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The Effects of Ability Grouping on Kindergarten Students' Reading Achievement

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Abstract

The number of elementary students in the United States reading at a proficient level is significantly low. Elementary schools in the United States need to increase the number of students reading at the proficient level in order to move towards success in other subject areas, raise graduation rates, increase economic opportunities, and boost the likelihood of favorable long term health. Foundational reading skills, beginning in kindergarten, are an early predictor of future reading proficiency. Homogeneous ability grouping is one instructional strategy that can help students master foundational reading skills. Ability grouping is an educational practice that can be used with all students. Few studies exist in the research involving American kindergarten students' participation in homogeneous ability groups. This research seeks to fill that gap by testing the effects of ability grouping on kindergarten students' reading achievement. This study utilized an AB research design over the course of 12 weeks in a kindergarten classroom. In this study, all 24 students in the kindergarten class completed the FAST one-minute letter sound fluency assessment, Form 1, to establish a baseline score. The students received six weeks of foundational skills instruction during the baseline phase. During the intervention phase, the students spent six weeks engaged in homogeneous ability groups. It was hypothesized that kindergarten students who participated in an ability-grouped intervention in the area of reading would make greater gains in letter sound fluency than when not participating in a homogeneous ability-grouped intervention. A dependent samples *t*-test and subsequent analysis of the results did not support this hypothesis.

The number of students in the United States reading at the proficient level in elementary school is a significant problem. According to the Nation's Report Card, in 2015, 64% of fourth grade students from public and nonpublic schools scored below proficient on the reading portion of the assessment ("How Did U.S.," n.d.). In 2017, 63% of fourth grade students from public and nonpublic schools scored below proficient on the same assessment. According to the National Assessment of Educational Progress (NAEP) ("NAEP," n.d.), which is a measure that assesses American students' knowledge across curricular areas, reading scores have nearly flat lined since 1998. Only one third of students are reading at a proficient level, as defined by the NAEP. In 1998, the fourth grade average scale score in reading was 217 (*SD* = 39). In 2002, 2005, 2009, 2013, and 2017, the fourth grade average scale scores in reading were 219 (*SD* = 36), 219 (*SD* = 36), 221 (*SD* = 35), 222 (*SD* = 37), and 222 (*SD* = 38), respectively. A score of 240 is considered proficient.

According to the NAEP, in 2011 more than 65% of fourth and eighth grade students scored below the proficient level in the area of

reading (Vaughn et al., 2015). The NAEP requires students to locate and recall information, integrate and interpret text, and critique and evaluate what they have read. Students who scored below the proficient level were unable to show mastery in these areas. Additionally, one-third of fourth grade students and one-fourth of eighth grade students failed to comprehend text at grade level (determined by a score from 0-500 that corresponds to a basic, proficient, or advanced designation). Text becomes increasingly difficult as students progress through the grades. However, the likelihood that pupils beyond third grade will receive a reading intervention declines significantly (Vaughn et al., 2015). According to Wanzek et al. (2013), reading interventions are more beneficial in earlier grades. Wanzek et al. (2013) conducted a meta-analysis consisting of 19 studies and 9,371 students from kindergarten through grade 12. The results were analyzed in order to report the effects of reading interventions. The study showed that early (primary grade) reading interventions were much more impactful than in later elementary and high school. The average Cohen's *d* effect sizes were 1.52 for kindergarten and first grade reading achievement among nationally normed tests, 0.40 in fourth and

fifth grade, and 0.19 once students reached ninth grade (Vaughn et al., 2015). When the NAEP first reported public and private school reading scores in the 1990s, results showed an uphill climb into the early 2000s; nine-year-old students' average scale reading scores progressed from 211 ($SD = 36$) to 219 ($SD = 37$) through these years. Since 2005, literacy scores have remained stagnant at approximately 220 ($SD = 35$), despite the push for more rigorous standards and expectations brought about through No Child Left Behind ("NAEP," n.d.). Furthermore, Nippold (2017) studied 426 children beginning in kindergarten and ending in grade eight, with typical language development (TLD), specific language impairment (SLI), and nonspecific language impairment (NLI). Findings showed that all students, not just those with disabilities, need reinforcements in the area of reading. Children with SLI and NLI scored lower on average than children with TLD in all areas, including lexical development at 87.15 ($SD = 8.35$), 81.81 ($SD = 9.42$), and 100.19 ($SD = 11.60$), respectively. Children with SLI and NLI also scored lower on average than children with TLD in reading comprehension at 73.22 ($SD = 21.87$), 61.04 ($SD = 25.07$), and 98.26 ($SD = 23.58$), respectively. Students with SLI and NLI need intensive interventions in the area of reading. However, these reports indicate that all students need additional supports in order to boost levels of reading proficiency.

The Progress in International Reading Literacy Study (PIRLS) is a worldwide assessment that compares student learning in reading every five years. According to the 2011 PIRLS report, 74% of students were not proficient in letter naming. These students could only recognize 12 letters of the alphabet at the beginning of kindergarten, and some could even recognize fewer (Mullis, Martin, Foy, & Drucker, 2011). The current kindergarten Common Core State Standards specify that students will be able to read emergent level (phonetically controlled, patterned) text with purpose and understanding; in 1998 only 31% of teachers believed that students should learn to read in kindergarten (Bassok et al., 2016). However, teachers' beliefs about when children should begin reading have changed since kindergarten mastery standards are more demanding. D'Agostino and Rodgers (2017) reported that according to the Early Childhood Longitudinal Study- Kindergarten (ECLS-K), in

2011 80% of kindergarten teachers believed that students should learn how to read in kindergarten.

In the past ten years, while reading scores in the United States have remained low and stagnant, international reading scores have been steadily rising (Mullis et al., 2011). In 2011, 10 (out of 53) countries had higher overall scores in reading than in 2001. Additionally, 13 countries (out of 45) had higher average scores in reading in 2011 than 2006. Only four countries' average scores declined in the decade from 2001 to 2011. According to Sparks (2017), the most recent report from PIRLS states that reading scores are at an all-time high globally, but the United States does not fit that trend. The 2016 PIRLS report showed that the United States scored seven points lower than in 2011, which also lacked growth since the 2006 report. While seven points may not appear significant, a continual downward trend is disheartening. From 2011 to 2016, overall reading scores in the United States have declined from 556 to 549. The top 20% of students showed little or no increase in scores, while the bottom 20% showed a decrease in scores. Of the three different literacy elements in which PIRLS focuses (purposes for reading, processes of comprehension, and reading behaviors and attitudes), American students performed poorest on sections that required making inferences and reading to locate and use information. This means that students scored lowest in reading comprehension.

Impact of Poor Reading Skills

There are four potential long-term effects of illiteracy: (a) falling behind in other subject areas, (b) dropping out of school, (c) receiving fewer economic opportunities, and (d) suffering from health-related issues. First, if students do not have the skills they need to read, they have the possibility of falling behind in other subject areas (Lonigan, 2006). Three core curriculum areas, science, social studies, and mathematics, require students to read. In these areas, reading is where most individuals gain new information. If students cannot read, they will struggle to gain success in these core areas (Lonigan, 2006; Duggan-Haas, 2015; Franz, 2015). According to Duggan-Haas (2015), struggling readers face challenges in science due to its abundance of vocabulary, high readability, and text features (tables, graphs, etc.) Struggling readers often do not possess the skills needed to decode the technical vocabulary and are

unable to use context clues to comprehend the text, therefore, they fall behind their proficient-reading peers. According to the 2005 National Assessment of Educational Progress (NAEP), 73% of students with reading disabilities scored non-proficient in science, compared to 38% of students without a reading disability (Grigg, Lauko, & Brockway, 2006). Struggling readers also typically fall behind their proficient-reading peers in social studies. Middle and high school social studies textbooks are often at a readability far more difficult than struggling students' current reading levels (Brenner, 2015). Other social studies reading materials including newspapers, diaries, speeches, timelines, maps, and charts require students to use complex reading skills such as making inferences, interpreting data, and analyzing opinions (Brenner, 2015). The most recent NAEP results show that students are not doing well on national social studies assessments. On a 500 point scale, the average eighth grade score for geography in 2014 was 261, where 282 is considered proficient ("New Results Show," n.d.). Mathematics also requires literacy skills (Franz, 2015). Students must understand that words may have more than one meaning (for example, the words *sum* and *some*) and be able to understand the correct meaning based on the context. Struggling readers also have difficulty understanding mathematical ideas because they are unable to read the textbook or infer based on teacher instruction. Additionally, students who lack appropriate reading skills (depending on the grade level) may not be able to read or comprehend word problems. Forsyth and Powell (2017) reported the results of 128 fifth grade student scores on the mathematics Wide Range Achievement Test (WRAT). These researchers compared the scores of students with and without reading difficulties. Results showed that students with reading difficulties scored lower in whole numbers ($M = 16.72, SD = 6.95$), fractions ($M = 3.89, SD = 3.14$), measurement ($M = 6.78, SD = 3.44$), and geometry ($M = 19.17, SD = 6.78$) than students without reading difficulties in whole numbers ($M = 25.9, SD = 6.73$), fractions ($M = 6.46, SD = 2.21$), measurement ($M = 10.49, SD = 3.11$), and geometry ($M = 25.31, SD = 6.43$) (Forsyth & Powell, 2017).

Second, students who are labeled as struggling readers are less likely to graduate from high school (Hayes & Wilson, 2016). Hernandez (2011) conducted a study that followed

approximately 4,000 students from third grade until age 19. This study showed that pupils who are labeled as non-proficient readers by the end of third grade have a dropout rate of four times higher than proficient readers. Only 4% of proficient third grade readers fail to graduate compared to 16% of non-proficient third grade readers. These statistics come from the 12% of total students who do not graduate by the age of 19. The same study found that students who could not master foundational skills such as letter sounds, phoneme segmentation, and blending by third grade have a high school dropout rate of six times higher than students who have mastered these skills.

Third, individuals who cannot read have fewer career opportunities, which puts them at a greater risk for poverty. According to Noguera (2011), illiteracy in impoverished families is a vicious cycle. Because students who cannot read have a higher chance of dropping out of high school, they are also more likely to acquire a low level job. According to the Bureau of Labor Statistics, the 2013-2014 unemployment rate for high school dropouts was 30.3% compared to 14.5% for individuals who had graduated high school and were enrolled in college ("Employment and Unemployment," n.d.). Further, Tyler and Lofstrom (2009) detail additional problems faced by high school dropouts such as lower annual earnings. Individuals who fail to complete high school earn less per year than those who receive their high school diploma. For example, the median yearly income for women without a high school diploma was \$13,255 in 2006 compared to \$20,650 for women with a high school diploma. Similarly, the median yearly income for men without a high school diploma was \$22,151 in 2006 compared to \$31,715 for men with a high school diploma (Tyler & Lofstrom, 2009).

Fourth, struggling readers typically suffer from more health-related issues than adults who are considered literate (Marcus, 2006). According to the study conducted by Marcus (2006), illiterate adults do not have the knowledge and skills required to understand health-related information from books, newspaper articles, brochures, or online sources. Therefore, instead of seeking a remedy to a specific symptom, the illiterate individual may continue to suffer (Marcus, 2006). Additionally, adults who cannot read at a level well enough to understand health-related information are more likely to avoid clinics and

outpatient centers to seek treatment due to the arduous amount of paperwork. These individuals suffer health-related issues due to lack of treatment. Furthermore, according to Hummer and Hernandez (2013), adults who do not have a high school diploma have a life expectancy of 10 years shorter than their high school graduate counterparts. American adults ages 45-64 with nine to 11 years of education have a fatality rate of 93% higher than American adults with more than 17 years of schooling of the same age (Hummer & Hernandez, 2013).

Past Interventions

Researchers have sought to intervene upon non-proficient readers (Miller & Moss, 2013; Nomi, 2010; Poole, 2008; Chiu, Chow, & Joh, 2017). Four interventions that educators use include Drop Everything And Read (DEAR) or other similar independent reading activities, heterogeneous grouping, tracking, and homogeneous grouping.

Drop Everything And Read. According to Miller and Moss (2013), independent reading without support, such as Drop Everything And Read (DEAR) or Sustained Silent Reading (SSR), is not an effective use of instructional time. Mostow, Nelson-Taylor, and Beck (2013) reported that students who spent time reading out loud, rather than silently, averaged greater gains in reading abilities such as blending and word identification. In a study (Mostow, Nelson-Taylor, & Beck, 2013) of 173 students from grades 1 through 4, Project LISTEN's Reading Tutor heard 88 students read aloud over the course of 19 hours. The other 90 students engaged in SSR over the same amount of time. Students using the reading tutor outperformed students participating in SSR in blending words $F(1, 169) = 5.02, p < 0.05$, partial $\eta^2 = 0.029, d = 0.34$. Students also made greater gains using the reading tutor as opposed to SSR in word identification $F(1, 173) = 90.75, p < 0.001$, partial $\eta^2 = 0.344, d = 1.45$. Additionally, a number of studies have been conducted that connect oral reading fluency, rather than silent reading fluency, to reading comprehension for primary grade students (Roberts, Good, & Corcoran, 2005; Cook, 2003; Fuchs, Fuchs, Hosp, & Jenkins, 2001). Through his study of 79 first grade students, Cook (2003) tested pupils on the oral reading fluency portion of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) assessment. Results showed that oral reading

fluency was strongly positively correlated to reading comprehension ($r = 0.728$). The previous studies imply that silent reading practices such as Drop Everything And Read (DEAR) are not effective instructional practices; in order to maximize comprehension students should be reading aloud.

Heterogeneous grouping.

Heterogeneous grouping refers to the practice of placing students of different ability levels together in a small group (Johnson, 2014). Regarding grouping strategies, a heterogeneous mix does not lend itself to differentiation because the academic abilities of the group vary (Nomi, 2010). Nomi (2010) used the Early Childhood Longitudinal Study- Kindergarten (ECLS-K) data to analyze ability grouping methods. In this study, 13,512 kindergarten and first grade students' data was used. The author used a propensity score to report results, which is an estimated probability of schools adopting a homogeneous ability grouping approach (Nomi, 2010). The average propensity score of ungrouped students was 0.55 ($SD = 0.25$), while the average propensity score of students grouped homogeneously was 0.83 ($SD = 0.17$). Six strata of propensity scores were reported, with stratum 6, the highest in the series, containing the greatest number of ability-grouped schools. Stratum 1 contained the least number of ability-grouped schools. Average propensity scores from stratum 6 through stratum 1, respectively, were 0.91, 0.75, 0.65, 0.51, 0.32, and 0.11. The highest scores occurred within schools using greater ability grouping.

An additional study conducted by Poole (2008) concluded that heterogeneous ability grouping did not produce advantageous results, especially for low performing students. Fifth grade students were the participants in this heterogeneous grouping strategy in which at least one of each low, average, and high ability students were placed in a small group for a reading intervention. Data shows that the low performing students recorded the fewest speaking turns, 28 turns, as opposed to 41, 42, and 48 turns by the average and high performing members of the group. Further data shows that the low ability students also read considerably fewer words in a shorter time span (150 words in 3 minutes 12 seconds, as opposed to 283 words in 2 minutes 45 seconds by average and high ability students). This achievement gap between low, average, and

high ability students is representative of data from the remaining heterogeneous groups in the study. This data suggests that lower ability students recognize they are, in fact, a low achieving student in comparison to the rest of their group. Hesitancy to participate may result from this suggestion. According to Poole (2008), mixed ability groups tend to be held back by lower achieving students. Less proficient students receive support from the more proficient students, but this help is not reciprocated. Additionally, lower ability students' reading time was interrupted, discontinued early, or corrected by higher ability students, which did not give the less proficient students the opportunity to practice fluency or self-correction (Poole, 2008).

area of literacy, to gauge reading achievement. Students' reading scores varied depending on elements such as the child's past reading skills, originating country, family variables, student gender and attitudes, and classmate variables. Students were required to respond to 64 multiple choice questions and 62 constructed response items, for a total of 126 points. These items measured reading achievement according to PIRLS. Pupils who were tracked into classes because their reading achievements averaged 10% greater than their peers scored approximately five points higher in literacy achievement than the students whose reading achievements averaged less than 10% greater than their peers ($SE = 0.136$). Chiu, Chow, and Joh (2017) suggest avoiding tracking students based on extreme similarities between classmates (two standard deviations above or below the mean should not be tracked together); students should be mixed according to past achievements.

Zimmer (2003) studied the effects of tracking on peer interaction. The results of the study showed that tracking low and average ability students lowers the impact that classmates have on one another's achievement (Zimmer, 2003). This suggests that students benefit from being exposed to more proficient peers, $t(df^1) = -2.61, p < 0.05$. Betts and Shkolnik (2000) state that students placed in lower tracks do not experience the peer group effect, which reinforces that a student's achievement is based on individual ability as well as the average ability of the class. Tracking creates ability level classes and low to average ability level students are not exposed to the high

Tracking. Tracking, which includes placing students in classrooms based on the previous school year's testing, is an instructional practice used worldwide (Chiu, Chow, & Joh, 2017). A similar instructional approach, called streaming, occurs when students are placed into a specific school based on previous academic accomplishments. In order to determine the effects that streaming and tracking have on achievement, Chiu, Chow, and Joh (2017) conducted a study that examined 208,057 fourth grade students from 40 countries. The multilevel analysis sought to determine whether streaming and tracking positively or negatively impacted academic achievement. Fourth grade students were given an assessment booklet, created by experts in the levels of motivation and achievement that the higher level tracked students receive.

Homogeneous grouping. A common misconception of ability grouping is that some individuals consider this practice equal to the practice of tracking (Matthews, Ritchotte, & McBee, 2013). However, unlike tracking, ability groups are fluid and permit students to change groups depending on current needs (Steenbergen-Hu, Makel, & Olszewski-Kubilius, 2016). According to Slavin (1987), ability grouping is a widely used educational practice in American schools. All ability groups within a class are essentially focused on proficiency within the same academic standard. However, two distinct features of ability grouping include adjusting the pace and level of instruction to meet the needs of the students in each group. Lleras and Rangel (2009) used data from the ECLS-K, which included surveys and assessment data from approximately 22,000 children. The students whose data was studied have testing scores from kindergarten, first, and third grade and have ability grouping information provided by the teachers. Minority students, particularly African American and Hispanic students who are placed in low ability groups, show lower achievement gains than African American and Hispanic students who are placed in high ability groups. Overall effects of low ability grouping on reading achievement gains was $-3.86 (p < 0.01)$ for African American students and $-4.45 (p < 0.01)$ for Hispanic students from kindergarten to first grade, versus no grouping. Overall effects of high ability grouping on reading achievement gains was $2.73 (p < 0.01)$ for African American students and $2.27 (p < 0.01)$ for

Hispanic students from kindergarten to first grade, versus no grouping. Instead of placing students in a group considered low, educators should identify specific skills and move students in and out of groups as achievement is gained.

Provus (1960) reported positive results in an experimental study when students were ability-grouped for a part of the school day. Fourth grade students were placed into ability groups and then matched with students of a similar IQ in order to compare results. The highest achieving students showed the greatest gains ($ES = 0.79$). Average and lower ability students also showed gains, while not as significant ($ES = 0.22$ and $ES = 0.15$, respectively). Students are capable of making such gains if materials and instruction are provided at the student's instructional level.

Slavin and Karweit (1985) tested the effects of individualized, ability-grouped, and whole class instruction with 354 fourth through sixth grade students' mathematics achievement. Students were randomly assigned to an individualized, ability-grouped, or whole class instruction group for 18 weeks at the end of the school year. The whole group instruction was derived from the Missouri Mathematics Program (MMP) which incorporated a mixture of direct teaching, guided practice, independent work, and homework (Slavin & Karweit, 1985). Ability-grouped instruction was derived from the MMP, however, the teacher differentiated the pace and materials to match the needs for the low-ability and high-ability groups. The individualized instruction was chosen based on the needs of the groups, which consisted of four or five students. To measure student achievement, scores from the mathematics subsections of the Comprehensive Test of Basic Skills (CTBS) were analyzed. Results showed that students who received ability-grouped instruction (pre-test $M = 49.77$, $SD = 10.21$, post-test $M = 52.48$, $SD = 9.60$) outperformed their whole-class instructed peers (pre-test $M = 48.4$, $SD = 8.85$, post-test $M = 45.44$, $SD = 8.51$).

McCoach, O'Connell, and Levitt (2006) reported on over 10,000 kindergarten students' response to within-class ability grouping using a multilevel analysis. The teachers in the study reported that, on average, ability groups were used once per week for 15-30 minutes per session. The ECLS-K was used to measure early literacy skills such as word identification and letter sound

knowledge. The results showed that ability groups significantly predicted reading scores, $\beta = 9.920$, $p < .001$. According to McCoach, O'Connell, and Levitt (2006), ability group instruction must be differentiated based on the needs of the group in order to increase student achievement. A positive effect on student achievement may not occur if universal instruction is presented to ability groups (McCoach, O'Connell, & Levitt, 2006).

With the limited amount of time that educators have to teach reading, teachers must find a way to differentiate instruction in a manner that meets the needs of all students. Hong and Hong (2009) studied the effects of within-class ability grouping on kindergarten students' reading achievement to determine whether this instructional practice is worthwhile in kindergarten. Students were grouped according to reading time (low reading time was considered less than one hour per day and high reading time was considered one hour or more per day) and intensity of grouping (no grouping, low-intensity grouping, or high-intensity grouping). The authors used outcomes from the ECLS-K cohort data set for reporting. The average monthly reading achievement of students experiencing a low amount of reading instruction coupled with low-intensity ability grouping was 1.69, and 1.73 for high-intensity grouping. A reader is expected to achieve one month's worth during one month. This is depicted by the numeral 1. If a student has a monthly gain of 2, that individual made two month's worth of progress in one month's time. According to the results, a student participating in low-intensity grouping rather than no grouping showed a reading gain of 0.99 in approximately one school year. In this case, a gain of 1 refers to one school year's worth of progress. Students involved in low reading time with low-intensity grouping showed a monthly reading gain rate of 1.58, while students involved in high reading time with low-intensity grouping showed a monthly reading progress rate of 1.69. Students involved in low reading time with high-intensity grouping showed a monthly reading gain of 1.52, while students involved in high reading time with high-intensity grouping showed a monthly reading progress rate of 1.73. Hong and Hong (2009) concluded that when teachers spend more than one hour each day on whole class literacy instruction, homogeneous ability grouping has positive effects on kindergarten student achievement. Students of high ability level had a mean score of 34.23 ($SD =$

9.67) in the fall and 43.52 ($SD = 11.46$) in the spring. Students of medium ability level had a mean score of 21.55 ($SD = 5.99$) in the fall and 31.84 ($SD = 8.69$) in the spring. Students of low ability had a mean score of 16.47 ($SD = 5.82$) in the fall and 26.97 ($SD = 8.07$) in the spring.

Theoretical Framework

Linking pictures to words, in order to make connections between letters and sounds, is an approach to phonics instruction based on decades of research (Carpenter, Gehsmann, Smith, Bear, & Templeton, 2009). The intervention in this study requires students to match pictures to their letter sound, presented in the form of a letter. For example, a picture of a mouse would be paired with the letter m. Children also read the alphabet linking chart, which matches a picture to its beginning sound. The intervention also requires students to use pictures in an emergent level text to read unknown words. The framework of this intervention was based upon Mayer's Cognitive Theory of Multimedia Learning. Multimedia refers to the combination of text and pictures and is not exclusive to technology (Tobias & Fletcher, 2014). According to Mayer (2002), learning occurs when individuals form mental images from words and pictures. A central premise of the Cognitive Theory of Multimedia Learning (CTML) is that learning happens at a deeper level when connections are made between words and pictures, as opposed to independently from one another (Mayer, 2002). Multimedia Learning assumes that humans process information using dual channels: an auditory and a visual channel (Mayer, 2002). Humans process visual and verbal information differently; using both channels gives individuals the opportunity to learn using both visual and verbal connections (Clark & Paivio, 1991). Linking pictures to letters or words and using pictures as a strategy for reading connected text requires that both channels work simultaneously.

Mayer's Cognitive Theory of Multimedia Learning is based upon 12 principles, three of which connect directly to the intervention in this study. First, the Multimedia Principle claims that children learn better from words and pictures. In the alphabet linking chart, the words *Andy Apple* are presented alongside a picture of Andy Apple. Mayer (2002) states that students need the chance to form both verbal and pictorial representations and make connections between the models. When

students are presented with pictures and the letter that represents the image's beginning sound, a connection is formed in the brain. According to Mayer (2002), of 11 tests given, students scored better on transfer of information on all 11 tests when text and pictures were presented rather than text alone.

Second, the Spatial Contiguity Principle asserts that students learn better when they see pictures and words together spatially. For example, images should be placed near the words on a screen or page, rather than far away from one another. That way, the child does not have to use cognitive resources to search for the corresponding word or picture. When both forms are presented simultaneously, students are more likely to keep the mental images in their working memory (Mayer, 2002). On the alphabet linking chart, both upper and lowercase forms of a letter are presented directly below an image that corresponds to that letter sound. Of five tests given, students scored better on transfer of information on all five tests when text and pictures were placed near each other on a page as opposed to far from each other (Mayer, 2002).

Third, the Temporal Contiguity Principle proclaims that students learn better when pictures and words are presented concurrently rather than consecutively. For example, a word should be presented with a picture, rather than after the picture is presented. When both words and pictures occur simultaneously, the child is able to make a connection between both models and hold a mental representation in their working memory (Mayer, 2002). During the intervention in this study, the alphabet linking chart holds the letters and picture in the same box. Additionally, the picture sorts require the teacher to present the letters and pictures simultaneously rather than separately. Meaningful learning occurs during the intervention presented in this study due to the CTML. According to Mayer (2002), of eight tests given, students scored better on all eight tests when text and pictures were presented together rather than separately.

Moreno and Mayer (1999) tested the role of spatial contiguity as part of the CTML. Spatial contiguity asserts that students learn better when images and words are presented close together. In their study, three groups of 132 college students listened to an informational text. Each group was presented with a different version; the narration

version included text right next to the picture, the integrated text version consisted of words underneath the picture, and the

separated text version consisted of words far away from the picture. Results showed that of the 19 ideas presented in the next, the narration group could correctly recall 61% of the ideas, while the integrated text and separated text groups recalled 48% and 41% of the ideas, respectively (Moreno & Mayer, 1999).

The Dual-Coding Theory of Multimedia Learning asserts that individuals have an audio and a visual channel that is used to construct meaning (Mayer & Sims, 1994). Mayer and Sims (1994) studied 86 college students who were classified with either high-spatial or low-spatial ability and separated into a control or treatment group. The study sought to test the effects of words and images presented concurrently (together) or successively (one after the other) on problem solving. The control group received no instruction to serve as baseline data. Significantly higher scores were reported from the concurrent group ($M = 8.70$, $SD = 2.58$) than the successive ($M = 6.10$, $SD = 3.15$) and control ($M = 4.72$, $SD = 1.60$) groups for high-spatial learners (Mayer & Sims, 1994). Higher scores were also reported from the concurrent group ($M = 5.42$, $SD = 2.54$) as opposed to the successive ($M = 5.05$, $SD = 2.46$) and control ($M = 5.00$, $SD = 2.32$) groups for low-spatial learners (Mayer & Sims, 1994). According to Mayer and Sims (1994), students who received instruction with words and images presented together were able to generate a greater number of problem solving solutions than students who received instruction with words and pictures presented successively.

According to Mayer and Moreno (2003), designers of curriculum materials should be aware of cognitive demands. Educators may have to construct their own intervention materials if the items provided are cognitively overloaded. Students have limited space for cognitive processing, and overload in this area could prevent learning (Mayer & Moreno, 2003). Cognitive overload happens when a task requires greater processing demands than the cognitive system can handle. In order to reduce the chances of a cognitive overload, Mayer and Moreno (2003) propose nine solutions for designing instructional materials that adhere to the CTML, two of which apply to the intervention in this study. Off-loading

is one solution that includes moving information from the visual channel to the audio channel. For example, rather than designing a picture card with a word included, only the picture needs to appear on the card. The teacher would say the corresponding word aloud. Weeding is the second solution that can prevent cognitive overload. Weeding suggests omitting unnecessary or extraneous pictures or words. For example, if the objective is to sort a picture of a slide, the picture card should only contain a slide, not an entire park. An entire park may cause the learner to draw out the incorrect word. The goal of Mayer and Moreno's (2003) solutions is to help design materials that promote meaningful learning between words and pictures to prevent cognitive overload.

Gap in the Research

The present study is imperative because gaps exist in the research regarding the impact of within-class ability grouping on kindergarten students' reading achievement. First, there are a limited number of studies that have investigated the effects of within-class ability grouping on kindergarten student achievement. From the within-class ability grouping data that has been collected, even fewer studies include national data. A broad range of international research has been conducted. Second, a large number of experimental studies exist that compare students who were placed in high ability groups as compared to low ability groups. Few quasi-experimental AB studies comparing whole group instruction to ability-grouped instruction have been conducted. Last, much research exists regarding the homogeneous grouping practice known as tracking. Tracking places students into classrooms based on previous math and reading scores. Ability grouping students for a small portion of the week (3-4 days per week for 15 minutes per day) lacks research.

The proposed intervention fills these gaps by allowing kindergarten students to participate in homogeneous ability groups three to four times per week. The teacher created ability groups of two to four students in order to provide differentiated instruction in an area of literacy. The area of literacy was determined by the fall FAST universal screener. Possible intervention areas for beginning kindergarten included letter names, letter sounds, onset sounds, and phoneme segmentation. The intervention groups were 15 minutes in length.

Since there are few studies that address within-class ability grouping in kindergarten, this research contributes to that gap. Additionally, this study adds to the little national data that has been reported on homogeneous ability grouping.

Purpose Statement

Elementary students in the United States, on average, are performing below proficiency in the area of reading. Struggling readers have a tendency to underperform in core subject areas, have a higher high school dropout rate, receive fewer economic opportunities, and suffer from more long term health issues than their proficient-reading peers (Lonigan, 2006; Duggan-Haas, 2015; Franz, 2015; Hayes & Wilson, 2016; Tyler & Lofstrom, 2009; Marcus, 2006). Educators need to differentiate instruction, for at least a portion of the day, in order for all students to test at proficient levels in reading. Research shows that although trends in assessment scores in the United States have increased, although slowly, the majority of students are not scoring at or above proficient levels (Sparks, 2017). Letter sound fluency, phoneme blending and segmenting, and phonogram fluency are all early predictors of oral reading fluency (Clemens, Simmons, Simmons, & Wang, 2017; Burke, Hagan-Burke, Kwok, & Parker, 2009). Each of these phonemic awareness skills (phoneme blending, phoneme segmenting, and phonogram fluency) can be a focus of a within-class ability group in kindergarten. Teachers who provide intensive small group instruction in areas of high need have a greater chance of developing students into proficient readers than teachers who ignore this instructional strategy (Otaiba, Connor, Folsom, Greulich, & Meadows, 2011). Educators should be aware of instructional practices that are unlikely to increase student achievement. Unsupported independent reading (such as DEAR), heterogeneous grouping, and tracking are instructional practices that do not produce proficient readers as the majority (Miller & Moss, 2013; Nomi, 2010; Zimmer, 2003).

There are very limited studies that focus on the impact of ability grouping on American kindergarten students' achievement in reading. From the kindergarten data that has been collected, most studies involve international data. This study utilized a quasi-experimental AB study to compare whole group instruction to ability-grouped instruction. This study took place in a kindergarten classroom with 24 students. The

teacher provided six weeks of whole class reading instruction. Then the teacher formed ability groups of two to four students to provide differentiated instruction for the next six weeks. Students completed Form 1 of the FAST letter sound fluency assessment before the A (baseline) phase, directly following the A phase, and directly following the B (treatment) phase. It was predicted that kindergarten students who participated in an ability-grouped intervention in the area of reading would make greater gains in letter sound fluency than when not participating in an ability grouped intervention.

Methods

Participants

Students selected for this study attended an elementary school in the Midwestern United States. In the 2016-2017 school year, 314 students were enrolled in the K-fifth grade primary school. Of the 314 students, 39% were Caucasian, 38% were Hispanic, 15% were African American, 4.5% Pacific Islander, 1% Asian, 1% Native American, and 1.5% were identified as multiracial. The school had a free or reduced-priced lunch rate of 68% and an ELL population of 34% for the 2016-2017 school year.

A total of 24 kindergarten students participated in the study. Students were selected due to placement in the specific kindergarten classroom. Students were randomly placed into one of two kindergarten sections by the school secretary prior to the beginning of the school year. Student's ages ranged from 5-6 years old. A total of 11 females and 13 males participated in the study. Five students were on an Individualized Education Plan (IEP) and one student was on a 504 plan. Of the 24 students who participated in the study, 41% of students were Caucasian, 45% Hispanic, 9% African American, and 5% Asian. Seventeen students spoke English as their first language and seven students spoke Spanish as their first language. Approximately 68% of the kindergarten students were eligible for free or reduced-priced lunch. Participants were not offered an incentive for participation in the study.

Apparatus and Materials

Apparatus. The students completed the study in the general education classroom. While participating in the pre-assessment, the teacher used an HP Elitebook x360 G2 Notebook PC-

Customizable to administer, time, and score the baseline assessment. This apparatus had an Intel Core i5-7200U Processor, 8 GB of memory, 128 GB SSD storage, and a 13.3" diagonal FHD (1920 x 1080) BrightView LED UWVA ultra slim touch screen with Corning Gorilla Glass, and was approximately 2.82 lbs. The stopwatch on the FastBridge website was used for the pre-test. The stopwatch on an iPhone 8 Plus was used for the mid- and post-assessments. The iPhone 8 Plus had a 5.5" display, 7.5mm thickness, 64 GB storage, and was 7.13 ounces. The body was comprised of an aluminum frame with front/back glass. A projector and Promethean Board were used during the sight word portion of the non-intervention phase. The Promethean ActivBoard 300 Pro was a 78" x 46" interactive whiteboard. This device had an internal resolution of 2730 points per inch and an output resolution of 200 points per inch.

Curriculum. Throughout the baseline phase (A), the teacher used the Journeys comprehensive kindergarten English language arts program, published by Houghton Mifflin Harcourt. Journeys contained six units, and each unit consisted of five, five-day lessons. Journeys provided instruction in both informational and literature texts, foundational literacy skills, and speaking, listening, and writing. During the phonological awareness portion of the non-intervention phase, the teacher used the Journeys picture cards for rhyming and onset sounds activities. The cards came in a set of 133, 4 1/2" x 5 1/2" laminated colored cards (see Appendix E). The teacher used the Journeys big book: *A Journey from A to Z* to introduce new letters. The big book was a 16" x 18" spiral bound text with 33 pages (see Appendix K). The Journeys Aa-Zz alphabet cards were used in the guided practice section of letter name introduction. One letter, either capital or lowercase, was centered in the middle of a 4.5" x 5.5" laminated card (see Appendix F). Students practiced writing the capital and lowercase letter using an 8 1/2" x 11" piece of white handwriting paper (see Appendix G). The paper had six lines, and the first line had three uppercase letters that the students traced. The second and third lines were blank. The fourth line had three lowercase letters that the students traced. The fifth and sixth lines were blank. The teacher used the Journeys vocabulary in context cards to introduce and review the sight words. The laminated 8.5" x 5.5" cards contained a sentence at the bottom with the sight word highlighted. The card also had a

colored picture that went along with the sentence at the top. The back of the card was for teacher use and described what the word meant, how to use the word, and how to encourage students to talk about the word (see Appendix H). Sight word cards and paper and pencil were also used to practice and review the sight words. The laminated 5.5" x 3" sight word cards went on the word wall for teacher and student reference. The white cards had one sight word centered in the middle of the card (see Appendix I). Students used a sharpened pencil to write the sight words on a 5.5" x 8.5" piece of skip-a-line ruled newsprint (see Appendix J).

Intervention. During the intervention stage, the teacher used materials from Journeys. The alphabet linking chart (see Appendix A) was on a laminated 9"x12" piece of white cardstock with color printed pictures. Picture word sorts were on non-laminated 9" x 12" pieces of white cardstock, cut apart into 16, 1.5" x 2" cards or 12, 1.5" x 3" cards (see Appendix B). Student books were categorized into below level (green circle), on level (purple triangle), above level (blue square), or language (teal diamond). The books were colored, 6" x 8" leveled readers, ranging from levels A-F for kindergarten. Books came in different genres including informational text, realistic fiction, and fantasy (see Appendix C).

Assessment. The teacher administered the one-minute letter sound fluency assessment created by the Formative Assessment System for Teachers (FAST). Form 1 was used from the progress monitoring letter sounds materials (see Appendix D). The assessment was a laminated 9" x 12" form with a total of 107 letters. The letters were presented in horizontal rows, with 10 letters in each row, and 10 rows. There were an additional seven letters centered on the bottom of the page. The letters were presented in random order, letters were repeated, and only lowercase forms were used. Students named as many letter sounds as they could in one minute. A practice form was used in addition, before each assessment. The practice page was a laminated 9" x 12" form with a total of two letters, f and s (see Appendix D). The letters were centered in the middle of the page. The purpose of the practice page was for students to become familiar with the expectations before the assessment. The purpose of the assessment was to gather baseline data prior to the implementation of the non-intervention phase,

letter sound fluency growth after the non-intervention phase, and letter sound fluency growth after the intervention phase. Each correct sound was counted as one point. The student was scored on the number of correct letter sounds named in one minute. The student was expected to give the hard sound for c (/k/ as in *cake*) and g (/g/ as in *gift*). Only short vowel sounds were accepted for the vowels (/ă/ as in *apple*, /ĕ/ as in *egg*, /ĭ/ as in *igloo*, /ŏ/ as in *olive*, /ŭ/ as in *up*). A good score for the baseline assessment was 10+ sounds per minute. A good score for the mid-test (given after the A phase) was 20+ sounds per minute. A good score for the post-test (given after the B phase) was 30+ sounds per minute. The teacher used the following script when administering the assessments: (The teacher placed the letter sound practice copy with two letters in front of the student. The test page remained face down). "I will show you some letters on a page. You will tell me the sound of each letter. If you don't know the sound of a letter, that is okay. Just do your best. I will go first. (The teacher pointed to the letter f). /f/. Now you try. What is the sound of this letter (point to the letter s)?" If the student was correct: "Good. That letter has a /s/ sound. If the student was incorrect: "The sound of the letter is /s/."

All FastBridge assessments were designed to be sensitive to student growth while also providing instructionally relevant information (Biancarosa & Wyrick, 2016). Current research supports the validity of FastBridge reading assessments. According to Biancarosa and Wyrick (2016), predictive validity statistics for the letter name fluency (LNF) portion of the assessment is 0.47-0.63. Letter sound fluency (LSF) predictive validity statistics are 0.44-0.63. Predictive validity statistics for nonsense word fluency (NWF), phoneme segmenting fluency (PSF), and word reading fluency (WRF) are 0.44-0.67, 0.32-0.60, and 0.59-0.78, respectively. For most FastBridge learning assessments, there is no threat to inter-rater reliability because assessments are electronically scored. FastBridge test-retest reliability for LNF, LSF, NWF, and PSF is 0.94, 0.92, 0.76-0.94, and 0.83-0.86, respectively. Alternative form reliability for LNF, LSF, NWF, and PSF is 0.82-0.92, 0.85-0.94, 0.69-0.96, and 0.67-0.92, respectively. Interrater reliability for LNF, LSF, NWF, and PSF is 0.99, 0.99, 0.99, and 0.83-0.85, respectively. The pre-test was given through the FastBridge website, but subsequent

assessments were given by hand. The teacher administered and scored the mid-test and post-test by using Form 1 and a timer because online administration does not allow forms to be repeated until all 20 have been administered. There is no subjectivity to administering or scoring the assessments by hand. Students either can say the letter sound, or not. FastBridge assessments show reliability coefficients that account for minute test errors. Evidence supports the use of FastBridge measures for screening and progress monitoring. Research also supports the use of FastBridge for informing teachers if instructional practices are effective or if more/different instruction might be needed to further student achievement in reading skills. Research on FastBridge assessments insinuates that these measures are effective for reliably differentiating for students who are at risk for reading problems.

Procedure

The study took place in a kindergarten classroom during the first (fall) trimester of the 2018-2019 school year. The study used an AB research design. To begin, the teacher administered the FAST one-minute letter sound fluency assessment, Form 1, to each student individually to establish baseline data. After the pre-test, the six-week baseline (phase A) began. After the non-intervention phase, the teacher administered the FAST one-minute letter sound fluency assessment, Form 1, to each student individually a second time. After this data was gathered, the intervention (phase B) began. After the six-week intervention phase, the teacher administered the FAST one-minute letter sound fluency assessment, Form 1, to each student individually for the last time.

During the baseline phase, the teacher used the Journeys kindergarten resource, Unit 1, during a 60-minute section of the day. This phase lasted for six weeks. Students participated in activities that included phonological awareness instruction, letter work, and sight word practice. The teacher completed the same protocol each day of the non-intervention phase in a whole group setting. Every day the teacher began with a phonological awareness activity in rhyming or onset sounds. The teacher used the Journeys picture cards to display two rhyming words, such as *pan* and *van*, and pointed out the similarity of the ending sounds. Next the teacher continued with two additional sets of words, such as *cat* and

bat, and *vet* and *net*. Then students named the picture that rhymed with *pan*. After that, students named another word that rhymes with *pan* and *van*. The teacher began each day for the first five days with this rhyming instruction but used different sets of rhyming words from the Journeys picture card collection. For the remainder of the non-intervention phase, the teacher began with onset sound instruction. The teacher displayed seven pictures from the Journeys picture card set, such as *mule*, *seal*, *pot*, *gate*, *feet*, *kite*, and *lock*. Then the teacher said a picture name and just the sound at the beginning of the word. The teacher asked children to make the beginning sound on their own and name five other words that begin with that sound. This procedure was repeated with two other pictures. The teacher used onset sound instruction for days six through 30 of the baseline phase but used different picture cards from the set each day.

After the rhyming or onset sound work, the students participated in letter work. The same routine was followed for each day of the six-week baseline phase. The teacher displayed the letter on the Journeys big book: *A Journey from A to Z*. Then the teacher pointed to, named (upper and lowercase), traced, and described each letter. For example, the capital K has all straight lines, one straight line down and two slanted lines. A description was also provided for the lowercase letter. The teacher identified any children in the class whose name began with this letter. Next the teacher identified the letter sound and named the pictures on the big book page, enunciating the first sound. Then 10 random uppercase and lowercase letters from the alphabet card set were displayed along with the uppercase and lowercase letter of the day. Children were asked to find the uppercase and lowercase letter of the day and point to and name other letters the class has introduced. Next the teacher distributed the handwriting paper for the letter of the day. Students traced the model capital letter and then wrote the letter on their own. Students did the same with the lowercase letter. On day one of the baseline phase, the teacher began with the letter Kk, and proceeded in order to the letter Zz. Then the teacher started at the beginning of the alphabet with Aa to Jj. Two days were spent on vowels Ee, Ii, Oo, and Uu.

The last part of the 60-minute daily baseline phase, after rhyming/onset sound work and letter work, was sight word instruction. One

word was the focus each week for the six weeks: *I*, *like*, *the*, *and*, *see*, and *we* were presented in that order. The teacher began by displaying the vocabulary in context card for the sight word of the week. Then the teacher read the sentence on the front of the card and followed the directions on the back of the card. After that, students got a word wall paper on the way back to their desks and put their name on the top. Next students stood up for the cheer. The teacher pulled down *I* from the word wall and displayed the word on the projector. The Week 1 cheer was "airplane." The class said the letter(s) of the word as they put their arms out and pretended to fly like an airplane (*I, I!*). The teacher and class repeated the cheer three times. Then the kids sat down and wrote the word. As the weeks progressed, students cheered up to three words. During Week 2, students cheered and wrote the words *like* and *I*. During Week 3, students cheered and wrote *the*, *like*, and *I*. During Week 4, students cheered and wrote the three most recent words, *and*, *the*, and *like*. This continued for weeks five and six. The cheer changed each week also. In Week 2, a clapping cheer was used. Weeks 3 through 6 cheers included jumping jacks, stomping, and drumming on your desk, respectively.

During the intervention phase, the students began each day by looking at the center chart to see their beginning group. Students began at one of the six centers independent from the teacher (reading, writing, puzzles, ABC, Imagine Learning, or creativity) or with the teacher at the ability-grouped intervention table. Once the teacher's group was at the table, a timer was set for 15 minutes. The materials used for the ability group varied based on skill level, but the same basic procedure was used for all of the groups. The group began by reviewing the alphabet linking chart. Each student and the teacher had an alphabet chart (see Appendix A). The group went through the whole alphabet chart together (said letter name, said picture name, said letter sound). This took approximately two minutes. Next the group participated in a letter sound sort using picture word cards specific to the needs of the group. The teacher chose a letter sound sheet that had sounds in which the group needed additional practice (for example /n/, /p/, /c/, and /t/). The teacher put one card for each sound so students could see them. The teacher told the students the beginning letter names and sounds of the pictures and showed students what their mouth should look

like when forming each letter sound. The teacher went through each picture in the set, saying the name, and asking students to take turns placing the picture in the correct category. After all of the pictures were in the correct categories, the teacher and students said the names of all the pictures in each category. This took approximately three minutes. Next the students got their own picture sorts with the same letters/sounds as the group sort. Students completed each sort and then read the pictures back to the teacher. Corrections were made if necessary by showing students the shape of their mouth as the sound is made, and enunciating the first sound. This took about three minutes. Last the teacher introduced the small book (see Journeys teacher edition, Unit 1, pages T80-T81). Depending on the needs of the group, the teacher used the struggling, on level, advanced, or vocabulary reader. The instructions on page T-80 or T-81, depending on the book chosen, were followed. This took approximately seven minutes. When the timer went off, groups rotated. The teacher started the 15-minute timer again once the second group was ready. The above procedure was repeated for the second and third groups. The teacher saw a total of three groups each day.

Data Analysis

This study tested the effects of ability grouping on kindergarten students' reading achievement. One group was compared to itself through six weeks of regular instruction versus six weeks of ability-grouped instruction, and academic performance was measured by FAST data. A dependent samples *t*-test was used to compare before and after intervention achievement through a pre-test, administered before the first six weeks of instruction, a mid-test, administered directly after the first six weeks, and a post-test, administered directly after the second six weeks. It was hypothesized that kindergarten students who participated in an ability-grouped intervention in the area of reading would make greater gains in letter sound fluency than when not participating in an ability-grouped intervention.

Results

The purpose of this study was to measure the effectiveness of using homogeneous ability groups as a reading intervention in order to improve letter sound fluency in a kindergarten classroom. Twenty-four students ($n = 24$) were engaged in six weeks of whole group letter sound

instruction at the beginning of the school year. During the next six weeks, students spent 15 minutes, three times per week engaged in an ability-grouped intervention with the goal to improve letter sound fluency. The FAST letter sound fluency progress monitoring Form 1 was used for baseline (pre-test), mid-test, and post-test data. A dependent samples *t*-test was used to compare the results from the baseline to the mid-test. Upon completion of the intervention phase, a dependent samples *t*-test was also used to compare the results from the mid-test to the post-test. It was hypothesized that kindergarten students who participated in an ability grouped intervention in the area of reading would make greater gains in letter sound fluency than when not participating in an ability-grouped intervention.

All students were tested with the same baseline, mid-test, and post-test FAST letter sound fluency progress monitoring Form 1 probe. Results showed that, on average, students outperformed their scores from the pre-test to the mid-test, $t(23) = -4.033, p < 0.001$. The mean scores from the mid-test ($M = 7.750, SD = 9.143$) were approximately 3 points higher than the mean scores from the pre-test ($M = 4.500, SD = 6.672$).

Students also outperformed their scores from the mid-test to the post-test, $t(23) = -5.100, p < 0.001$. The mean scores from the post-test ($M = 14.167, SD = 12.883$) were approximately 6.5 points higher than the mean scores from the mid-test ($M = 7.750, SD = 9.143$). Mean scores for the pre-test, mid-test, and post-test can be seen in Table 1 and Figure 1. Figure 1 also shows error bars that denote one standard deviation around the mean. Standard deviations were larger than the mean scores on both the pre-test and the mid-test. This means that scores were significantly spread out on this measure.

Baseline scores had a range of 25, with scores spanning from 0 to 25. The median score on the baseline measure was 2.5. Mid-test scores had a range of 31, with scores spanning from 0 to 31. The median score for the mid-test was 4. Post-test scores had a range of 49, with scores spanning from 0-49. The median score for the post-test was 13. Overall, findings show an increase in letter sound scores after the six weeks of whole group instruction.

Table 1

Means and Standard Deviations for Student Scores on the Pre-Test, Mid-Test, and Post-Test

Testing Period	<i>M</i>	<i>SD</i>
Pre-Test	4.500	6.672
Mid-Test	7.750	9.143
Post-Test	14.167	12.883

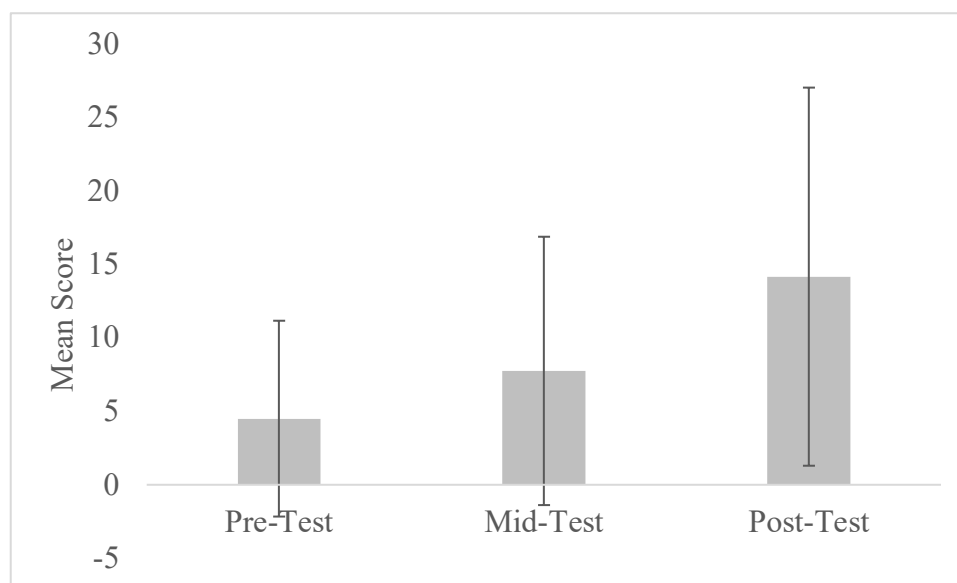


Figure 1. Mean (*M*) student scores for the pre-test, mid-test, and post-test. Error bars denote one standard deviation around the mean.

The general results of these analyses do not indicate a significant difference in the scores from the pre-test to mid-test $t(23) = -4.033, p < 0.001$ and the mid-test to post-test $t(23) = -5.100, p < 0.001$. Findings suggest that homogeneous

ability groups do not produce greater letter sound fluency scores than whole group instruction. Therefore, the hypothesis that students who receive a homogenous ability-grouped intervention in the area of reading will outperform students who receive whole group reading instruction was not supported.

Discussion

The ability to read is essential for students' future success in core subject areas, prospective high school graduation, eventual economic opportunities, and long term health (Lonigan, 2006; Hayes & Wilson, 2016; Tyler & Lofstrom, 2009; Marcus, 2006). Reading is a

complex process involving a variety of skills. One foundational skill required for reading includes letter sound knowledge. This study demonstrated the effectiveness of homogeneous ability groups on kindergarten students' letter sound fluency.

The results from this study do not indicate a statistically significant effect for the use of homogeneous ability groups in order to improve letter sound fluency. This means that kindergarten students performed no better in letter sound fluency from the baseline phase (whole group letter sound instruction) to the intervention phase (ability-grouped letter sound instruction). In the twelve weeks of this study, there was an average upward trend of letter sound knowledge. Table 1 and Figure 1 show the means and standard deviations for student scores on the pre-test, mid-test, and post-test. Mean scores from the mid-test were higher than mean scores from the pre-test and mean scores from the post-test were higher than

mean scores from the mid-test. This is typical of kindergarten students as they progress through the year. However, the results of the *t*-test lead to the conclusion that the alphabet linking chart, picture sort, and emergent level text intervention did not produce great enough gains in letter sound fluency to warrant continuation. These results suggest that whole group letter sound work is a better use of instructional time; more students are engaged in reading instruction for a greater amount of time in large group than in homogeneous ability groups.

Findings of the present study did not match the results of past studies. Wanzek et al. (2013) conducted a meta-analysis of 19 studies that tested the effects of early reading interventions and features of the intervention. Wanzek et al. (2013) stated that reading interventions are more beneficial in primary grades than in later elementary and high school. The results from the present study show that ability-grouped interventions were no better for kindergarten students than whole group instruction; the variance in results could be due to the large discrepancy in participants. Wanzek et al. (2013) suggests that literacy interventions prior to third grade are more beneficial because struggling readers have not yet shown a significant enough gap in achievement as compared to their peers. The results of the present study were consistent with the results of reading interventions in grades 4-12, where only a small positive effect of the interventions were noted regarding fluency. An average effect size estimate for the fluency measures of 0.16 ($p = 0.004$; 95% CI [0.05, 0.26] were shown. The present author suggests that the results of the current study produced no significant gains in reading fluency scores due to distractions during the intervention time. Additionally, three studies from the meta-analysis tested reading fluency scores after the small group intervention period. Consistent with the present study, a majority of the students fell below grade level in correct words per minute even though gains were made (Wanzek et al., 2013).

Hong and Hong (2009) studied students participating in homogeneous ability groups in the area of reading. They found a large contrast between students that were involved in high reading time and ability group interventions versus no ability grouping (contrast = 0.76, $SE = 0.29$, $t = 2.58$, $p < 0.01$). High reading time referred to at least one hour per day of whole group reading instruction. The present study did not support the

results from the study conducted by Hong and Hong (2009) because students did not significantly increase mean scores after high reading time was paired with high-intensity reading instruction (pre-test to mid-test $t(23) = -4.033$, $p < 0.001$, mid-test to post-test $t(23) = -5.100$, $p < 0.001$). This leads the current author to suggest spending instructional time on large group instruction or interventions.

Slavin and Karweit (1985) state that accommodating students of varying abilities is one of the most difficult tasks for educators. Teaching the same instruction to the whole class is not beneficial to students who have not mastered the foundational skills needed for the lesson or have already mastered the skill being taught (Slavin & Karweit, 1985). Slavin and Karweit (1985) studied the effects of whole group, ability-group, and individualized instruction during a mathematics class for 18 weeks. The results showed significant improvement for ability-grouped and individualized instruction compared to whole group instruction, $F(2,13) = 7.22$, $p < 0.08$. These results suggest that in order for ability-grouped or individualized instruction to be effective, behavior management strategies such as establishing guidelines and modeling expected behaviors must be present. The present study could have produced more effective results and a well-structured environment if these behavior techniques were modeled.

The instruction used in the intervention phase of this study was consistent with the Cognitive Theory of Multimedia Learning (CTML). The alphabet linking chart routine, picture sound sorts, and emergent level text facilitated the construction of mental representations from words and pictures. Students used both auditory and visual channels when participating in the homogeneous ability group activities. Furthermore, students were presented with words and pictures simultaneously and close together, which is consistent with the Multimedia and Spatial Contiguity Principles of CTML. According to Sorden (2005), the words presented can be spoken or written; in the picture sound sorts the words were spoken and in the emergent level text the words were written. The kindergarten participants in the study gained in letter sound knowledge because the activities were grounded in the CTML. This theory states that students will learn at a more meaningful level, not necessarily a

more fluent level, as evidenced by the results of the present study (Sorden, 2005).

Students did not perform as well as expected when involved in homogeneous ability groups. The results showed that students made just as much progress on letter sound fluency when involved in whole group instruction. A possible explanation for the lack of growth during the intervention period could be classroom interruptions. During the daily 60 minute intervention phase, the teacher-led ability groups were consistently interrupted by student behaviors, questions, and other adults performing pull-out interventions. These interruptions affected the flow of the interventions as well as students' concentration.

With a large population of low income and minority students, many resources (ELL, Title One reading, grandparent volunteer, ELL associate, and special education associates) were available for additional practice with core instruction in the school involved in this study. Not only were students involved in a homogeneous ability group with the teacher, all students had exposure to additional letter sound practice with either the ELL teacher, ELL associate, speech teacher, Title One reading teacher, or grandparent volunteer between one and five times per week for 10-30 minutes per session. However, due to the high number of mandated student pull-outs during the intervention time, the classroom teacher was not always able to provide the three desired ability-grouped interventions per week for every student.

Limitations

When considering the conclusions drawn by the present researcher, it is important to consider the limitations of the study. First, the study contained a small sample size of only 24 students. This made it difficult to draw reliable conclusions about the study. Larger sample sizes are also more likely to apply to a wider range of individual abilities, income levels, and cultures, thus having the ability to approximate the population.

Second, doubling the length of the study from 12 to 24 weeks could have provided more data in which to determine the effectiveness of homogeneous ability groups. The six week duration of the study did not allow the classroom teacher to provide a reading intervention three times per week. Although students were given an

intervention at least three times per week, it may not have been specifically in the area of reading or from the classroom teacher. Doubling the length of the study would allow students to receive more intervention time with the classroom teacher. Vaughn and Denton (2008) state that daily, individualized instruction provided through ability groups is necessary for reading interventions. This notion of daily interventions indicates that statistically significant student growth may only occur if this element is present. With the significant amount of outside-the-classroom interventions that occur throughout the school day, it would be reasonable to conclude that daily interventions with every child would be difficult to achieve. Such assumptions may lead one to wonder if students can make statistically significant growth in letter sound fluency if these daily interventions are not provided.

A third limitation of this study is that it did not assess every letter of the alphabet. If students were slow in naming letter sounds, he or she did not have the opportunity to name every letter sound. Students could know more sounds than what was named in one minute. Therefore, Form 1 of the FAST letter sound progress monitoring materials did not give a true picture of students' letter sound knowledge.

Recommendations for Future Research

A suggested first step for additional research is to replicate the study with a larger sample size. A larger sample size could confirm or deny the results of this study. Requiring kindergarten teachers within a school or district to follow the proposed method would result in a greater sample size. A greater sample size would add reliability to the study results.

A second recommendation would be increasing the duration of the study. This would allow researchers to gather additional data points in which to analyze. Doubling the length of the study to 24 weeks would give researchers the opportunity to administer at least two additional assessments: one at the midway point of baseline instruction and one at the midway point of the intervention period.

A third recommendation is to revise the one minute time limit in order to assess whether students have knowledge of all letter sounds. Rather than terminating the assessment after one minute, the researcher would mark the one minute

point. The assessment would continue until sounds for all letters have been attempted. This additional component would give students the opportunity to show knowledge for all letter sounds. Further, removing the time limit would give researchers increased data. Letter sound knowledge and letter sound fluency scores could be analyzed and compared. This information would benefit teachers so they could determine if students have a deficit in letter sound knowledge, letter sound fluency, or both.

Implications

The immediate implication of this study for educators is that homogeneous ability groups may not be the most effective use of instructional time in the area of reading. If students are making gains in letter sound fluency with whole group instruction, the teacher would be able to produce more instruction, for example an hour each day to a larger group of students. Teachers may want to provide a whole group intervention instead.

The teacher should work to minimize classroom distractions during intervention time. In the present study, students were in and out of the classroom during the intervention time, which was distracting to the group. Students were also interrupting the teacher with tattling, disruptive behavior, questions about the independent centers, and confusion as to where to go if the children were coming back from ELL, speech, or Title One instruction. This may mean that educators need to spend time teaching problem solving skills, what to do in certain situations if the teacher isn't available. Also, the teacher should allow plenty of time to teach and model independent routines. If the student comes back from speech or ELL, how can they find out which learning center to go to without interrupting the teacher?

Along with educators teaching the independent routines, children need to feel comfortable practicing these routines, knowing how to use materials correctly, how and when to switch to a new center, and when it is okay to interrupt the teacher's intervention group. If students do not have plenty of scaffolding, with a gradual release of responsibilities, disruptions will continue. Regarding the interventions, kindergarten children have a wide range of abilities. Results from the current study's post-test showed that the scores of this particular class ranged from 0-49, with a median score of 13. For

students, the use of homogeneous ability groups ensures that individuals' academic needs are met and challenged. Instructing in letter sounds using a whole group approach may cause boredom for students who already know the letter sounds or be overwhelming for students in the 0-5 letter sound range.

Implications for administrators exist as well. Protocol for homogeneous ability groups need to be developed based on research before requiring teachers to implement this instructional strategy. The state of Iowa requires that teachers provide a 15 minute intervention at least three times per week for students who do not meet proficiency standards on the FastBridge universal screener. Teachers may need assistance developing instruction that will best supports students' acquisition of letter sound knowledge. Administrators should devote professional development time to research-based instructional strategies in the area of reading interventions. Additionally, the instructional leaders and coaches can support teachers by providing resources that align with needs, as determined through data. Based on the results of this study, administrators may want to consider requiring daily interventions for students. Teachers may need additional support from the building principal and the curriculum and instructional leader. For example, assisting the teacher in implementing independent routines for students while ability groups are being held could be a helpful scaffold for students.

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