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Moving Forward and Looking Back: A Letter from the Editor

Happy Spring! As you adjust to a new normal, I hope that you all will take the time to read the latest edition of the Georgia Journal of Reading. I am honored to take on the role of editor of the Georgia Journal of Reading, the research journal of the Georgia Association of Literacy Advocates, as longtime editor Lina Bell Soares steps down.

You will notice a few changes in our Spring 2020 edition. First, our editorial board unanimously voted to change our name from the *Georgia Journal of Reading* to the *Georgia Journal of Literacy.* In doing so, we mirror our parent organization (ILA), and reflect a more inclusive view of all things literacy.

Secondly, we have gone online. We are now on Digital Commons, which will allow for a larger readership base and a metric count to enable wider recognition for our journal and its authors.

Finally, we have expanded our focus to meet the needs of our broad readership base. You will see a "Voices" area, in which we highlight the views of a policy leader. In this issue, we feature Dr. Caitlin Dooley, Deputy Superintendent of the Georgia Department of Education, who shares her department's work related to literacy in Georgia and what she sees as top literacy research needs in Georgia.

The "Perspectives" section provides varying points of view on topics. In this issue, we address the potential effects of proposed dyslexia policies of Georgia PSC proposal 505.3-01. Dr. Nora Schlesinger explains the bill and why she feels that it is important to literacy education in Georgia, while Bonnie Mondesir and Dr. Robert A. Griffin's article provides a summary of the theoretical tenets and past research on balanced literacy.

In the "Research" section, we highlight an article by Dr. Tracy Renee Hudson, Dr. Linda Reeves, Dr. Rebecca M. Giles, and Dr. Lauren R. Brannon, who share a study on the effects of computer assisted instruction on the reading achievement of first grade students.

In the "Reviews" section, Dale Ioannides offers her take on Jennifer Sarvallo's *The Writing Strategies Book*.

We end the issue with a celebration of the life of a truly inspiring literacy educator and advocate, Dr. Ron Reigner, written by longtime GALA board member Dawn Owens.

On behalf of our editorial review board, we hope that you will enjoy reading this issue and consider contributing to your work.

Dr. Shannon Tovey Howrey
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What's Next for Literacy Education in Georgia? An Interview with Dr. Caitlin Dooley, Deputy Superintendent, Georgia Department of Education

Shannon Tovey Howrey

Kennesaw State University

Tovey: **Caitlin, thank you so much for agreeing to do this interview for the *Georgia Journal of Literacy*. Our editorial board has participated in brainstorming questions and topics that we believe will help our journal to become more relevant and focused in the scholarly work that may inform literacy education policy and practice in Georgia.**

Dooley: Hi Shannon. Thanks so much for asking for input. We have such a strong state, and our students are showing tremendous strength academically. And at the same time, so much is changing in education as we adapt to a digital society, address the state's high poverty level, and we learn more from research about learning. The scholars in our state can help us all better serve Georgia's children.

Tovey: **First, what do you see as top areas of scholarly research right now in Georgia? For example, what specific research is needed regarding high school striving readers and what specific research might be needed regarding multilingual learners regarding English reading and literacy skills?**

Dooley: Some of the questions I get most often from educators around the state involve the following:

1. I have middle/high school students who are still struggling to read. I can get them the skills through remediation programs, but these programs are not very interesting and have problems of their own. The remediation programs sometimes even make the students not want to read once they learn how. I need help getting older students interested and excited about reading and writing without giving them materials and activities for younger kids. What can I use?
2. Our school population just changed, seemingly overnight (or over a summer). We now have more English learners, low-income families, etc. than we have ever had before. What do we do to make sure our teachers provide high-quality instruction?
3. My school is very rural—we have one stoplight and a Piggly Wiggly and lots of fields. What can I do if my students are coming from families that are suffering from poverty? I know it's affecting the students' learning. Where do I even begin?
4. The elementary school that my child goes to is a new "Community School." What does

that mean? Will it help with literacy?
5. We know that over 60% of students in Georgia's public schools are growing up in impoverished communities. What does this mean for literacy learning? How can we ensure high quality instruction AND all of the other supports for learning are in place?
6. Dyslexia. Can I "diagnose" it? What's the role of the general classroom teacher in ensuring that students get the services they need? Who else needs to be involved (think SST)?
7. How should writing be taught in Kindergarten and first grade?

I get these questions regularly. These are excellent opportunities for "research-practitioner partnerships". Some questions can be answered with extant literature. Others would require a deeper look at local context and implementation.

Tovey: **You have stated concerns that rural areas carry challenges for literacy that go beyond the school system, including women and infant health issues and other challenges that affect brain development. How might we, as research professionals and literacy advocates, address these challenges in our research or through other efforts?**

Dooley: According to Kids Count, Georgia suffers from one of the highest poverty rate among children. We see this in our public schools where over 60% are "economically disadvantaged" (Ga Dept. of Ed., 2019). This is not to suggest that poverty dictates education outomes; in fact, Georgia was recently ranked 13th in the nation for K12 academic achievement by Ed Week's Quality Counts. This is evidence that children, their families, and their educators are striving to overcome the effects of poverty *in spite of* regressive policies and practices that limit children and families' access to health care, housing, food, internet service, libraries, and texts.

Tovey: **What can research and literacy professionals do?**

1. Too often, issues related to poverty are constructed as "partisan issues"; but they aren't. There are advocates for children in all political parties. Enter the conversation respectful of differences and try to find where convergences exist. Respect is key. Listen. Voices for Children is non-partisan and has some helpful resources.
2. Make the evidence clear and share the data. These data are available on GeorgiaInsights.com.
3. Consider statistical models that can shed light on the systems relating literacy to the effects of poverty such as structural pathway analyses, structural equations, HLM, and other research methods. We need to map the logic between seemingly disparate entities. This not only helps shed light on the connections, but we may also discover new ways to innovatively move in on the effects of poverty in ways that benefit literacy learning.
4. Tell the success stories. We have many Georgia citizens who have grown up in poverty and have "made it" with literacy learning. Tell their stories. Pay attention to the change-makers in their lives who made learning possible. Those stories will inspire others.

5. Study systems. No one learns in a vacuum. Literacy is especially a social act. Therefore, study how literacy takes shape in the context of a family, a school, or a community. These systems studies help us understand how to navigate complexities.
6. Stop fighting with other literacy researchers. The literacy wars need to end—there's no teacher worth his or her salt who thinks "oh, we should never teach phonics" or "oh, I would never focus on language development." Arguments about the "Science of Reading" seems to polarize our literacy community; I prefer the term "evidence-based" because it requires us not only to look at extant research but also to investigate the efficacy of our practices. The *Every Student Succeeds Act* uses the language of "evidence" to drive these two objectives as well. Accept that we have many studies and lots of research and we need to move forward. Take the next step to make a difference by teaching someone to read and write and/or studying how others learn to read and write in local communities.

Tovey: **How do you envision the dyslexia legislation recently passed affecting Georgia teacher preparation and the overall teaching of literacy in elementary, middle, and high schools throughout the state? What kinds of research might be needed?**

Dooley: We need to do a better job as literacy professionals in understanding what makes someone have difficulty learning to read. According to the US Department of Education's National Center for Education Statistics, about 80% of American adults (ages 16-65) can read and write sufficiently enough to complete tasks, paraphrase, compare and contrast, and make low-level inferences. While not sufficiently admirable for a nation as rich and promising as the U.S. is, this literacy rate far outpaces many countries. Yet, we are faced with a large segment of students in the US, about 20%, who never master literacy even at this basic level. That's a lot of people! The National Institutes of Health estimates that 10% of the total population suffers from dyslexia. I think that we are starting to take this statistic seriously in Georgia. We would never be satisfied with an 80% "land" rate by Delta airlines; why should we be satisfied with an 80% reading rate?

In teacher education programs, we need to shore up understandings about reading difficulties, including dyslexia. We have experts right here in Georgia's university system who can help. I suggest researchers study how we change our own work in light of these stats. What can we do better to prepare educators to serve *all* literacy learners.

Tovey: **Is there anything else you would you like to add?**

Dooley: Georgia's state plan for the *Every Student Succeeds Act* is centered around the Whole Child. That policy statement helps us situate all that we do so that it benefits a child—we literally ask ourselves: how will this effect a child? Developing that focus—that "why"—is essential to Georgia's continued improvement. In my own education at the University of Virginia, I learned to think about children's physical, cognitive, social, emotional, and academic growth as inter-related. As I study the state-wide system, keeping the child at the center—knowing that any child is learning

within this dynamic developmental trajectory—helps me situate literacy policies and practices.

Tovey: **Thank you so much for your time, Caitlin. You've given us information that will help to strengthen the partnership between GALA/the GJL and the Georgia Department of Education as we work toward the common goal of world-class literacy education in the state of Georgia.**

About Dr. Dooley:

Caitlin McMunn Dooley, Ph.D., is Deputy Superintendent for Teaching and Learning at the Georgia Department of Education and a Professor of Education at Georgia State University. Her research investigates digital literacies, emergent comprehension, literacy instruction and testing in elementary grades, and teacher development. With over 50 publications, her research has been published in national and international refereed journals and chapters published by the Literacy Research Association, the International Reading Association, and the National Council of Teachers of English, among others. Dooley has led and evaluated funded research totaling more than $250 million from the National Science Foundation, US Department of Education, US Department of Health and Human Services the US Corporation for National and Community Service, and various foundations. She served as co-Editor for the National Council of Teachers of English premier journal *Language Arts* (2011-2016). A former Fulbright Scholar, Dooley's awards include "2020 Jimmy Stokes Service Award" from the Georgia Association of Education Leaders; "2012 Spirit of Partnership Award" from the Professional Development School Network; "2008 Jerry Johns Promising Researcher Award" from the Association of Literacy Educators and Researchers; "2006 Outstanding Dissertation—Distinguished Finalist," from the International Reading Association, "2005 Outstanding Dissertation" from the Georgia Association of Teacher Educators, "1998 Eisenhower Teacher Leader" from the School University Research Network and William and Mary College. In addition to having taught preschool and elementary grades, Dooley has served as a consultant to the Texas Educational Agency Student Assessment Division, the national non-profit Children's Literacy Initiative, as well as several urban schools and districts. Dooley received her doctorate from the University of Texas at Austin and her undergraduate and master's degrees from the University of Virginia.

Dyslexia and Georgia Senate Bill 48

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The interest in and understanding of dyslexia has become increasingly important in educational fields and the legislative process in the United States. This article provides information on what dyslexia is, the history of research on dyslexia, dyslexia laws across the US, and Georgia's Dyslexia Law: Senate Bill 48 and its impact on educational entities.

keywords: dyslexia, laws, Senate Bill 48, dyslexia intervention

In recent years there has been an expansion of disability legislation in the US, specifically dyslexia legislation. In fact, Georgia has a new dyslexia law, Senate Bill (SB) 48, which was signed into law on May 2, 2019. This article is written to provide information on dyslexia, including past and present dyslexia research, as well as information about dyslexia legislation in the US. In addition, the article presents how SB 48 may impact colleges of education, local educational agencies, and classroom teachers.

Dyslexia Defined

The International Dyslexia Association (IDA) and the National Institute of Neurological Disorders and Stroke (NINDS) defines dyslexia as a neurobiological disorder. Characteristics include difficulty with accurate and/or fluent word reading and poor spelling and decoding abilities. Typically, difficulties result from deficits in the phonological component of language that are unexpected in relation to other cognitive abilities and unexpected in relation to the provisions of effective classroom instruction. This may cause concerns with reading comprehension and reduced reading experiences that impede vocabulary growth and background knowledge. Individuals with dyslexia do not exhibit cognitive concerns (IDA, 2019; NINDS, 2019). The reading concerns are unexpected for the child's age and other academic abilities (Lyon et al, 2003; Shaywitz et al., 2008). For example, the explanation for the reading concerns cannot be explained by sensory deficits, cognitive difficulties, poor motivation, or lack of reading instruction (Lyon et al, 2003). Neuroimaging studies imply that

dyslexia is associated with differences in the neuro networking of brain regions associated with typical reading development (D'Mello & Gabrielli, 2018; Shaywitz et al., 2008).

Dyslexia is a multidimensional learning difference. Individuals with this disorder have difficulties with reading and other language skills. They often have difficulty with spelling, writing, and pronouncing words (IDA, 2019; Simon, 2000). Dyslexia is a persistent chronic condition and is not transient in nature (Berninger et al., 2008; Berninger et al., 2009; IDA Basics, 2019; Shaywitz, 1998). It is referred to as a learning disability because dyslexia makes it hard for students to succeed within the general educational classroom. Depending on the severity of their deficit, many students with dyslexia qualify for special education, special accommodations, or extra support services (IDA Basic, 2019). However, like most disorders, the impact of dyslexia may present varying degrees of severity across timelines (Shaywitz et al., 2008). For example, the impact of dyslexia may be profoundly felt in early elementary when learning to read. Even with successful early intervention, the disorder may significantly impact learning again in middle school and high school, when more technical and sophisticated content vocabulary and discourse are introduced (Kamil et al., 2008), as well as when trying to meet requirements for learning a foreign language (Schneider & Crombie, 2003; Simon, 2000).

Past and Present Research on Dyslexia

Dyslexia is the most common neurobehavioral disorder that affects children, with estimated prevalence rates ranging from 3 to 10 percent to upwards of 17percent (e.g., Gabrieli, 2009; Shaywitz, 1998; Shaywitz et al., 1994; Snowling & Hulme, 2011). It affects about 80% of individuals identified as learning disabled (Lerner, 1989). Different theories have been proposed for the underlying causes of dyslexia. Suggested causes include abnormalities with the visual system (Stein, 2001), language system (Liberman, 1973; Liberman et al., 1974), working memory (Berninger, et al., 2006; Swanson & Ashbaker, 2000; Swanson & Siegel, 2001), as well as other factors such as temporal processing of stimuli within these systems (Neville et al., 1993; Stein & Walsh, 1997). However, the vast body of research suggests dyslexia is primarily a phonological processing disorder (e.g., Berninger et al., 2006; IDA, 2019; Peterson & Pennington, 2012, Stanovich, 1988; Wagner & Torgesen, 1987).

Past Research

Prior to the adoption of current technology, postmortem

evaluations provided cerebral anatomy advances regarding dyslexia. Paul Broca, a French surgeon in the 1860s, noted individuals with trauma to the brain exhibited a specific type of aphasia, an inability to understand or express speech (Carroll, 2008). These individuals often spoke in a halting manner primarily using nouns and verbs with omission of function words. However, they were able to demonstrate intact comprehension. Post-mortem examinations revealed damage to frontal regions of the left hemisphere in these individuals. This region of the brain is now known as Broca's area (Carroll, 2008; Hallahan & Mercer, 2007). Shortly after Broca's discovery a German surgeon, Carl Wernicke, discovered a different form of aphasia in which patients exhibited fluent nonsensical speech but impaired comprehension. The left temporal lobe, near the auditory cortex, was damaged in these patients and is now known as Wernicke's area (Carroll, 2008; Hallahan & Mercer, 2007), see Figure 1. Both physicians' work has stood the test of time and added substantially to the scientific community's knowledge of the left hemispheric dominance of language.

Descriptions of specific reading impairments both acquired and congenital began to emerge in the 1870s. In the mid-1890s, journal correspondences between John Hinshelwood, a French physician, and W. Pringle Morgan, a British physician, shifted the understanding of acquired reading impairment from adults to children with congenital reading deficits (Hallahan & Mercer, 2007). Samuel Orton, a neurologist (Henry, 1998) and a neuropathologist (Orton et al., 1975; Rawson, 1987) in the United States, began to study reading disabilities and noted, using newly designed intelligence quotient tests, many of the children he studied had average to above average intelligence (Hallahan & Mercer, 2007). Orton also suggested familial tendency for reading disabilities. He was among the first to suggest a neurological basis for the reading disorder and to associate the disorder with speech and language (Orton et al., 1975). Dr. Orton also addressed the comorbid nature of dyslexia with emotional and behavioral issues (Henry, 1998).

Norman Geschwind's (1965) work in aphasia, apraxia, and hemispheric dominance continued the advancement of the neurobiological understandings of dyslexia. Geschwind observed that a majority of non-impaired individuals had brain asymmetry with a larger left planum temporale than right in Wernicke's area (see Figure 2). He hypothesized the larger planum temporale of the left side may explain the dominance of the left hemisphere for language (Geschwind & Levitsky, 1968). It was later found individuals with dyslexia did not show the same asymmetry in this area. Together, Geschwind and Albert Galaburda brought forth the idea that dyslexia

may be a result of early developmental changes in the cerebrum (Galaburda et al., 1985; Springer, 1987).

Liberman's seminal research in the 1970's stressed the importance of phonological awareness in reading acquisition (Liberman, 1973; Liberman et al., 1974) and promoted the belief that there is an underlying core phonological deficit in dyslexia. A decade later Bradley and Bryant's (1983) longitudinal study indicated that children's awareness of rhyming and alliteration prior to formal education influenced later reading and spelling. In the late 1980s Wagner and Torgesen (1987) expanded the phonological processing concerns in dyslexia.

Present Research

The causes of any disorder are layered; they may have internal as well as environmental factors (Cowan, 2010). In addition, it is important to bear in mind that the causes of developmental disabilities are multifaceted; there may not be one single cause, but rather several different causes (Cowan, 2010). Advances in the epidemiology of dyslexia from neurobiology, genetics, and cognitive influences have allowed practitioners to approach dyslexia within a traditional medical framework (e.g., Alexander & Slinger-Constant, 2004; Gabrieli, 2009; Shaywitz, 1998). Data from epidemiologic studies indicate dyslexia fits a dimensional model, such that individuals with dyslexia present the disorder along a continuum with varying degrees of severity. However, the etiological research supports the belief of a phonological core deficit in the disorder (Stanovich, 1988; Wagner & Torgesen, 1987). This view is supported by the IDA (2019) and the National Institute of Neurological Disorders and Stroke (NINDS, 2019). In addition, recent research indicates dyslexia is a genetic disorder, and a number of genes have been identified that may predispose a person to dyslexia (NINDS, 2019).

Today's researchers have access to digital technology to study the working brain. Doctors Sally and Bennett Shaywitz from Yale (2005) utilized the noninvasive imaging of functional magnetic resonance imaging (fMRI) to analyze the brains of individuals with dyslexia and typical readers at work completing a set of hierarchical structured language tasks. The Shaywitz team's finding demonstrated individuals with dyslexia do in fact present different activation patterns while engaged in reading activities compared to unimpaired counterparts (Shaywitz et al., 1998). The activities, in order of simplest to complex language demands, consisted of visual-spatial processing, orthographic processing, simple phonological analysis, complex phonological analysis, and lexical-semantic decisions (Shaywitz et al.,

1998). An evaluation of brain activation patterns across tasks resulted in significant findings of group-task interactions in four posterior regions.

Consistent with modern neuroimaging, posterior cortical regions have been postulated to be important to the reading process (Geschwind, 1965). Please refer to Figure 2 for depiction of the posterior hemispheric region. Wernicke's area, the angular gyrus, and the striate cortex have been shown to be activated by typical readers when increasing orthographic and phonological demands were presented (Shaywitz et al., 1998). However, under-activation of these areas was shown to be statistically significant in individuals with dyslexia (Shaywitz et al., 1998). In addition to under-activation, individuals with dyslexia had over-activation in anterior regions of the brain compared to typical readers. The inferior frontal gyrus of individuals with dyslexia showed significantly greater activation in comparison to typical readers when presented with demands of increasing phonological difficulty (Shaywitz et al., 1998).

In addition to differences found in activation patterns in the left hemispheres, fMRI images of typical readers and those with dyslexia have shown different right hemispheric activation (Shaywitz et al., 1998). The readers without reading impairments showed greater activation in the left hemisphere for these areas, while individuals with dyslexia had greater activation in the right hemisphere. It is important to note these activation patterns were evident across all tasks (Shaywitz et al., 1998).

Neuroimaging has provided a neuro-signature (Gabrieli, 2009) for dyslexia and as a result there is general agreement within the scientific community that phonological deficits are at the heart of developmental dyslexia. Currently, however, there is not consensus as to the neural and sensory causality of the deficit (Goswami et al., 2011). As advances in medical technology continue, future research may be better able to synthesize the intricate complexities of the brain processes involved in developmental dyslexia.

Neuroimaging has also shown the positive impact on the brain when individuals with dyslexia receive proper intervention. Imaging studies have shown the brain's ability to increase activation, based on effective intervention, in regions associated with typical reading (e.g., Alexander & Slinger-Constant, 2004; Gabrieli, 2009). Normalization for phonological processing has been shown in the left temporo-parietal and frontal regions upon receiving effective dyslexia intervention. In addition, increased right-hemisphere activation has been shown immediately after intervention (Gabrieli, 2009). Though typical readers have decreased right

hemispheric activation, for individuals with dyslexia the increased right-hemisphere engagement may indicate a covenanted time where both the right and left hemispheres are activated to support reading (Gabrieli, 2009). For a review of studies indicating significant brain physiological changes please see Alexander and Slinger-Constant (2004) and D'Mello and Gabrieli (2018).

Hruby et al. (2011) point out current neuroscience studies of reading focus primarily on neuro structures and processes associated with decoding. This focus is not in tandem with the general scholarship found in reading and literacy education (Hruby et al., 2011). Therefore, it is important to keep in mind the complexities of reading and the very purpose of reading, to make meaning. Critical components of reading and reading scholarship include comprehension and related strategies, motivation, text selection, multiple literacies, and sociocultural relevant pedagogy (e.g., Allington, 2002, 2013; Boardman et al., 2008; Duke & Pearson, 2011; Guthrie, 2015; Rueda, 2013). Therefore, omission of these important reading components does not comprehensively represent the act of reading (Hruby et al., 2011).

Dyslexia Laws across the US

In 2013 there were only 22 states with dyslexia legislation (Youman & Mather, 2018). During 2018 the US witnessed an expansion of dyslexia legislation. From January to March of 2018 there were 33 dyslexia related bills introduced (Youman & Mather, 2018). The increase of dyslexia related legislation is in part compelled by grassroots organizations, such as Decoding Dyslexia (Youman & Mather, 2018), and individuals who have been impacted by dyslexia (Bhat et al., 2000; Rose & Zirkel, 2007), as is the case for SB 48.

The growth in dyslexia legislation has continued into 2019. Per the website, Dyslegia (2019), there were 75 dyslexia bills with either pending legislation or legislation being acted upon. The focus of current laws includes a) dyslexia awareness, b) screenings and intervention pilots, c) educator training, d) dyslexia provisions for accommodations and interventions and, e) rights for individuals with dyslexia (Youman & Mather, 2018).

Dyslexia Awareness

The label of dyslexia as a neurobiological disorder, as defined by the IDA (2019) and NINDS (2019), has received increased focus. This is in contrast to reading related impairments categorized within the Individuals with Disabilities Education Improvement Act (IDEA) as one type of *specific learning disability* (U.S. Department of Education, 2018) or the *Diagnostic*

and Statistical Manual of Mental Disorders-5 that uses an overarching terminology for a specific learning disorder with the addition of the specific academic area of concern (Petretto & Masala, 2017). For reading impairments the specifications for abilities of concern include word reading accuracy, reading rate or accuracy, and/or reading comprehension (Petretto & Masala, 2017). Many states have begun to define dyslexia per the IDA guidelines as a neurobiological disorder (Youman & Mather, 2018). Georgia is one such state. The adoption of a precise definition for dyslexia has helped to establish a model of identification based on inclusionary criteria versus exclusionary criteria (Adolf & Hogan, 2018; Odegard, 2019).

Another reason for the increase in dyslexia advocacy is that historically local education agencies (LEA) prohibited, or at the very least discouraged, educators from using the terminology, *dyslexia* (Macdonald, 2009; Youman & Mather, 2018). Due to the pervasiveness of LEA not using the word dyslexia, the executive director of the National Center for Learning Disabilities in May of 2015 requested the federal office of Special Education and Rehabilitative Services to issue guidance to LEA regarding the use of appropriate terms and provisions for accommodations (Wendorf, 2015). The office of Special Education and Rehabilitative Services did in turn inform school districts in October 2015 of the unique educational needs of children with dyslexia, dyscalculia, and dysgraphia. The 2015 letter set forth that IDEA does not restrict the use of the terms, dyslexia, dyscalculia, and dysgraphia in evaluations, eligibility requirements, or individual education plans (Youman & Mather, 2018; Yudin, 2015).

Screenings and Intervention Pilots

Per the Center on Response to Intervention (RTI) at American Institutes for Research (2019) a screener is used to predict students whose academic learning may be at risk. Screeners are brief and all students of a specific grade level are assessed, then typically followed with additional testing or progress monitoring (Center on RTI at American Institutes for Research, 2019).

Research indicates dyslexia may be predicted and possibly prevented in young children (Gabrieli, 2009; Shaywitz et al., 2008). A diagnosis of dyslexia is commonly made, in the United States, around grade 2 when a child is 7 to 8 years of age (D'Mello & Gabrieli, 2018; Gabrieli, 2009). The earlier the disorder is diagnosed and proper intervention is initiated, the length and intensity of intervention needed decreases (Gabrieli, 2009; Shaywitz et al., 2008; Torgesen et al., 2001). Early intervention is especially important for later fluency concerns

(Gabrieli, 2009; Torgesen et al., 2001). Therefore, recent legislation in the U.S. has included mandated universal screening and intervention (Youman & Mather, 2018) with the hopes of early prevention and intervention.

Some legislative action has specified universal screeners for all kindergarten students (Georgia General Assembly Legislation, 2019) or when students are first enrolled in school as a kindergartener or first grader (Youman & Mather, 2018). Screeners include: common processes correlated with dyslexia such as phonological awareness, rapid automatic naming, and letter to sound correspondence; and familial history of difficulty with literacy acquisition (Youman & Mather, 2018). Some states have supplemented screeners by requiring progress monitoring (Youman & Mather, 2018).

Educator Training

Though there has been an increase in legislation requiring universal screeners and appropriate intervention, often clarification on who will be responsible for implementing and monitoring screeners and outcomes is not adequately addressed (Youman & Mather, 2018). Some states have hired individuals with specialized training in dyslexia (Lonergan & Duthie, 2018) and in some cases the dyslexia specialist is at the district level. The dyslexia specialist may serve both special and general education students, but also increase dyslexia awareness and provide training to educators to work with individuals with dyslexia (Lonergan & Duthie, 2018; Youman & Mather, 2018). In addition, some states have stipulated special education teachers or other educators attend professional certification programs for the diagnosis and remediation of literacy related difficulties (Youman & Mather, 2018).

Dyslexia Provisions for Accommodations and Interventions

Legislative mandates for intervention have accentuated explicit instruction on essential components of reading (National Reading Panel [NRP], 2000). Research shows reading instruction that addresses core phonological deficits, such as phonemic awareness and spelling, is essential to support reading acquisition for students with dyslexia (e.g., Berninger & Amtmann, 2003; Gabrieli, 2009; Graham, Harris, & Chorzempa, 2002; Moats, 2006; Schlesinger & Gray, 2017, Snowling & Hulme, 2011). Bolstered by decades of reading research, mandates for reading intervention for individuals with dyslexia stress explicit and systematic instruction in phonemic awareness, phonics, fluency, and vocabulary and spelling (e.g., Berninger, Lee, Abbott, & Breznitz, 2013; Bradley & Bryant,

1983; Liberman et al., 1974; Shaywitz et al., 2008). Recent legislative actions are mandated and noncompliance may result in LEA losing government funding and possibly be subjected to legal action from parents (Youman & Mather, 2018).

Rights for Individuals with Dyslexia

Individuals with dyslexia who do not receive adequate support and intervention are subjected to dire consequences (Lonergan & Duthie, 2018). The persistent nature of dyslexia has marked consequences on reading outcomes for early elementary to high school students. Students who struggle with reading in grade 1 have a 90% prospect of reading poorly in grade 4 (Gabrieli, 2009), furthermore struggling readers in grade 3 have a 75% probability of continued reading concerns in high school (Francis et al., 1996; Gabrieli, 2009). Poor reading in early elementary grades has a negative impact on reading to learn in later educational years (Gabrieli, 2009). Therefore, legislation is necessary to mitigate the negative long-term effects of dyslexia (Lonergan & Duthie, 2018). In addition to schools and school districts, the new legislative action affects other areas such as the protocol for college entrance exams and protection in the work place. Please see Youman & Mather (2018) for specific laws.

Georgia's Dyslexia Law: Senate Bill 48

Dyslexia Awareness

Georgia was one state that passed significant dyslexia legislation in 2019. The State's dyslexia law, Senate Bill (SB) 48, was signed into law in May 2019. The new law defines dyslexia as a neurobiological-based disorder and provides definitions and characteristics of dyslexia and disorders, as well as terminology associated with dyslexia and dyslexia intervention. [(Georgia General Assembly Legislation, 2019: SB48. Passed. Reg. Sess. 2019-2020. 20-2-159.6. Sect. 1 (a)(1-8)]. The definitions and terminology provide common language for parents and the educational community and will hopefully prevent LEA from not using the word dyslexia and other related terminology. The term Structured Literacy™ is referred to in SB 48 and is defined as in the IDA Structured Literacy™ Introductory Guide (IDA, 2019). The term indicates the principals of effective literacy instruction are followed and includes, (a) the modeling of instructional tasks, (b) explicit instruction is provided for foundational skills and higher-level literacy concepts, (c) prerequisite skills are taught before more advanced skills, (d) meaningful language interactions are embedded in lessons, (e) multiple practice opportunities are provided, (f)

corrective feedback to student responses, (g) student effort is encouraged, (h) student engagement is monitored and scaffolded during teacher modeling (i) independent student work is monitored and facilitated, (h) students must meet lesson criterion before moving on to more advanced skills (IDA, 2019).

Screenings and Intervention Pilots

As in other states' legislation, SB 48 stipulates universal screeners and pilot programs. Under SB 48, no later than July 1, 2020 the State Board of Education must have procedures in place for referring students kindergarten through grades 3 for dyslexia screening who have been identified through the LEA RTI process as having concerns for dyslexia and/or other disorders. The State Board of Education is to provide a list of approved qualified dyslexia screening tools. Screeners must include phonological and phonemic awareness, sound symbol recognition, alphabet knowledge, decoding and encoding skills, and rapid automatic naming, [(Georgia General Assembly Legislation, 2019: SB48. Passed. Reg. Sess. 2019-2020. 20-2-159.6. Sect. 1 (b)(1)(2)(A-F)(3)].

Educator Training

Additional advocacy measures require the Georgia Department of Education to issue a dyslexia informational handbook by December 1, 2019. The handbook will provide information and guidance to LEA for the implementation of evidence based practices for educating students exhibiting characteristics of dyslexia. The handbook information pertains to kindergarten through grade 3 students who have been identified through the RTI process as exhibiting concerns for dyslexia. The handbook will provide information regarding evidence based and targeted pedagogy designed specifically for dyslexia, guidance on the development of instructional plans for students exhibiting concerns, meaning-centered literacy utilizing best practices, curricula that is developmentally appropriate with engaging materials and pedagogy, structured multisensory approaches to language and reading skills, and suggested training programs to meet the needs of students with dyslexia concerns. [(Georgia General Assembly Legislation, 2019: SB48. Passed. Reg. Sess. 2019-2020. 20-2-159.6. Sect. 1 (c)(1-7)]. In addition, the Georgia Department of Education (DOE) in collaboration with the Professional Standards Commission will be required to update professional development opportunities for training specifically related to dyslexia. The intent is to focus training and coaching on dyslexia and other disorders. The DOE is to identify high-quality trainers to provide support to LEA

utilizing a coaching model to develop school level dyslexia experts [(Georgia General Assembly Legislation, 2019: SB48. Passed. Reg. Sess. 2019-2020. 20-2-159.6. Sect. 1 (d) (1-2)]. Furthermore, the DOE is mandated to develop training modules for all instructional personnel regarding dyslexia, and to provide structured multisensory approaches to teach language and literacy as well as accommodations for students exhibiting dyslexia and related concerns. Lastly, training is required to focus LEA and school system policies and procedures as related to RTI in addressing literacy, mathematics, and behavior with educators being notified annually of changes in policy, procedures, and specific instructional methodologies [(Georgia General Assembly Legislation, 2019: SB48. Passed. Reg. Sess. 2019-2020. 20-2-159.6. Sect. 1 (d)(3-5))].

Dyslexia Provisions for Accommodations and Interventions

Starting in the academic year 2020-2021 a three year pilot program will be established to demonstrate and evaluate the effectiveness of early reading support for students with dyslexia concerns. Three districts, at minimum, will be selected by the State School Superintendent. Preference is for an LEA in an urban setting, suburban setting, and a rural setting. The Superintendent will consult with recognized organizations that specialize in Structured Literacy™ for instructing students with concerns of dyslexia to establish and operate the pilot program [(Georgia General Assembly Legislation, 2019: SB48. Passed. Reg. Sess. 2019-2020. 20-2-159.6. Sect. 1 (e)(1)]. Per SB 48, the application processes for LEA interested in applying for the pilot program are to include: (a) a method for screening for low phonemic awareness, rapid automatic naming, and dyslexia characteristics, (b) provisions for students with dyslexia concerns to receive an IDA approved reading program via a teacher trained in Structured Literacy™ per the IDA's Knowledge and Practice Standards, and (c) a manner for evaluating the effects of the reading program on students with dyslexia concerns. [(Georgia General Assembly Legislation, 2019: SB48. Passed. Reg. Sess. 2019-2020. 20-2-159.6. Sect. 1 (e)(2)(A-C)].

Rights for Individuals with Dyslexia

Once selected, the LEA will be required to screen all kindergarten students for characteristics of dyslexia, and may screen for other disorders. In addition, students in grade 1 through 3 who have been identified via the LEA's RTI as having concerns for dyslexia will be screened for dyslexia and may be screened for other disorders. The LEA will provide appropriate reading intervention support for students

identified for dyslexia concerns and ascertain if the intervention provided improves students' language processing and reading skills. All LEA participating in the pilot study will be mandated to comply with all applicable state and federal laws and require parents or guardians of students with dyslexia concerns to communicate in writing that they voluntarily and knowingly consent to their child's participation in the pilot program for reading intervention services. In addition, the LEA will provide the parents or guardians with information about dyslexia and recommended interventions. [(Georgia General Assembly Legislation, 2019: SB48. Passed. Reg. Sess. 2019-2020. 20-2-159.6. Sect. 1 (e)(3-4)].

Impact on Education Preparation Providers

It is important to systematically support struggling readers with dyslexia and provide educators with the necessary training to work with individuals with dyslexia. Senate Bill 48 will have an impact on Education Preparation Providers (EPP), the institutions that provide undergraduate teacher candidate instruction as well as instruction for candidates in graduate teaching programs. Section 2 of SB 48 amends Subpart 1 of Part 6 of Article 6 relating to certified professional personnel in elementary and secondary education. Per the new Code section, by December 30, 2019, the Professional Standards Commission (PSC) is mandated to create a dyslexia endorsement for teachers to be trained in recognizing and responding to students with concerns for dyslexia and language-based disorders, for example expressive or receptive language concerns. The development of the GAPSC rules were in association with the Georgia Department of Education and a Dyslexia Task Force. The task force included individuals from across the state of Georgia with literacy expertise, including college and university literacy faculty, qualified practitioners (e.g., psychologists, speech language pathologists, dyslexia practioneers), and other community stakeholders (e.g., administrators). The requirements for the dyslexia endorsement may include training on the use of universal screeners for identification of students at risk for dyslexia, providing support and guidance to parents, and providing training/guidance to other educators and school personnel. Lastly, the PSC are to establish measures to assess fidelity of teacher training and implementation for teachers who receive a dyslexia endorsement [(Georgia General Assembly Legislation, 2019: SB48. Passed. Reg. Sess. 2019-2020. 20-2-208. Sect. 2 (a-c)].

Section 3 of SB 48 concerns certification of teachers in elementary and secondary education. Section 3

adds a new Code section, 20-2-208.1, which mandates standards for teacher preparation programs for elementary and secondary education to include instruction on the following: (a) the definition and characteristics of dyslexia and other disorders, (b) evidence based interventions and accommodations for students with characteristics of dyslexia and other disorders, and (c) core elements of a RTI framework to address reading, writing, mathematics, and behavior. The RTI framework should include universal screening, scientific, research-based interventions, progress monitoring of the effectiveness of interventions, and data-based decision-making procedures. The related data-based decision procedures are to include determining intervention effectiveness, determining if the intervention should continue, be altered, or discontinued, and if further evaluation of the student's needs should be conducted. Lastly, instruction should be provided on the application and implementation of RTI and dyslexia instructional practices in the classroom [(Georgia General Assembly Legislation, 2019: SB48. Passed. Reg. Sess. 2019-2020. 20-2-208.1. Sect. 3 (1-3)(A-D)(i-ii)(E)].

In addition, the GAPSC Rule 505-3-.14 Elementary Education (P-5) Program Requirements, Teaching of Reading stipulates education preparation programs prepare education professionals to meet the standards for the Reading Endorsement per GAPSC Rule 505-3-.01 (Georgia Professional Standards Commission, 2016: Rule 505-3-.14 (2) 9). This rule stipulates graduates of EPP elementary education programs in Georgia who meet the required standards graduate with a reading endorsement. It is probable that individuals with reading endorsements will be called upon to implement the universal screeners called for in SB 48. Therefore, education preparation programs will likely need to train teacher candidates to give screeners with fidelity and to interpret student data with reliability in their initial certification program of study.

Importantly, a theoretical understanding of the cause of learning disorders, assessment measures, and the required intervention lead to effective evidence- based intervention (Snowling & Hulme, 2012). Therefore, it would be advantageous for an EPP to provide instruction regarding the relationship among language, reading, and language impairments along a spectrum of reading disorders (see Figure 3); (Bishop & Snowling, 2004; Snowling & Hulme, 2012). The figure depicts the spectrum of reading disorders within the relationships of language. At the top of the figure, individuals with intact phonology, but poor language often are poor comprehenders. However, typical readers are individuals with both intact phonology and language. The

bottom half of the figure shows the dyslexia with comprehension issues as individuals with poor phonology and language. Individuals with poor phonology, but have intact language are depicted as persons with dyslexia. The severity of reading disorders follows on a continuum depending how the deficits with phonology and/or language (Bishop & Snowling, 2004; Snowling & Hulme, 2012).

Impact on Local Education Agencies

Early identification and intervention of educational concerns for dyslexia has been shown to play a crucial role in academic obtainment (Snowling & Hulme, 2012; Shaywitz et al., 2008). In order to meet mandates set forth by SB 48, such as early elementary schools screeners, LEA will need to start to plan now to ensure district curriculum and educator in-service are aligned to meet SB mandates. However, researchers and practioneers should take a critical eye when selecting commercially available programs for addressing the needs of individuals with dyslexia. Snowling and Hulme (2012) suggest a virtuous circle, where theory inform practice and vice versa. Each LEA will need to ensure individuals making decisions for effective programs have a solid understanding of principles of interventions, and which children are suitable for selected interventions (Snowling & Hulme, 2012). Effective instruction for early signs of dyslexia, per Snowling and Hulme (2012), has more than one targeted component. For children who may have poorly developed language, instruction should target oral language. Activities should focus on speaking, listening, and vocabulary instruction and training in oral narration. Other targeted areas should include phonemic awareness (segmenting and blending), letter-sound knowledge, and reading from texts at the students' appropriate level. Please see Snowling and Hulme (2012) for program details. For older students with concerns for dyslexia it is recommended evidence based intervention pedagogy be explicit, systematic, well structured, multisensory, and incorporate direct teaching, learning, (e.g., Berninger & Amtmann, 2003; Gabrieli, 2009; Graham et al., 2002; Moats, 2006; NRP, 2000; Schlesinger & Gray, 2017; Snowling & Hulme, 2011) and time (Snowling & Hulme, 2012) for students to consolidate what has been taught. In all situations, structured language concepts should be coupled with the practice of applying the concepts taught via authentic reading and writing (Adams, 1990; Pearson, 2004). Furthermore, our struggling readers and writers should receive instruction from highly qualified practitioners (Allington, 2013). To meet mandates, LEA will need to prepare so that classrooms have quality authentic literature, and direct educators to available trainings or

provide the trainings themselves from qualified individuals or organizations such as state colleges and universities of education.

Impact on teachers and classroom instruction

Typically it rests on the shoulders of general education teachers to notice and provide early intervention for reading concerns (Otaiba, et al., 2019). As time goes on other educators, such as speech pathologists (Lonergan & Duthie, 2018), reading specialists or dyslexia specialists (Otaiba et al., 2019), will be involved with addressing concerns for dyslexia. Teachers will need to be well informed on the structure of the English language, for example understanding the progression of early reading skills from phonological awareness to alphabetic principle, from phonics to word study skills (Otaiba et al., 2019). Teachers will need to be able to interpret and address student needs based on universal screener's results, provide differentiated instruction, implement scientifically-based literacy instruction for students with concerns for dyslexia, and understand and become involved in their district's RTI (Otaiba et al., 2019; Youman & Mather, 2018).

Conclusion

In conclusion, SB 48 has brought dyslexia and the teaching of reading to the forefront of education in Georgia. Reading is a complex process and extends beyond the act of teaching phonics (e.g., Adams, 1990, NRP 2000, Carlisle, 2000; Carlisle et al., 2011; Pearson, 2013). Senate Bill 48 aims to address components of reading that research has shown are essential for individuals with dyslexia (e.g., Gabrieli, 2009; Shaywitz et al., 2008; Torgesen et al., 2001). The tenets of the bill are aligned with dyslexia advocacy that has occurred over the last few years in the U.S. The bill defines dyslexia as a neurobiological-based disorder and provides definitions to encourage the use of dyslexia and dyslexia related terminology. Universal screening of kindergarten students, as well as kindergarten through grade three students who demonstrate concern for dyslexia based on LEA RTI is stipulated in the law. A three-year pilot study will be initiated in academic year 2020-2021, which will evaluate the effectiveness of early reading support for students with concerns for dyslexia. A component addressing professional learning opportunities is included in the dyslexia handbook that will be available December 1, 2019. In addition, the law sets forth the process for the PSC to establish standards for a dyslexia endorsement. There is no doubt that SB 48 will have an impact on EPP, LEA, and teachers in the classroom. The result is hoped to have a positive influence on literacy gains for students in Georgia with literacy

concerns.

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A Balanced Approach to Literacy Instruction and Support for Diverse Learners

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Abstact

In this article, the authors explore various theories to inform educators and educational leaders who are looking for ways to better meet the literacy needs of all of their diverse students, including striving readers, culturally and linguistically diverse readers, and proficient and excelling readers. They call on educators to embrace a balanced approach that is informed by multiple bottom-up and top-down theories to better meet the needs of all their students. Focus is first given to Gough's and LaBerge and Samuels' information processing models (bottom-up models) followed by the psycholinguistic, schema, and transactional reader response top-down theories. Discussion of both the bottom-up and top-down theoretical approaches includes background information on notable theorists and explanations of specific theories that are instrumental in enriching the teaching of reading in a variety of classroom settings to a variety of students. Literature relevant to these theories is reviewed, and practical classroom implications of implementing these theories are explored to provide educators with hands-on tools and suggestions they can use to improve and enrich literacy instruction for all their students. Finally, a case is made for why educators should call upon multiple theories when making instructional decisions.

keywords: literacy theory, balanced literacy, diverse learners, striving readers

The purpose of this article is to explore various theories to inform educators and educational leaders who are looking for ways to better meet the literacy needs of their diverse students, including striving readers, culturally and linguistically diverse readers, and proficient and excelling readers. Recent results from our National Report Card regarding lower achievement levels in reading raises alarm and points to the need for changes in the way we approach reading instruction in schools throughout the U.S. and our state specifically. Looking specifically at results in Georgia on the 2019 National Assessment of Educational Progress (NAEP), only 32% of students in 4th and 8th grades performed at or above the proficient level in reading, a 2% decrease from 2017. Even while statistics reveal a lack of improvement in reading, they also show an increase in the diversity of the student population, which calls for differentiated instructional practices to address the needs of students from a variety of cultural,

linguistic, and socioeconomic backgrounds.

Because literacy is a critical component in the academic and future success of students, selecting instructional strategies that will help to build and develop a literacy-rich environment that will contribute to literacy success for all students is challenging, but this challenge does not result from a lack of knowledge or focus on reading as an area of concern. Literacy has been and continues to be a key initiative in many states, districts, and schools throughout the U.S. and specifically here in Georgia with the new dyslexia legislation signed into law in 2019. Considerable funding has been invested in numerous reading programs and research-based literacy incentives that promise impactful results, yet outcomes continue to show the need for more change, as our students continue to struggle to reach, much less surpass grade-level reading proficiency.

Improving literacy instruction does not rely on what is new or yet to be discovered; instead, we need to look back to the foundational theories and models that continue to provide guidance, methods, and strategies that contribute to a strategic, informed, intentional, and balanced approach to the teaching of literacy. Helping teachers recognize how theories affect the way we think about life and learning will ultimately lead to a better understanding of how a variety of models and theories can lead to more effective and high-quality instruction for *all* students (Tracey & Morrow, 2017). Moreover, educators should approach the teaching of literacy intentionally and strategically; one effective way of doing this is through the exploration, examination, and application of multiple foundational literacy theories.

Considering the diversity of their students and the different levels of their reading abilities, a one-size-fits-all approach will not be effective; teachers need to be familiar with a variety of theories so that they will be able to call upon multiple strategies to meet the diverse needs of their students. A balanced approach to literacy instruction requires knowledge of both bottom-up and top-down models. Being proficient in various theoretical approaches also empowers teachers to be strategic and flexible in designing lessons that will engage all of their students, including less-motivated readers, striving readers, multilingual learners, and proficient or excelling readers (Griffin, 2019).

Reading is a complex endeavor that integrates both lower and higher-order thinking, and both are required to achieve understanding of a text (Afflerbach et al., 2015). As such, bottom-up approaches posit that the road to reading comprehension begins with processing lower-level information, like letter sounds and word meanings, which will then lead to higher-level information

processing, such as comprehending the overall meaning of the text (Tracey & Morrow, 2017). Top-down approaches, conversely, begin with an overall understanding of the central idea of a text, and from there, readers then focus on the lower-level processes, such as the phrases and words that create the overall message (Angosto et al., 2013).

This paper is an exploration of bottom-up and top-down theoretical approaches and how they both contribute to an effective balanced approach to literacy instruction. First, focus will be given to two prominent bottom-up models, followed by a focus on three leading top-down theories. These five theories are included as a representative sample of prominent paradigms from both schools of thought. Discussion of both theoretical approaches will consist of historical background information, notable theorists, and explanations that are instrumental in enriching the teaching of literacy in a variety of classroom settings. Literature relevant to these theories will be reviewed and practical classroom implications of implementing these theories will be explored to provide educators with hands-on tools and suggestions they can utilize to improve and enrich literacy instruction. Finally, a case will be made for why educators should consider multiple theories when making instructional decisions.

Bottom-Up Theoretical Approach

Background

To reach the top of a flight of stairs, one must begin at the bottom and climb each step one by one, each step providing the leverage and support needed to reach the next until one finally achieves the goal of reaching the top. Much like climbing stairs, the bottom-up approach to literacy instruction posits that the reading process begins with mastering foundational lower-order skills that then provides access to the next set of skills, and this process continues in a step-by-step fashion to higher-order skills which eventually lead to the goal of overall reading comprehension. Gough's information processing model and LaBerge and Samuels' automatic information processing model are two models that have influenced and continue to influence literacy pedagogy and classroom practices.

Bottom-up theorists perceive reading as a process that begins with decoding. According to Samuels (1988), decoding refers to the ability to connect the printed word to its corresponding sound. This process is critical in helping students to be successful in the next component of reading, comprehension (Samuels, 1988). This bottom-up approach to reading reflects the ideas found in the cognitive-processing perspective, which focuses on examining the fundamental mental actions that take

place during reading. One model that reflects the bottom-up and cognitive-processing perspective is Philip Gough's information processing model. Gough described the stages the mind goes through to process, store, and receive information when interacting with texts during reading (Tracey & Morrow, 2017). Initially proposed in 1972, Gough's information processing model was later renamed The Simple View of Reading (Hoover & Gough, 1990). Around the same time as Gough, David LaBerge and S. Jay Samuels presented another reading model that stemmed from the cognitive processing lens called the automatic information-processing model. Like Gough, LaBerge and Samuels viewed reading as a stage-by-stage process (Tracey & Morrow, 2017).

Selected Theories

Gough's Information Processing Model

Gough's information processing model is text-driven where the reading process begins with the printed word on the page and proceeds in sequential order from a phonics-based approach to word recognition to the overall meaning of the text (Lonigan et al., 2018). The process starts when the visual representation of the letter, the iconic image, is examined by the scanner and decoded and changed to the corresponding sound in the phonemic tape. At the next level, these letter sounds are brought together and attempts are made to connect them to word meanings—a stage referred to as the librarian. Once meaning is attained, the next step involves combining the words into sentences in the primary memory, and the Merlin stage, helps to give these sentences meaning; the sentences are then added to the knowledge system (Lonigan et al., 2018; Tracey & Morrow, 2017). According to Rumelhart (1994), Gough's model takes into account the various ways that different types of information interact to lead to understanding. *The Simple View*, as this model was later coined, posits that decoding skills and language comprehension are the processes that lead to the higher-order skill of reading comprehension, which can be illustrated as the equation $R = D \times LC$ where R is reading comprehension, D is decoding, and LC is language comprehension (Gough & Tunmer, 1986; Hoover & Gough, 1990).

Automatic Information Processing Model

Another notable model that is bottom-up in orientation is the automatic information processing model (AIPM) developed by LaBerge and Samuels (LaBerge & Samuels, 1974). The AIPM rests on two assumptions: (a) The human brain is capable of processing a small amount of information at one time, and (b) it

is necessary for someone to decode and understand words in a text in order to achieve understanding (Samuels, 2004, 2006). As shown in Figure 1, the AIPM has five different parts that, like Gough's model, occur in a linear order (Sadoski et al., 2012; Tracey & Morrow, 2017). First, readers use their visual memory (VM) to process the text and identify the visual input as letters. Readers then move to the phonological memory (PM) where sounds are attached to images, then on to the episodic memory (EM), where the reader now pays attention to the context surrounding the information they are viewing. This and other knowledge is stored in the semantic memory (SM). This follows to the final part of this process, attention (A), of which there are two types—external attention and internal attention (LaBerge & Samuels, 1974; Samuels, 2004). Readers must be able to decode words accurately and automatically recognize them to achieve fluency; once they can do this, readers will have more working memory available to dedicate to understanding what they are reading (Schrauben, 2010).

Figure 1

Stages of the Automatic Information Processing Model

A discussion of the AIPM is incomplete without highlighting one of its core components, *automaticity*. More clearly, automaticity is the ability to perform a complex task effortlessly with little attention (Samuels, 1988). Emergent and striving readers often struggle with decoding, which leaves their mental faculties so taxed that they have little mental energy left to devote to comprehending the text they are struggling to decode. As such, emergent and striving readers need extensive practice with letter-sound recognition (phonemic awareness) and phonics, along with a vocabulary of high-frequency words, knowledge of morphological (word parts) and orthographic (spelling) patterns (rimes and phonographs), etc. for them to build skills in decoding so

that the mental task of decoding becomes more and more effortless and automatic, thus freeing their attention to devote to understanding or comprehending the text (LaBerge & Samuels, 1974; Samuels, 2004).

Selected Research Findings

Several studies have been conducted that investigate instructional strategies that emerge from Gough's simple view of reading and the AIPM, both of which emphasize the linear progression from decoding to comprehension. To find ways to improve the decoding skills of students identified as poor readers, Squires (2018) explored how working memory and cognitive load affected the decoding skills of elementary students. Squires noted the negative effect when readers have to devote a significant amount of attention to cognitive tasks associated with decoding that then leave fewer resources for them to use for the job of comprehension. Specifically, Squires administered three different measures to a group of 2nd and 5th-grade students that required varying levels of cognitive demand for auditory-verbal and visual-spatial working memory, then assessed their level of decoding skills. Findings revealed a relationship between auditory-verbal working memory and the students' ability to perform decoding tasks, which suggests that reading programs that are language-rich would be beneficial in improving reading and academic performance.

In a paper where he reflected on his career in reading education, Samuels (2006) noted the positive results, specifically in fluency, associated with using the repeated reading strategy for the first time with a group of special education students in the late 1970s. Over 30 years later, Bennett et al. (2017) investigated the effect of repeated reading, combined with culturally relevant stories and technology, to improve the reading fluency of a small group (N = 7) of second-grade African American students in two inner-city elementary schools. Results showed improvement in reading fluency and comprehension for six of the seven students who participated and the gains were greater when compared to some of their peers in the conduct group.

In a similar study, Redcay and Preston (2016) used a control and experimental group of 20 second-graders in each to determine the effect of teacher-guided repeated reading instruction delivered using an iPad app. The goal was to help students improve their ability to read automatically. Though there were some limitations due to differences between the groups selected, both the fluency and comprehension scores of students in the experimental group were significantly higher than those in the control group, thus demonstrating the benefits of the

repeated reading strategy in improving automaticity in the reading process with the added benefit of meaningfully integrating technology in the process (Redcay & Preston, 2016).

Instructional Implications

Bottom-up models like Gough's simple view of reading and AIPM emphasize the importance of students mastering the skills needed for success in reading sequentially. This linear progression is significant as it relates to the classroom, not only in terms of daily decisions that teachers make about instruction but in decisions regarding helping striving readers. Research-based practices in literacy instruction have the potential to influence historically lower-performing groups, including students of color, students with exceptionalities, and multilingual learners. Utilizing technology may also help to make instruction more engaging and accessible to students (Redcay & Preston, 2016).

Georgia's Standards of Excellence, based heavily on the Common Core Standards, emphasize higher-level, critical thinking, which has inadvertently prompted some teachers to drift away from spending time on foundational reading skills such as decoding and fluency, even when supporting striving readers in the upper elementary and secondary grades (Hendrix & Griffin, 2017). Bottom-up models suggest that without helping students to master these early reading skills, they will not be able to acquire higher-level comprehension skills.

Implementing repeated reading activities in classes of striving readers and multilingual learners could lead to significant improvement and growth in their literacy skills (Bennett et al., 2017; Rasinski, 2017; Redcay & Preston, 2016; Samuels, 2006). Samuels (2006) found that incorporating a peer-lead repeated reading activity had a more significant effect on student performance than a teacher-led one. Teachers can plan group activities where they can work with small groups of students, while other students read aloud to each other (Rasinski, 2017). As shown in Redcay and Preston's (2016) study, teachers can also use iPads or other forms of technology to incorporate repeated reading activities in the classroom with small groups or individually at home, thus increasing the ease and likelihood of differentiating instruction. In another study on scaffolding second language reading for multilingual learners, Taguchi et al. (2016) introduced another way to incorporate technology in the learning process by using an audio recording to model reading the text, so students can hear the text being read aloud and practice reading it on their own.

Bottom-up models are also useful for coming up with interventions for striving readers. Students at all grade levels who are having trouble with comprehension or demonstrating higher-order reading skills need to be assessed for their knowledge of the lower-level skills. Having students read aloud will help teachers recognize where in the reading process they require support and interventions (Rasinski, 2017). Free software programs, such as Screencast-O-Matic (screencast-o-matic.com), allow teachers to record lessons that meet the needs of their students. In addition, free audio recording or video recording apps like Flipgrid (flipgrid.com) enable students to practice and demonstrate their progress to their teachers, parents, and themselves. Readers theater is another fun way for students of all ages to work on improving their fluency and mastery of lower-level reading skills (Young et al., 2019). Frequent formative assessments also need to be in place to monitor students' progress so that instruction is aligned with their specific needs. The bottom-up approach continues to earn its place in the literacy classroom as it continues to be relevant for improving literacy instruction, especially for emergent and striving readers.

Top-Down Theoretical Approach

Background

Before working on learning a new musical piece, a conductor will often allow the musicians to hear the entire composition, so that each member will have a clear understanding of how each part and instrument works together to produce the final performance. This whole-to-part metaphor is similar to the thinking behind the top-down orientation toward the reading process, which focuses first on the role of the readers and their understanding of the overall text rather than the elements of the text itself (Tracey & Morrow, 2017). When students begin with a contextual understanding of the text, they may more easily master the individual skills and vocabulary that they need to grasp the meaning more fully. For example, a reader begins by trying to understand the message of an entire paragraph first before focusing on the words, phrases, and sentences that comprise the paragraph (Angosto et al., 2013). This theory contrasts with the bottom-up approach to reading, which stresses the importance of first mastering the foundational skills, such as decoding, word recognition, and fluency before the reader can reach the higher-order thinking that is involved in grasping overall meaning (Suraprajit, 2019).

Top-down theories find their roots in constructivism with three primary factors underlying literacy acquisition: (a) Not all learning can be seen by an outside viewer, as some learning processes occur internally within the reader's mind; (b) some learning occurs as a result of successful educational guesswork on the part of the reader (e.g., using context clues); (c) readers sometimes attain meaning by inserting their background knowledge and making connections when there are gaps in their understanding of the text—a process called *inferencing* (Tracey & Morrow, 2017). Noted educational or learning theorists that contributed to top-down theories include Jean Piaget and John Dewey. Piaget influenced the foundation of constructivist theory through his beliefs that humans learn using a process of continuous building of logical structures; Dewey added the importance of learning to be grounded in experiential and inquiry learning. According to Dewey, an effective learning environment is one where students have the opportunity to create hypotheses, test their hypotheses using data that they have collected, and reflect on the process they engaged in to arrive at their conclusions. These early thinkers influenced the later development of top-down theories that continue to play a significant role in literacy education, including psycholinguistic, schema, and transactional reader response theories.

Selected Theories

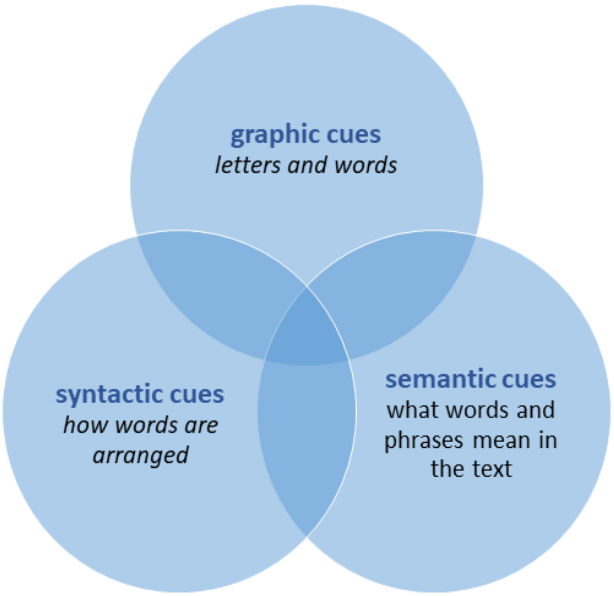
Psycholinguistic Theory

One of the theoretical models of reading closely associated with the top-down processing approach is the psycholinguistic theory. Artley (1980) described psycholinguistics as the joining of linguistics and cognitive psychology. This theory suggests that when readers engage in the process of reading, they use their prior knowledge of language and the world to make sense of what they are reading (Goodman, 1971). As such, young children learning to read would be more impacted by the knowledge they obtain from the adults and the environment around them than from specific instructional materials (Smith & Goodman, 1971). According to this constructivist viewpoint, at the center of the learning process is the learner herself actively connecting old knowledge with new knowledge, formulating hypotheses to make sense of unknown information, and making inferences to help him understand what the text means. Kenneth Goodman (1967), one of the first theorists to apply psycholinguistics to the reading process, referred to this process of predicting the meaning of a text based on prior experiences and schemata as "a psycholinguistic guessing game" (p. 126). As shown in

Figure 2, this theory posits that proficient readers use three central cueing systems: (a) graphic cues, referring to letters and words; (b) syntactic cues, referring to how words are arranged grammatically; and (c) semantic cues, referring to the reader's perception of what words and phrases mean in the text (Hayes, 1980).

Figure 2

Cueing Systems in Psycholinguistic Theory of Reading



Schema Theory

Another notable top-down or constructivist theory is the schema theory. The ideas surrounding schema theory and its connection to the reading process were first developed by psychologist Sir Frederic Barlett (1932/1995), who used the term *schema* to describe one's mental organization of events that occurred in the past. Anderson and Pearson (1984) applied schema theory to reading by suggesting that readers had schemata for content, text structures, and reading processes; they posited that a reader's ability to comprehend text is directly related to how detailed their schemata are. According to Anderson and Pearson, existing structures of knowledge are always changing, and these changes involve three processes: (a) *accretation* occurs when readers acquire new information; (b) *tuning* is when a schema has to be changed to

integrate new information; and (c) *restructuring* occurs when the reader realizes that an old schema is no longer enough and a new one needs to be created.

Transactional Reader Response Theory

Both the psycholinguistic and schema theories place heavy emphasis on readers' prior knowledge and how they use schemata to engage in the reading process to construct meaning. In her development of the transactional reader response theory (TRRT), Louise Rosenblatt (2013, 1994/1978) also gives credence to the significance of the reader's schemata in extrapolating meaning from the text; however, she also adds another element to the reading process, the reader's *transaction* with the text. Rosenblatt (1994/1978) postulated that because schemata are acquired from life experiences, a reader's response to the text is central to comprehension. Stated differently, what readers take from a text is influenced by the knowledge that they bring to it. This exchange between reader and text is referred to as a transaction, as the way each affects the other is what contributes to the meaning (Probst, 1987). This meeting between reader and text is further influenced by the type of response the reader has to the text: An *efferent* response refers to the factual information that a reader gathers from a text, while an *aesthetic* response refers to a more personal or emotional response (Sebastian, 2014). In keeping with the constructivist view, the TRRT emphasizes that the reader is an active participant in the reading process (Woodruff & Griffin, 2017).

Selected Research Findings

Instructional strategies that emerge from top-down literacy theories such as psycholinguistic theory, schema theory, and TRRT have been shown to significantly and positively affect student literacy outcomes. In a meta-analysis of articles published between 2007 and 2017 on effective vocabulary instruction, Moody et al. (2018) examined the theories that influenced word-learning strategies and found that recommendations for effective vocabulary instruction were greatly influenced by both schema and psycholinguistic theories. Strategies based on these theories included comparing and contrasting word features using semantic groupings, utilizing a Frayer Model graphic organizer to learn new vocabulary words, incorporating the home languages of multilingual students in classroom discussions, and examining common semantic meanings and phonological features of words. The influence of both schema and psycholinguistic theories highlighted the importance of prior knowledge, word connections, and

mentally organizing words to maximize understanding.

Chilton and Ehri (2015) demonstrated the central role schemata play in vocabulary acquisition and reading comprehension of elementary school children (N = 40). Their research experiment examined the impact of connecting semantic scenarios to meanings for third graders who were learning the definitions of six new verbs (*anticipate*, *attain*, *devise*, *restrain*, *wield*, and *persist*). To observe the influence of schema and context on learning, Chilton and Ehri provided instruction for one group of students where the new words were used in sentences where events were all connected to a common scenario, like a birthday party, while another group of students was also provided with sentences with the new words, but without connections to everyday events or scenarios. Results showed that students who were offered the opportunity to use their existing schemata of the common scenarios included in the sentences were better able to acquire and retain the meanings of the new words that they learned. This theory also demonstrates how students actively apply their schemata of content and reading processes to build knowledge and achieve reading comprehension (Suraprajit, 2019). This focus on the reader being the central agent in the creation of meaning during the reading process is also evident in Rosenblatt's TRRT (Sebastian, 2014).

Meyer and Schendel (2014) explored the use of the TRRT with a small group (N = 10) of first-grade students who were identified as striving readers. This action research study examined the effect of the implementation of literature circles on student's assessment outcomes and classroom behaviors. Students were placed in literature circles and given specific roles, including Artful Artist, Question Asker, Connector, and Passage Picker, to facilitate meaningful transactions with the text. Students called upon their collective prior knowledge to discuss and write about their aesthetic and efferent responses to the high-interest texts they were reading collectively in literature circles. Meyer and Schendel cited high student engagement, enhanced comprehension, and attainment of new learning strategies and tools as just some of the benefits gained from their implementation of literature circles.

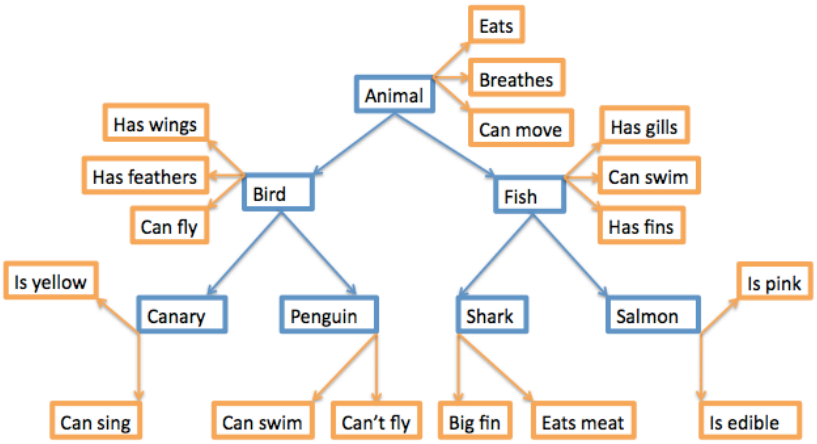
Instructional Implications

The discussion above of research studies highlights practical ways instructional strategies that emerge from psycholinguistic theory, schema theory, and TRRT can positively influence student achievement in reading. These strategies include the use of graphic organizers to explore prior

knowledge and to make connections to the text and build new meaning, the use of existing schemata to acquire new vocabulary, and participation in literature circles to increase engagement and learning while reading a text. Little and Box (2011) suggested using semantic mapping as a useful instructional tool to help students who may not have enough of the background knowledge they need to comprehend the text they are reading. Much like the example with common animals shown in Figure 3 below, this strategy involves allowing students to create a visual representation of ideas connected to the concepts in the text they will read; this can be even more effective if, after allowing students to brainstorm on their own, the teacher leads the class in a collective sharing of ideas that helps all students build their knowledge of the concept using what they already know and what they are learning from their peers.

Figure 3

Example of Semantic Map to Build Schemata Related to Common Animals



Technology can also be integrated. Venn diagrams and mapping tools are available via free online apps for students to use to explore their prior knowledge. Literature circles may be conducted online using discussion boards so that students not only get to interact with the text but also communicate with their peers to discuss the books they are reading. In discussing the use of technology to facilitate reader response, Clarke (2014) suggested several technological tools that could be used to engage students in strategies based on the TRRT. These digital tools include Wordle (wordle.net) to create a graphic representation of word connections, Kami (kamiapp.com) to annotate text

online, VoiceThread (voicethread.com) to allow students to discuss text with their peers, and Glogster (glogster.com), Smore (smore.com), or Prezi (prezi.com) to create engaging multimedia presentations.

The top-down approach continues to play a significant role in the teaching of literacy; its premise that the learner is the most vital component in the reading process encourages teachers to keep students at the center of their instructional practices and learning activities.

Concluding Thoughts

Viewing learning experiences from multiple theoretical perspectives, including from bottom-up and top-down approaches as we have done, allows educators to consider different explanations and ways to analyze and meet the needs of diverse at all stages of the literacy acquisition continuum. When educators are aware of the theories they use to "see" and work through a phenomenon, theoretical background knowledge is even more effective. Being conscious of and purposeful in the way we use and apply various theories allows us to analyze, think through, discuss, reuse, improve, or even dismiss them if needed; most importantly, this awareness will enable us to recognize when something is working, how it is working, and how to make it work better (Tracey & Morrow, 2017).

In the context of literacy instruction, if teachers only choose to consider one theoretical orientation in their approach to teaching students how to read, they could miss the opportunity to help many students reach their potential, and may even cause some to fail in their attempts. Considering multiple theoretical perspectives also improves our understanding of individual components that need to be considered when trying to solve a problem (Tierney, 1994). When a teacher has a student who is struggling to read, utilizing all methods at her disposal to help that student to be successful is vital, and understanding that there are multiple ways to understand and work through literacy problems is equally essential (Tracey & Morrow, 2017).

What was and what is, as it relates to learning and life, continue to be inextricably linked. Ryan and Dagostino (2017) pointed out that Louise Rosenblatt's warning made 80 years ago that teachers were not doing a sufficient job developing their students' interest in having a pleasurable and meaningful experience in reading is still relevant to today's standardized testing driven school environments. This is not just a literacy problem; the way students relate to reading and writing correlates to their development as creative, problem-solving, productive members of a democratic society

(Ryan & Dagostino, 2017). Increased knowledge of the strategies affiliated with various theoretical orientations, including bottom-up and top-down, can lead to immediate improvement in the way we help our students to read. There is no old way versus new way—all strategies should be considered in developing a balanced approach that meets the needs of *all* our students.

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A Comparative Study of the Effects of Computer-Assisted Instruction on the Reading Achievement of First Graders

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Abstract

With reading proficiently by the end of third grade as a common goal, many school districts are exploring options to enhance early reading instruction. The purpose of this study was to investigate whether the supplemental, computer-assisted reading program i-Ready would significantly affect first grade students' reading achievement. Participants (n=159) were first graders at two elementary schools - treatment (n= 82) and comparison n= 77). An independent samples *t*-test was used to compare the mid-year reading achievement scores of the treatment and comparison groups and found no statistically significant differences between groups. Following 10 weeks of twice-weekly 45-minute sessions of i-Ready reading instruction for the treatment group, an independent samples *t*-test showed that no statistically significant differences in reading achievement existed between the treatment and comparison groups. Several possibilities for this finding are discussed.

Keywords: reading, first grade, computer-assisted instruction

Literacy competency may be regarded as the cornerstone of academic success. Both educators and parents recognize the longstanding effects of literacy failure on the development of self-confidence and motivation to learn, which adversely impacts overall academic performance (Armbruster et al., 2001; National Reading Panel, 2001). With the transition from learning to read to reading to learn that occurs around fourth grade, ensuring that children are successful readers by the end of third grade is of utmost importance (Fiester, 2010; Reynolds et al., 2011). In fact, seventy-five percent of students who are poor readers in third grade will remain poor readers in high school (Fiester, 2010). Further, relationships have been found between third grade reading deficits and ninth grade course failures (Dorsey, 2015). This need to ensure early reading success has led many school districts to explore options for enhancing early reading instruction.

Beginning Reading Instruction

Reading instruction and the acquisition of reading skills have been popular topics of interest for over 50 years, and the research is both prevalent and varied. Despite multiple theories and various models which offer frameworks for approaching reading instruction, learning to read continues to present a struggle for many students. The National Reading Panel (NRP, 2000), viewed as quite conservative in its numbers, reported an estimated 20% of children encounter reading difficulties before third grade, while Reynolds, Wheldall, and Madelaine (2011) supports Adams' (1990) broader claim that at least a third of the population has or is experiencing literacy acquisition difficulties.

Gaps in reading achievement have been consistently identified in comparing performance between White and Black students, English language learners and native English speakers, and disabled and nondisabled populations of students. As a result, there is a pervasive need to address the disparate reading abilities among these different groups (Coffee et al., 2014). The creation of the NRP in 1997 was one of the first organized approaches to evaluating the research on reading inclusive of "alphabetic, fluency, comprehension, teacher education, and computer technology" (Coffee et al., 2014, p. 82). The NRP cited five essential components for reading instruction; known as the "Big 5," these components are phonemic awareness, phonics, vocabulary, fluency, and comprehension (National Reading Panel, 2000). A noted limitation in the NRP report, however, was that its scope included reading for school-age children, and it did not address the research on early childhood.

In consideration of NRP's limitation, the National Early Literacy Panel (NELP) was convened

in 2002 with the purpose of synthesizing the existing research on the development of literacy skills in early childhood. NELP identified six fundamental emergent skills. These skills consist of alphabet knowledge, phonological awareness, automaticity in naming letters and numbers, automaticity in naming objects or colors, writing letters or names, and phonological memory. NELP also identified five categories of intervention: code-focused intervention which involved establishing the relationship between the letters in written words with the sounds in spoken words, shared reading interventions, parent and home programs, pre-school and kindergarten programs, and language enhancement interventions (National Reading Panel, 2000; National Early Literacy Report, 2008).

Both the NRP and NELP substantiate the scientific basis for instructional targets and intervention, but the translation of such massive reports and publications still proves to be challenging (National Reading Panel, 2000; National Early Literacy Report, 2008). Overwhelmingly, the research has established a need for instructional competency during the first couple of years of schooling to overcome literacy deficiency (Reynolds et al., 2011).

Methods for Delivery of Reading Instruction

Reading instruction can align with various theoretical concepts or frameworks. The NRP's evaluation of the various instructional approaches and its establishment of the "Big 5" provides a narrowed focus for approaching reading instruction. Phonemic awareness, phonics, vocabulary, fluency, and comprehension are essential to any program choice or explicit instructional practice. The question of how efficient and how applicable a given program may be for a particular setting remains largely unanswered due to the scarcity of affirmative data.

While reading instruction may be delivered explicitly by an educational professional using any variety of programs that address the skills determined most essential, the era of technology has also ushered in the option of computer-based instruction (Messer & Nash, 2018). Consequently, there are multiple software programs across the educational spectrum created to addresses student needs by program design.

Messer and Nash (2018) affirm the success of one-on-one tutoring in phonics instruction but also hold that efficacy is greater with the instruction coming from a professional educator rather than a paraprofessional. It is, however, costly to employ adequate personnel to implement such instructional practices. The costly nature of a professional educator's time opens the door for the more cost-effective

nature of computer-based instruction. The availability of computer-assisted instruction provides the opportunity for professional instruction at a greater economic advantage since differentiated instruction or even individual attention can be provided despite staffing limitations allowing students to receive supplemental instruction without pulling a classroom teacher away from other responsibilities.

Along with cost effectiveness, computer-assisted instruction also offers such advantages as enhanced motivation, individual pacing, instant feedback, and a combined sense of learning with judgment-free response (Messer & Nash, 2018). Computer-assisted instruction provides a variety of supports, like pictures and animations, that facilitate emerging literacy skills (Macaruso & Rodman, 2011) that may also improve motivation. Additionally, computerized feedback is instant for all students without the time required by teachers to work through assignments that have been submitted by an entire class (Blok, et al., 2002). Prompt response allows students to work at their own pace and level, thus, the appropriateness of independent practice may be substantially enhanced.

Two studies investigating kindergarteners' phonological awareness training using computer-assisted instruction provided via *Waterford Early Reading Program* (*WERP*) found positive results. Hecht and Close (2002) reported that at-risk kindergarteners using *WERP* scored higher on tests of phonological skills, letter-sound knowledge, and word reading than those who did not use *WERP*. In a study by Cassady and Smith (2004), kindergartners using *WERP* made greater gains than controls on tests of phonological awareness.

Macaruso and Walker (2008) examined the benefits of Lexia's *Early Reading* as a supplement to a phonics-based reading curriculum for kindergartners. Two matched classes (morning and afternoon sessions taught by the same teacher using the same curriculum) in an urban, public school system served as the treatment and comparison groups. Results showed a significant increase on posttest measures of phonological awareness skills for students receiving computer-assisted instruction, particularly for those with the lowest pretest scores.

Similarly, Macaruso and Rodman (2011) conducted two studies examining the use of computer-assisted instruction to supplement a phonics-based reading curriculum for urban preschoolers and kindergartners. For preschoolers, the treatment group made significantly greater gains in phonological awareness. For kindergartners, treatment students with low pretest scores made significantly greater gains, particularly in word reading. Overall, preschoolers and low-performing kindergartners benefited from the intensive practice provided through computer-assisted instruction.

Gibson, Cartledge, and Keyes (2011) examined the effects of a computerized supplemental reading program on the oral reading fluency, reading growth rates, and comprehension of eight African American first graders. Using the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) oral reading fluency (ORF) as a posttest measure, all participants increased their reading fluency and improved their comprehension scores. Seven of the students increased their reading rate. These findings led researchers to support computer-assisted programs as supplementary interventions.

Bennett, Gardner, Cartledge, Ramnath, and Council (2017) conducted a study investigating the effects of a multicomponent, supplemental intervention on the reading fluency of seven urban, African-American second graders who showed reading and special education risk. The packaged intervention combined repeated readings and culturally relevant stories, delivered through a novel computer software program to enhance oral reading fluency and comprehension. Results showed that participants exceeded the growth rates for comparison peers, thus, supporting the beneficial effects of both repeated reading strategies and computer delivered instruction.

Keyes and Vostal (2016) investigated the impact of a computer-assisted intervention on the oral reading fluency of four elementary (1st-6th grade) students with learning disabilities. The students engaged with the computerized repeated reading program for 30 minutes three times a week for 10 weeks in an inclusive classroom during the reading-language arts block. Data revealed mixed results as all students increased their oral fluency on progress monitoring generalization passages and tended to reach their goals, but only two of the four students showed a positive level change on the computerized repeated reading intervention passages.

Keyes et al. (2016) examined the effectiveness of a supplemental repeated reading intervention delivered through a computer-assisted instruction program on the oral reading fluency (ORF), comprehension, and generalization of second graders who were at risk for reading failure. Six students received the Read Naturally Software Edition (RNSE) treatment passages three to four times a week for 7 to 12 weeks. A multiple baseline across participants design with embedded changing criteria tactics revealed ORF increases for all six participants. AIMS-web stories and classroom reading materials were used to assess clinical and classroom generalization. Five of the six participants increased their ORF on both generalization measures. Comprehension assessments revealed mixed results.

Todtfeld and Weakley (2013) found that 3rd-grade students using i-

Ready in Ohio public schools showed significant improvements on state tests in comparison with those who did not use the program. It should be noted, however that third, fourth and fifth grade students were studied, and there was only evidence that i-Ready made a difference in MAP Communication Arts Composite scores for third graders.

Given the broad availability of computer-assisted program options and the fact that there is still a significant gap in achievement, their classroom use must be investigated further. Since the current body of research acknowledges at least minimal positive effects of computer-based programs in providing supplemental reading instruction (Messer & Nash, 2018), it is important to explicitly consider program attributes when assessing potential effectiveness (Coffee et al., 2014). Among the many program options, some may offer more relevant insight and ease of accessibility that may be more, or less appealing, and ultimately more or less effective depending on the individualized needs of the targeted student population.

Significance and Purpose

The extent to which new technologies effectively support reading instruction and learning in the classroom is unknown. There is little empirical research on the topic generally and even less that specifically addresses computer-assisted reading instruction for first graders. There is, however, promising evidence of the effectiveness of reading instruction, such as computer-based technology, that integrates print and visual texts (Todfeld & Weakley, 2013).

For the past three years, many first-grade students in a large, southern school district have not demonstrated proficiency on the STAR Early Literacy Test, which is the district's primary measurement tool for reading achievement. In effort to increase reading achievement, the district recently adopted a new reading program (*Wonders*) aligned to Common Core State Standards. Two years later, the district piloted a new computer-assisted supplemental reading program (i-Ready) with the goal of significantly improving students' reading achievement. The purpose of this study was to investigate whether the computer-assisted reading program had a positive impact. The specific research question is as follows: Are end-of-the-year STAR scores higher for first graders who receive supplemental reading instruction through the i-Ready program?

Method

Participants

Purposive sampling was used to identify a school that implemented

i-Ready and a demographically similar school that did not implement i-Ready. Participants (n=167) were first grade students at two public elementary schools within the same district located in the Southeastern United States. Both were Title I schools in an urban setting, serving a high poverty student population with all students receiving free lunch. School size was also similar, as both enrolled over 500 students in kindergarten through fifth grade with over 35 teachers.

The treatment group (n=85) included four first grade classes, and the comparison group (n=82) included five first grade classes. Table 1 shows the demographics for both groups.

Table 1
Participant Demographics

	Gender		Race	
Group	M	F	Black	Other
Treatment	45	40	81	4
Comparison	47	35	82	0
Total	92	75	163	4

First grade teachers at both schools had previously participated in a half-day professional development for the i-Ready program. Participants in the treatment group received 150 minutes of core instruction daily using the McGraw-Hill literacy curriculum *Wonders* and two 45-minute session of i-Ready computer-assisted reading instruction each week.

Teaching and Learning Materials

Wonders is a literacy program developed by McGraw-Hill aligned to Common Core State Standards (Dorsey, 2015). It provides a comprehensive set of connected resources for teaching elementary (K-6th) students reading, writing, and critical thinking skills along with a social emotional learning curriculum for kindergarten and first grade. The *Wonders* program is equipped with teacher lesson plans and materials for full implementation as well as professional development resources (McGraw-Hill, 2019). All print resources are also available digitally, and the program is equipped with a data dashboard that provides for organization and recording of student assessments and other links (Shafferman, 2016).

All schools in this study used the Wonders program as a core reading curriculum. Teachers implemented this program within their two-hour literacy block in their daily schedule. In addition to the core curriculum, one school in the present study piloted the iReady, a supplementary computer-based program.

The i-Ready software package delivers student instruction, performance diagnostics, and progress reports based on K-12 Common Core State Standards in Mathematics and Reading. Designed to provide differentiated instruction

in order to simultaneously address the individual needs of multiple students, the program can be used as a supplement to teacher-directed whole and small group instruction. The adaptive diagnostic varies in difficulty based on the student's previous answers so that correct answers lead to more challenging questions while incorrect answers lead to easier questions. Immediately following the diagnostic, students work on customized online instruction that includes an interactive lesson, example problems, and practice problems. While the target audience is students who are struggling academically, i-Ready can be used to promote growth of all learners, since assessment data is used to match online lessons to a specific standard or sub-skill based on individual need. The program uses student centered engagement features, such as choosing a custom theme, earning tokens, and playing games, to motivate student participation (EdSurge, 2019).

The STAR Early Literacy Test was used in this study to measure reading achievement. Designed for use from kindergarten through second grade, it is a computer-adaptive assessment that assesses proficiency in early literacy skills, such as general readiness, phonemic awareness, graphophonemic awareness, phonics, vocabulary, comprehension, and structural analysis (Renaissance Learning, 2014). Using the Rasch ability scale, the test data provides a score ranging from 300-900 called the Scaled Score (SS), which identifies a student's reading level as emergent (SS below 675), transitional (SS 675 -774) or probable (SS 775 and above) (Renaissance Learning, 2014).

Data Collection and Analysis

Having received necessary permissions from the district, school administrators, and the University's Institutional Review Board, mid-year (January) and end-of-year (May) STAR Early Literacy data for both groups (treatment and comparison) were acquired from the databases of the two sample schools. Missing scores resulted in the analysis of data for 82 treatment participants and 77 comparison participants. To protect confidentiality, names were removed, and each participant was given an identification number.

SPSS Statistical Software was used for data analysis. In order to control for differences in reading achievement between groups, the mid-year reading achievement scores, as measured by the STAR Early Literacy Test, were compared using an independent samples *t*-test. Results indicated no statistically significant differences in reading achievement at the beginning of this research study, $t(157) = -0.08$, $p = .94$. This provided additional evidence of the similarity between the groups. Then, the end-of-year reading achievement scores, as measured by the STAR Early Literacy Test, were compared using

an independent samples *t*-test to determine if differences existed between the two groups at the conclusion of the treatment.

Results

The results of an independent samples *t*-test conducted at the end of the year to compare the reading achievement of the treatment and comparison groups indicated no statistically significant difference in scores for students who participated in the i-Ready program (M = 712.08, SD = 99.20) and those who did not participate in the i-Ready program (M = 726.87, SD = 106.11), $t(157) = -0.91$, $p = .37$. Table 2 provides the means and standard deviations for the treatment and comparison groups.

Table 2
Means and Standard Deviations for Groups on Reading Achievement

	N	Mean	Standard Deviation
Treatment i-Ready Program	77	712.08	99.20
Comparison No i-Ready Program	82	726.87	106.11

Discussion

While computer-assisted instruction could have merit for targeting instruction to student's needs with respect to improved reading achievement, the results of this study did not support this position. Findings from this study are like those of Dynarski et al. (2007), who evaluated five computer-based reading programs used to provide first-grade instruction in reading in 42 schools with 2,619 students and did not find a significant impact on reading growth from computer-based instruction. While Dynarski and colleagues attributed less direct instruction as contributing to the non-significant influence of computer-assisted instruction, that does not appear to be the case here. There are, however, several possible reasons that could account for the limited measurable benefit of the i-Ready supplemental computer-assisted reading instruction for first graders in this study, which include implementation procedures, student age, student engagement, and student selection.

First, implementation procedures could have possibly affected the results. In this study, students were expected to spend 45 minutes on computer-assisted instruction in reading during two sessions on two separate days each week. Scheduling conflicts resulting from field trips, assemblies, and school-wide early dismissals along with student absences could have caused inconsistency in the occurrence of computer-assisted instruction sessions per student. Similarly, technical difficulties and

lack of computer proficiency could have resulted in students receiving less than the total 45 minutes during each session that occurred. If all students participated in an entire 45-minute session twice weekly, the results may have been different. Given time constraints within the school day, supplemental computer-assisted reading instruction provided outside of the regular instructional day may yield more significant results.

Since age is typically a predictor of maturity, the age of students in this study could have been a substantial factor as well. Student's ability to focus for 45-minute intervals of computer-assisted instruction requires a functional level of maturity that may be beyond many 6-year-olds. Getting distracted easily, having poor concentration, lacking time management skills, and/or tiring easily may have prevented students in this study from receiving the maximum benefits of the computer-assisted instruction.

As with all instructional success, student engagement may have also been a crucial factor, as students lacking motivation for proficiency will not perform to their highest abilities. Students who were bored and unfocused or disinterested in the computer activities were very likely to have made random selections in their responses rather than a vested effort to answer cognitively with intentional accuracy.

Another factor of particular relevance to explaining this study's finding is the student selection. Participant scores were analyzed for in-tact classes without any regard to students' reading level. There was no categorical focus in the selection process. Computer supported instruction has been found to engage readers labeled at-risk in ways that may help compensate for inadequate reading ability (McKenna et al., 1999), and those at-risk of academic failure are sometimes the most adept and interested in understanding and utilizing computer-based learning (Alvermann, 2001). Further, research studies have shown positive, albeit inconsistent effects of computer-based instruction on improving reading abilities for students with learning disabilities and reading difficulties (Stetter & Hughes, 2010). Thus, supplemental computer-assisted instruction may result in the greatest gain for low-performing students. If the students had been intentionally selected based on certain performance competencies or lack of competency, such as low mid-year STAR scores, then the results may have yielded a different outcome.

A final factor contributing to the limited positive influence of computer-assisted instruction in this study could be a lack of alignment with instruction delivered via computer with that delivered by the teachers. In a study of first-grade students at risk for reading disabilities

by Torgesen, Wagner, Rashotte, Herron and Lindamood (2010), there were no differences in student reading performance between students assigned to the different intervention conditions using computer-assisted instruction, but the combined-intervention students, who received instruction delivered by specially trained teachers to prepare students for their work on the computer, performed significantly better than control students who had been exposed to their school's normal reading program. Thus, researchers concluded that reading instruction integrated very closely with students' experiences on the computer were needed to obtain a positive result. In this study, no attempt was made to coordinate teacher-delivered instruction with the computer-assisted instruction.

Limitations

There are several limitations that should be considered when examining the results of this study. The primary limitation of this study was the limited sample size (n=85). A larger sample size would increase the precision of being able to generalize the findings to a larger population. Furthermore, the study site was likely not representational of all elementary schools. Another limitation of the study is that class enrollment cannot be considered random selection, thus, limiting the generalizability of the study findings to individuals with similar demographics. A final limitation is related to the measure used. Although the reported reliability of the STAR Early Literacy Test is known, all measures are subject to some error, and the reliability with the specific participants in this study was not known.

Future Research

It is difficult to ascertain a specific reason for the outcome of this study, but the results do provide insight into the essential need for further research to support the selection and purchase of instructional materials. Currently, there is a lack of research evaluating the effect of computer-assisted instruction on reading achievement. With the overwhelming saturation of computer-related products that will surely become available to educators in the years to come, more studies are needed to inform and justify decisions regarding their purchase and implementation. Additional research is needed to further investigate the effectiveness of computer-assisted instruction delivered for students of various ages and reading abilities. Research on the effectiveness of various programs providing computer-assisted reading instruction across kindergarten, first-, and second-grade classrooms should be conducted, and it is recommended that the computer-assisted instruction provided is intentionally aligned with the instruction being delivered by teachers as part of the normal reading

curriculum. Studies with a larger sample size, longer research timeline, and a more controlled environment conducted over multiple sites would be additionally informative. Research ensuring diverse demographics of participants would be particularly beneficial as this would increase the generalizability of results.

Conclusion

Although the data were not conclusive, this study opens a doorway for developing future studies and provides meaningful data for school and district administrators responsible for spending funds to purchase programs for computer-assisted instruction. The level of popularity and perceived effectiveness of computer-based instruction in reading may vary, but computers have won a permanent place in today's classrooms. Computer technology may be part of the long-term solution for dyslexic and other at-risk students as a result of its capacity to provide highly specialized instruction and practice for relatively low cost with relatively high fidelity (Torgesen et al., 2009). Similarly, iPads® have been utilized in educational programs for individuals with Autism Spectrum Disorder (Neely et al. 2013; El Zein et al., 2016). Beneficial results of computer-assisted instruction with specialized populations, however, does not guarantee that it will yield similar favorable results with all students. Northrop and Killeen (2013) recognize that incorporating technology into academic instruction has the potential to increase engagement and motivation but caution that academic achievement could be hindered as children gain proficiency with technology rather than with the targeted literacy concepts. For many, varied reasons, further investigation of supplemental, computer-assisted reading instruction and teachers' use of technology for meaningful reading and writing instruction must also be explored.

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A Book Review of *The Writing Strategies Book*

Dale Ioannides

Instructional coaches all over Georgia are collaborating with teachers to grow readers and writers. Jennifer Serravallo has written multiple books around the workshop model, with the intention of providing mini-lessons for any teacher in support of any curriculum. *The Reading Strategies Book* and *The Writing Strategies Book* are similarly written. This review is focused on the writing version.

Within the metro Atlanta area, many school systems have adopted workshop model curriculums such as Lucy Calkins' *Units of Study* or *Fountas and Pinnell Classroom*. These models use short, direct and intentional mini-lessons, allow time for students to practice together, and then give time for independent work. During independent time, the teacher is conferring with individual students and conducting guided reading/writing strategy groups. Serravallo's mini-lessons follow this framework, but give them in a way that is organized by instructional goal, such as word choice. It is further organized by grade/writing level. This way of organization is intentional; writers need to think about spelling at more than one time in the writing process. Serravallo takes our favorite workshop gurus' resources, and makes them one pagers. Truly, this is a resource for anyone teaching students to read and write.

Are you a teacher looking to supplement your workshop lessons? Check. Are you an instructional coach looking for a resource that is research based and addresses standards for your teachers? Check. Are you a teacher who wants to try the workshop model and needs the streamlined best of the best? Check.

In Memory of Dr. Ronald Reigner

Dawn Owens, Ph.D.

Leaders and members of Georgia Association of Literacy Advocates (GALA), formerly Georgia Reading Association (GRA), were deeply saddened by the recent passing of a revered friend, Dr. Ronald Reigner. The association extends sincere appreciation for the contributions of Dr. Reigner, a Georgia Reading Association (GRA) Past President. Dr. Reigner served the organization faithfully in numerous positions during the past twenty years, including GRA President, GRA Executive Committee member, GRA Board of Directors member, GRA committee chair, local council president, and student council sponsor/liaison.

Dr. Reigner's work in the field of literacy was extensive. He was an active member of International Literacy Association (ILA) and Illinois Reading Association prior to becoming a professor at the University of West Georgia. He represented GRA at ILA conventions and was a respected presenter at many conferences. He served as ILA Special Interest Group Concern for Affect in Reading Education (C.A.R.E.) President and Journal for C.A.R.E. Editor. He was a member of the review board of Georgia Journal of Reading. He created and chaired the College of Coastal Georgia Annual Literacy Symposium. Dr. Reigner was instrumental in securing leading reading researchers and authors as conference speakers. He utilized these professional people to present community, literacy activities and programs for inner city children and educators. He advanced the work of Ferst Foundation for Childhood Literacy in Carroll County and Glynn County. Ferst Foundation for Childhood Literacy, now know as Ferst Readers, is an organization that provides free books on a monthly basis to children from birth to five years of age. He was a founding member of the Community Action Team for Carroll County.

At conferences, he served as a presenter, chaired and presided over sessions, and often served at the hospitality table, heartily welcoming participants and providing information. Dr. Reigner was a highly renowned professor and an exceedingly qualified presenter who involved many of his students in his professional presentations. He led efforts to structure registration provisions to allow college students to work at conferences to cover registration fees. Dr. Reigner sponsored membership in professional organizations at the national and state levels by paying the full membership fees or paying half the fees for large groups of new members. Dr. Reigner sponsored the initial ILA membership of two current GALA officers. He helped charter and supported local councils.

Dr. Reigner was instrumental in promoting literacy by encouraging many colleagues and all of his students to join the ranks of ILA and GALA, submitting

articles for publication, remaining current on literacy and reading research, and being an avid reader. He was always equipped with a quick reference list of reasons to belong to his beloved ILA and GALA. He was engaging when he talked of current literacy literature and innovative instruction. Ron was able to instantaneously provide a list of suggested selections, classic and current titles, for professional and personal reading pleasure.

Ron Reigner possessed the demeanor of a relaxed gentleman in every situation. He was an exemplary listener, thought through issues, offered sound ideas and solutions, and sought to be inclusive of all participants in professional or social conversations.

Dr. Reigner was an inspiration to family, colleagues, and friends. Even facing the difficult challenges of the last few years, Dr. Reigner was thinking of ways to remain active and to continue to provide dedicated service to GALA. He attended the GALA Summer Leadership Training last July. He made a sizable, monetary contribution to ensure a GALA publication was completed this past year, participated in virtual meetings, donated professional and student literature, sought to secure eminent people for intricate positions in the organization, and maintained a positive, encouraging attitude despite facing daily, personal health struggles. Ron provided a shining example of dedicated service and illuminated the path of literacy for all.

About the Authors

Dr. Robert A. Griffin is an assistant professor in the Department of Literacy and Special Education at the University of West Georgia, where he teaches graduate-level courses in literacy, TESOL, and diversity/inclusive education. Before moving into higher education full time, he served as a secondary English and English to Speakers of Other Languages (ESOL) teacher for 13 years in rural south and urban north Georgia public schools. Dr. Griffin's primary research interests involve exploring reading motivation and achievement for bi/multilingual students and "at-promise" student groups and challenging deficit-oriented paradigms among some educators related to the skills and talents of diverse learners. Dr. Griffin serves on editorial review boards for several journals in the fields of TESOL and literacy, including GATESOL in Action, the Georgia Journal of Literacy, and the Texas Journal of Literacy Education, and has published in peer-reviewed journals such as the Journal of Adolescent & Adult Literacy. He also serves as the editor of Focus, the quarterly newsletter of the Georgia Association of Literacy Advocates (GALA). For leisure, Dr. Griffin enjoys reading, traveling, visiting family, and spending time with his spouse, Mandi, and their two children, Miriam and Sarah Ruth.

Tracy Hudson is a district-level Reading Specialist with Mobile County Public Schools. Drs. Reeves, Giles, and Brannan teach in the Department of Leadership and Teacher Education, College of Education and Professional Studies at the University of South Alabama in Mobile, AL.

Dale Suzanne Ioannides has over 20 years of teaching and instructional coaching experience. Her teaching expertise is mainly in grades K-3, but this year she is teaching 5th grade part time, while guiding teachers through the first year implementation of Lucy Calkins Reading and Writing Units of Study as a literacy coach. Her education includes a Masters in K-12 Reading and Writing and a Specialists degree in Instructional Leadership. Other areas of expertise include digital literacy, guided reading, problem based learning and design thinking.

Nora Schlesinger is a dyslexia expert and has been involved with dyslexia legislation in Arizona and Georgia. She was a classroom teacher for almost 20 years in Arizona. Her teaching career included working in early childhood, Title 1 schools, as well as private and independent schools. In addition to being a certified teacher she holds endorsements in teaching English as a second language, structured English immersion, and early childhood and is a reading specialist. Later in her career, to help her own child with dyslexia and the children she taught, she became a certified academic language therapist and a certified dyslexia therapist. The author holds a Ph.D. in Speech and Hearing Science from Arizona State University, her dissertation received an Annals of Dyslexia New Investigator Award. She is currently an Assistant Professor of Literacy at Kennesaw State University in the Department of Elementary and Early Childhood.