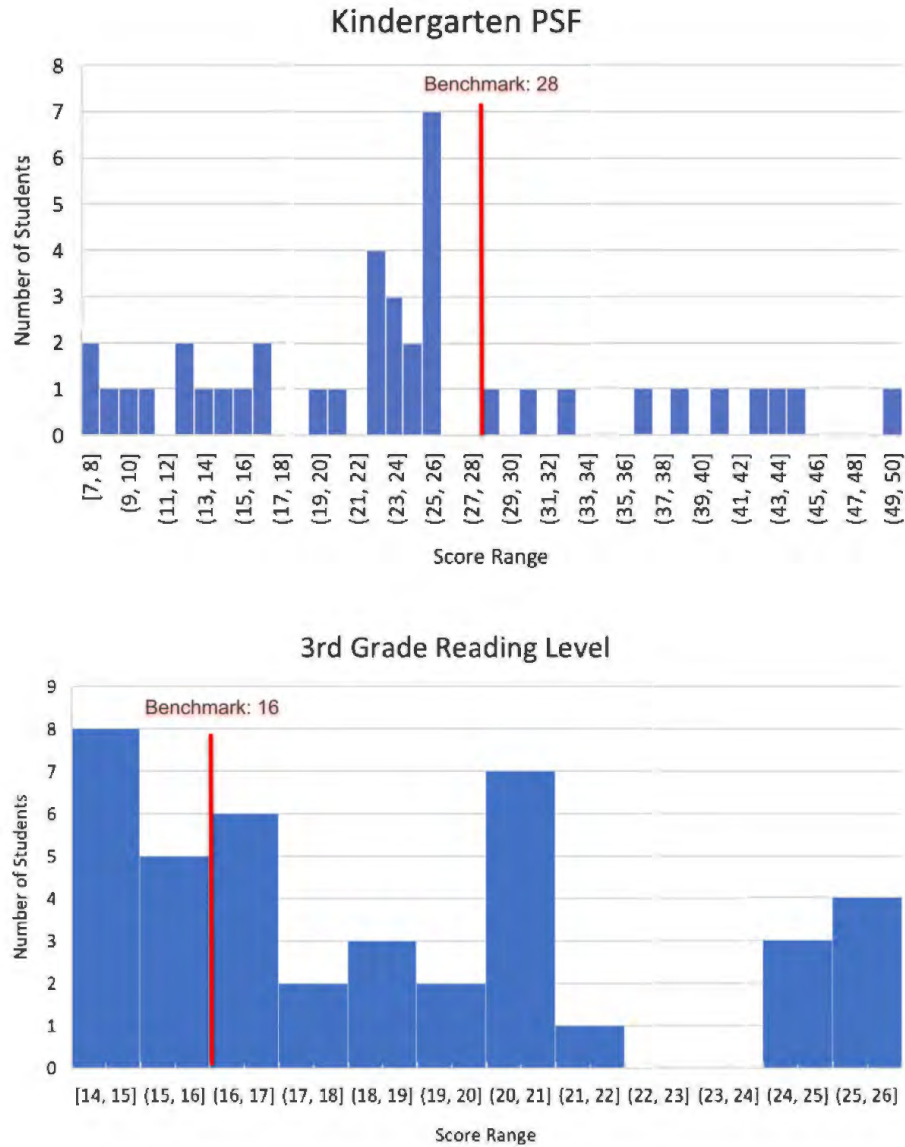


Figure 1

*Kindergarten PSF Score Compared to 3<sup>rd</sup> Grade Star Reading Score*

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**Figure 2**

*Kindergarten PSF Score Compared to 3<sup>rd</sup> Grade Reading Level*

KINDERGARTEN PSF & THIRD GRADE READING PERFORMANCE

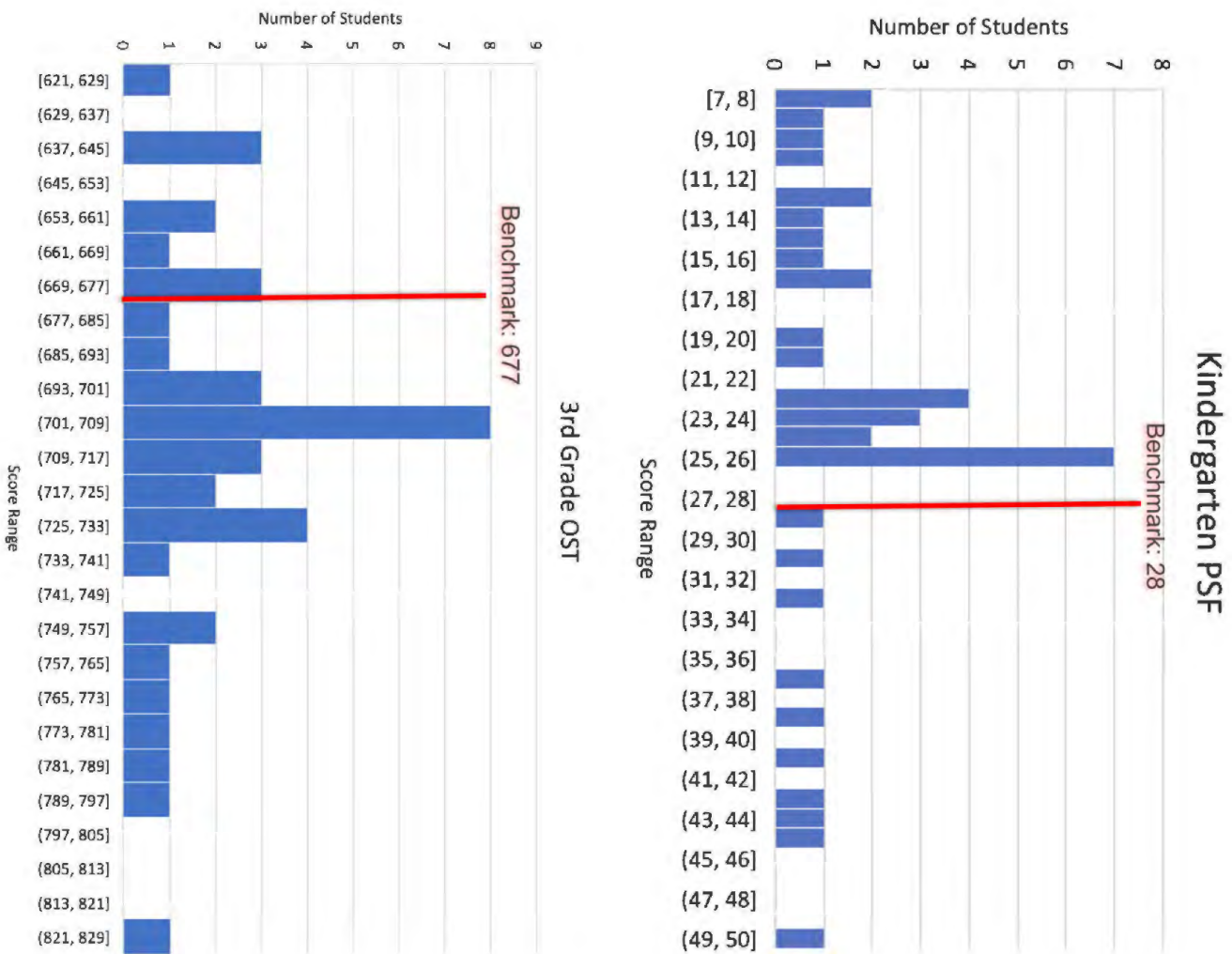


Figure 3

*Kindergarten PSF Score Compared to 3<sup>rd</sup> Grade OST Score*

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I feel that the strong correlations between the kindergarten PSF scores and the third grade reading scores is misleading when extrapolated out to the third grade year. It is more revealing to examine whether students who didn't meet the benchmark level on the kindergarten PSF also failed to reach the benchmarks for the three reading assessments in third grade. The McNemar's test analyzed this information and produced a very different narrative than the Spearman correlation.

### **Discussion of Benchmark Data**

The McNemar's test showed just how significant the effect of the years of education that each student receives between kindergarten and third grade is on reaching benchmark levels in third grade. Out of the thirty-one students who didn't reach benchmark in kindergarten, only five of them also failed to meet benchmark on any of the three third grade assessments included in this study. Whether or not a student meets the benchmark is one of the most important pieces of information educators and administrators take from the assessments that are completed. Meeting or not meeting certain benchmarks contributes to the report card grade for districts, the effectiveness evaluation of the teachers, the retention of students, and the path of the student's education in the future. How high and how low a student scores is very informative for the teachers to guide instruction, making sure to meet each student's needs on a daily basis but is not as relevant in the big picture aspect of educational decisions. However, meeting that benchmark is a critical factor because it also determines the level of intervention for which students qualify. None of the studies from the literature review examined whether students were meeting benchmark expectations. After examining my own data, I find this to be a limitation of those studies.

### **Students with the Least and Most Change in Scores**

Taking a closer look at those students who didn't meet the benchmark in kindergarten, then also those that had the least and most amount of change in their scores between kindergarten and third grade may help explain the limitations of stating that there is a correlation between these scores. Of the five students (students 16, 17, 25, 24, and 9, see Table 1) who didn't meet the benchmarks in kindergarten nor all three third grade assessments, two have IEP's and were able to pass the Star OST alternative assessment. This assessment is one that is accepted as a replacement should a student not pass the OST. It is a similar format to the Star Reading assessment also included in this study. The third student (9) who did not meet any of the benchmarks did not have an IEP but was consistently receiving tier 2 and 3 intervention instruction and was able to pass the Star alternative assessment as well. Student 24 was also consistently in Tier 2 or Tier 3 instruction, and one was only 3 points below the benchmark scaled score for the OST. That student did meet the other reported score for the OST, the promotion score, but then met the scaled score benchmark in the spring administration of the assessment.

Among the students with the most change in scores (below benchmark in kindergarten, at or above benchmark in third grade) is student 15. They were well below benchmark for the kindergarten assessment, below benchmark for third grade reading level, and third grade Star Reading assessment, but earned a passing score on the OST. This student received tier 2 and 3 instruction on and off between kindergarten and third grade but was also absent from school for periods of time due to high skill in a sport. On a few occasions, they missed up to a month of school at a time to travel, at one time



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receiving homeschool instruction during these periods. The inconsistency of their education may account for the third grade scores that fell below benchmark.

Students 20, 1, and 13 were also below benchmark in kindergarten, but met benchmark scores on reading level and Star Reading. Each of these students passed the Star alternative assessment. Student 20 had an IEP, and students 1 and 13 only received tier 2 instruction after missing the OST benchmark. In fact, student 13's third grade reading level was above benchmark. I think this variability illustrates exactly why educational decisions are based on multiple measures – students may not perform consistently on assessments of different formats. Figure 4 shows the relationship of kindergarten PSF and third grade OST scores for three students.

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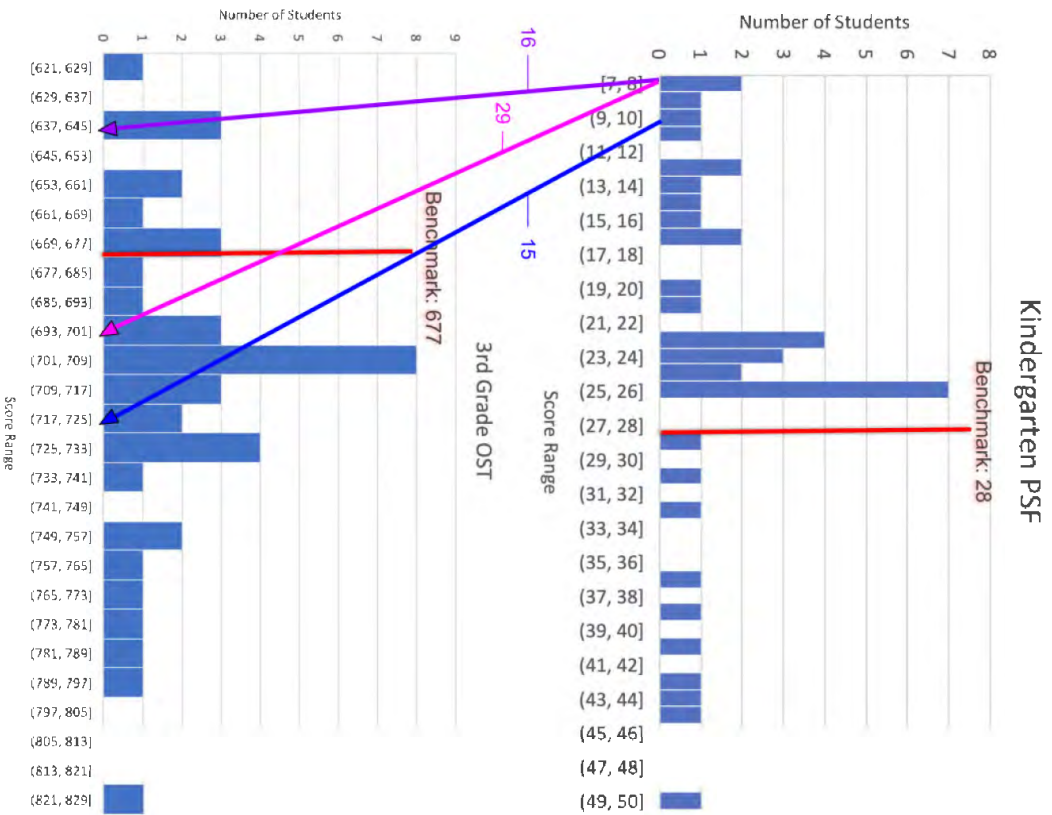


Figure 4

*Kindergarten PSF Score Compared to 3<sup>rd</sup> Grade OST Score for Students 15, 16, and 29*

Even though both students 16 and 29 scored the same (and the lowest) on the kindergarten PSF assessment (7), one passed the third grade OST benchmark while the other did not. Student 15 had the next lowest kindergarten PSF score, but scored well above benchmark on the third grade OST.

When considering all of the formats of assessment for third grade reading, every student eventually met benchmark in one measure. Though five students didn't meet

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benchmark on the three typical assessments used in third grade, they did find success in an alternate format, contradicting the suggestion of the original correlation I found between the kindergarten PSF and the third grade scores.

### **Implications**

Ultimately, the kindergarten PSF assessment can be a very valuable tool to guide instruction, especially within the kindergarten and first grade years, but the literature surrounding the topic and the analysis I conducted shows that there are limitations and conditions as to how these assessment results should be interpreted. Out of those thirty-one students identified as needing additional instruction to be on-task for reading achievement, only five remained in the at-risk category in third grade. I return to the question of whether or not we are over-identifying children at risk of reading failure, or are we finding these students early enough to make a real difference in their educational path to prevent this failure? I believe the latter is true.

I think there is cause for celebration when looking at the results of this study. We must be doing something right if the fates of those thirty-one kindergarteners weren't sealed when they failed to meet the benchmark on that early phonological awareness assessment. Despite even not having a specific phonics program in place, the classroom instruction and tier 2 and 3 interventions they received between kindergarten and third grade successfully brought those students to the benchmark level in third grade, declaring them to be effective readers who will have the reading skills needed to continue their education successfully.

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