The effects of the frequency of the interactive whiteboard’s (IWB) manipulation on kindergarten students’ achievement in phonemic small group instruction

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The Effects of the Frequency of the Interactive Whiteboard’s (IWB) Manipulation on Kindergarten Students’ Achievement in Phonemic Small Group Instruction

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Abstract

This action research study documents the intervention and the results of the effects of the frequency of the Interactive Whiteboard’s (IWB) manipulation on students’ achievement in phonemic awareness in the bilingual kindergarten classroom. Previous research confirms that young students benefit from the use of the IWB in the classroom: students’ motivation and engagement during lessons increases, and limited English proficient students’ literacy achievement improves with the daily use of the IWB (Preston and Mowbray, 2008; Wuerzer, 2008). This study was designed to examine the effects of the frequency of the IWB’s manipulation on kindergarten students’ achievement in phonemic small group instruction. The researcher determined 6 weeks for the duration of the study, which covered 2 kindergarten curriculum units. Student participants manipulated syllable sorting and word building activities on the IWB and took curriculum required and developed by the researcher tests. The findings of the study indicate that a student-centered and frequent utilization of the IWB in the classroom for teaching and learning has a positive effect on students’ academic achievement in phonemic awareness.
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Chapter 1

Introduction

This action research study presents the intervention and the results of the effects of the frequency of the Interactive Whiteboard’s manipulation on students’ achievement in phonemic awareness in the bilingual kindergarten classroom. The following five chapters provide an introduction to the research, a review of the literature of the available research on the topic, explanations of procedures and data as well as final results and recommendations for future research.

Problem

The following action research was planned with the purpose to establish engaging and instructionally productive techniques in utilizing Interactive Whiteboards (IWB) in a kindergarten bilingual classroom. The 2012-2013 school year was the first one when this technology became available to the bilingual kindergarten teachers in the classroom where the study took place. The educators had to research the best practices in utilization of the IWBs in their everyday instruction. There is little doubt that adding a highly visual instructional tool into everyday lessons could have a positive effect on students’ content understanding. Beeland (2002) demonstrated that visual component that the IWB adds to instruction increases student engagement. In his research, students’ positive responses in attitude surveys and questionnaires towards the IWB’s use were driven by the visual component this technology offered. Bruce, McPherson, Sabeti and Flynn (2011) discussed how a visual approach with the IWB’s utilization positively supports teaching and learning. Using the IWB, students were able to reflect on their thinking, share and compare their results quickly, which also helped to consolidate their learning.

The real interest for this study lies in identifying practices that could yield the highest academic results with the utilization of the IWB. Since the IWB not only offers a highly visual
approach to instruction, but also allows instructors and students to physically manipulate content on the board, the researcher chose to focus on how the frequency of content manipulation affects students’ achievement during small group phonemic awareness lessons. The Wuerzer’s (2008) study demonstrates that daily and repetitive utilization of the IWB enhances Limited English Proficient (LEP) students’ achievement in literacy. Swan, Schenker, Kratcoski and van’t Hooft (2007) also maintain the opinion that frequency of the IWB’s use as a medium of instruction positively affects learning. To develop the IWB’s lessons where the content is not only visual but is available for physical manipulation on the board could yield profound academic results.

The reason for taking a focus on phonemic awareness in a kindergarten bilingual classroom was due to scarcity of the developed bilingual resources available in this area, as well as to the goal of raising students’ achievement in this area. The researcher had to develop phonemic awareness lessons for the IWB considering the possibilities for students to physically manipulate the content on the board.

**Research Base**

The following study has been developed after careful investigation of the available research on the IWB’s use in school instruction. Preston and Mowbray (2008), write that young students benefit from the use of the IWB in the classroom. In their research, students’ motivation and engagement during lessons increased. It was attributed to teachers giving students an opportunity to move objects on the IWB and to the visual component this technology added to their lessons. The teachers in that study successfully utilized the IWB not only for introducing, assessing, concluding the lessons, but also for scaffolding the material in well-designed visual and interactive steps. It should be noted that kindergarteners did not require additional training in using the technology; on the contrary, they were quick to successfully adapt and use the IWB.
Solvie (2011) also observed an enhancement in student engagement, when they had an opportunity to manipulate the objects on the IWB. The researcher did not record substantial increase in students’ engagement when the teacher was the one manipulating the content on the board. However, when students manipulated the objects on the IWB, Solvie (2011) observed an elevated level of enthusiasm among the students. Wuerzer (2008) has found that LEP students’ literacy achievement improves with the daily use of the IWB. In his research the frequency of the IWB’s use played an important part in determining the results of the study. Likewise, Swan et al. (2007) maintain that the frequent utilization of the IWB improves students’ scores in reading, language and mathematics. The students who used the IWB outperformed the students who did not have the access to this technology. The researchers confirm that teachers who utilized IWBs and employed this technology more frequently and in a more engaging way had students’ academic performance improve significantly. When students have an opportunity to manipulate objects on the IWB they show an improvement in test scores (Zittle, 2004). Considering the available research in this area, the study of the effects of the frequency of the content manipulation on the IWB by the students has proven to be an appropriate investigation strategy.

**Description of population and Brief Overview of the Study**

The action research was conducted in a bilingual kindergarten classroom located at a Midwestern public school. The classroom was a part of Student Achievement Guarantee in Education, known by its abbreviation as SAGE program. The program provides funding to public schools to lower class sizes to approximately 15 students per teacher in K5-3rd grade. Two teachers could share the same classroom and some of the resources. The teachers in the classroom where the research took place shared the space and the majority of the resources, including the IWB. The researcher and the other teacher in the classroom had 13 and 14 students respectively. 13 Hispanic students, 7 females and 6 males, participated in the study.
All 13 students completed pre- and post-unit tests. The researcher collected the data via curriculum based formal assessment of the three week long literacy units. The major part of the units’ assessments focused on the phonemic awareness. Additionally, students were required to write 10 words that the researcher dictated to them. The dictated assessment was developed by the researcher. These 10 words included the words with the letters that were mastered during the three week long units. The formal assessments for the units and the dictated assessments were conducted before the beginning and at the end of the literacy units. The researcher analyzed the difference in pre- and post- tests’ scores. The teacher also asked students to complete attitude towards the IWB surveys in the beginning and in the end of the research.

The assessments used in this research tested the skills presented and practiced with the use of the IWB. Students manipulated the IWB during sorting activities, where students had to match the syllable with the correct picture, and word building activities, where students had to drag a letter to the correct place under the picture to build a word.

During the first part of the research (first three week unit) students had fewer opportunities to manipulate the IWB (0-1 physical manipulation three days a week) while during the second part of the research (second three week long unit) students manipulated the content on the IWB more often (3 physical manipulation five days a week). The researcher kept a time log, where she recorded each student’s physical manipulation of the IWB.

In the following study the researcher expected to find that with the increased frequency of physical manipulation of the learned content on the IWB, students’ achievement in the area of phonemic awareness would increase.
Chapter 2

Review of Literature

Introduction

Integration of IWBs into education has been quite successful. The IWB is a well-researched technology that has been adopted into education from businesses in the late 1990’s (Morgan, 2010; Beeland, 2002). The IWB is a large whiteboard that displays an image from the computer screen connected to it. Among the variety of functions the IWB could perform is physical manipulation of images reflected on the board and writing by putting pressure on the surface of the board. This technology provides a variety of resources and activities both for teachers and students. Among the advantages that IWBs offer for teaching and learning are the possibility to physically manipulate content on the board and easy access to interactive, visual resources. The research on the positive effects of IWBs’ use in the classroom is extensive.

The purpose of this study is to examine the effects of the frequency of the IWB’s manipulation on kindergarten students’ achievement in phonemic small group instruction. Before proceeding with the action research, it is important to review the literature about IWBs’ integration into teaching and learning. Thus, this chapter is dedicated to the analysis of the research on the IWBs’ use in education. The chapter has three sections that explore how educators use the IWB with young students, the advantages of student-centered and visual approaches to the IWB’s use, and the effects of the frequency of the IWB’s use on student achievement.

Use of the Interactive Whiteboard with Young Students

Since the purpose of this study is to investigate the effects of the frequency of the IWB’s manipulation on the kindergarten students’ achievement in phonemic small group instruction, it is important to first look into the research that has been done on incorporating this technology in
early childhood education settings. According to Goodwin 2007, the research on the use of the IWB in early childhood is limited, due to the scarcity of this technological resource in early childhood classrooms (as cited in Preston & Mowbray, 2008, p. 53). However, the following 2 studies draw a comprehensive picture of how the IWB’s use provides venues to facilitate learning and teaching in the kindergarten. The article by Preston and Mowbray (2008) provides varieties of successful strategies for the employment of the IWB in kindergarten classrooms. Additionally, Morgan (2010) describes important suggestions for early education teachers of how learning through play could be supported by IWBs’ use. Both articles serve as an example of how the IWB could be used to the advantage of both teachers and learners at the primary stages of education.

Preston and Mowbray (2008) explored the effects of IWBs on teaching, learning and assessment of kindergarten students in science. The authors state that even though kindergarten children are in an early stages of learning to read and write, they have a considerable base of prior knowledge that need to be challenged, extended and assessed (Preston & Mowray, 2008, p. 50). In their article they write about the successes they have noted that kindergarten teachers had when employing innovating strategies with the help of IWBs. During the 8 years of observations in Abbotsleigh Junior School, Preston and Mowbray, summarize their finding, on the basis of which they provide excellent suggestions for kindergarten teachers.

The authors noted that IWBs are excellent for introducing a lesson. With such visual activities as grouping, sorting and matching, students are able to demonstrate their prior knowledge. During the energy lesson, the Abbotsleigh kindergarten students were grouping the pictures of the objects into those that need electricity and those that do not using the IWB (Preston & Mowbray, 2008). The Abbotsleigh kindergarten teachers were able to utilize the IWB
in teaching students how to predict and to make simple scientific pictures when predicting what would happen to the plant if it was not watered (Preston & Mowbray, 2008, p. 51). The authors write that students are engaged and motivated by physically moving and representing objects on the IWB and by the visual component that this technology adds to the lesson.

The IWB allows the teachers to breaks down the lesson and assignments into “step-by-step instructions”, and that is really useful when developing lessons for kindergarteners that are not able to process several steps at once (Preston & Mowbray, 2008, p. 52). The authors point out that a detailed and very visual level of modeling, that the IWB allows to achieve, helps children to apply modeled skills on their own. After the Abbotsleigh kindergarten teacher have modeled on the IWB how far the Lego cars travel on different surfaces and what happens if you push or pull them, students were able to deepen their understanding of this science topic. The IWB can be used for showing videos and playing interactive activities, which provide additional practice for reinforcement of the science topics (Preston & Mowbray, 2008).

The researchers write that the IWB is effective in concluding and assessing the lessons. Preson and Mowbray (2008) write that ESL students, who often struggle to complete tasks by using such traditional methods as pen and paper, are able to complete the same tasks on the IWB. In fact, it was noted “as a major benefit” of the IWB (Preston & Mowbray, 2008, p. 53). IWB have a variety of interactive activities developed for the younger students that engage learners and facilitate assessment.

As the result of the study, it was noted that kindergarteners do not need a lot of additional instruction of how to operate the IWB. On the contrary, they are quick in adapting to this new technology in the classroom. The Abbotsleigh kindergarteners enjoy lessons on the IWB and
have a very positive attitude towards the technology. Additionally, the teachers were able to extend their lessons by incorporating practical interactive activities via IWBs.

The researchers noted few limitations of IWBs. It could take a lot of space in the classroom and be a distraction for some of the students. It is also important to emphasize that the IWB is a tool that does not substitute traditional teaching methods, but enhances “existing teaching practices (Preston & Mowbray, 2008, p. 53).

The action research at Abbotsleigh Junior School confirmed that IWBs help teachers in revealing students’ background knowledge, developing interactive lessons and assessing young learners. The researches explain that IWBs create venues for exploring a variety of learning styles. Students in the classrooms with the IWBs are engaged and excited. Kindergarten students, whose attention span is short, are motivated by the IWB’s activities that involve physical manipulation, highly visual exploration, and auditory options (Preston & Mowbray, 2008). In addition, the authors point out that the IWB is an excellent tool for assessing and developing students’ self-esteem. Kindergarten students could experience challenges when asked to record their observations in science; however, the IWB helps the teacher provide sufficient scaffolding and enough modeling (Preston & Mowbray, 2008).

The researchers have found that young children substantially benefit from the use of IWBs in the classrooms. Preston and Mowbray (2008) are hopeful that the positive reflections and experiences of the Abbotsleigh teachers and students will encourage adoption by the schools of this technology and will promote further research and development of science based interactive games and activities. This will help to build interest and knowledge in science from the early age.
Preston and Mowbray (2008) reflected on the successful strategies the Abbotsleigh teachers and students had with IWBs’ utilization in the early education classrooms. Morgan’s (2010) study discusses the needs to effectively blend play and learning with the help of IWBs.

In his article Morgan (2010) analyses the findings of the research on the practice of IWBs’ use with young students. The study was conducted with the purpose to understand how this technology is being utilized in classrooms with 3 to 7 years old children in South Wales, UK. Morgan (2010) looked closely at the previous research that provided evidence for the educational value of play at the early age of schooling, and aimed to examine how current IWB’s use supports that evidence.

The researcher selected thirty settings with 18-30 children from 3 to 7 years old. Data consisted “of semi-structured interviews with the class teacher, observations/field notes of lessons, video recordings of lessons and opportunistic dialogues with the children” (Morgan, 2010, p. 96). The author categorized the gathered data as the IWB’s utilization for the whole class instruction, group work and student’s independent use.

Most of the observed classroom instances with the utilization of the IWB fell into the whole group instruction category (51 out of the 60). It was a teacher-centered approach of instruction, during which students were supposed to be listening to the teacher. The next most frequent use of the IWB was during the group work (41 out of 60 sessions). The planned activities were usually “repetitive and undemanding and frequently did not demand any ‘higher-order’ thinking” (Morgan, 2010, p. 98). Students were frequently bored and not engaged, except for the moments when it was their time to manipulate the IWB.

Only 3 instances out of the 60 in the group work category were “supportive of communication and collaboration” (Morgan, 2010, p.99). In all of these instances students
associated their activities with play. In a second grade classroom, the teacher supported the interactive play by encouraging discussion among students. In a first grade classroom, the teacher used the IWB to visually reflect on students’ experience in building shelters outside of the school. Photographs and students’ thoughts were displayed on the IWB, and children were able to practice creating similar reflections. In another first grade classroom, students used the IWB to view the video of their role play, and deepened their knowledge of the Welsh vocabulary.

During the independent use of the IWB, students were engaged in informal play. However, these instances became rare as the teachers prohibited students to play due to the loss of the IWB’s tools and change in games’ settings. It is important to note that children view the IWB as a tool “belonging to the teacher” (Morgan, 2010, p. 99).

According to teachers’ reflections about having the IWB in the classroom, all of them were positive and promoted the idea of learning through a play. All of the teachers saw their use of the IWB as engaging. The teachers talked about the visual component that the IWB adds to their lessons. They emphasized the opportunities for student reflection and ideas’ representation via the IWB.

Morgan (2010) provides some characteristics that he intended to find connections to the IWB’s use in the observed classrooms. He identified these characteristics based on the sociocultural theories of learning. Morgan (2010) refers to the theories of Vygotski and Rogoff in his article (p. 100). The list comprises of four requirements: collaborative work, where the IWB plays an important purpose; working on the IWB’s activity, where the learner and the teacher are the ones in the control; engagement in the higher-order thinking, when playing on the IWB and knowledgeable support provided by the teacher.
In spite of the positive reflections of the teachers about IWBs’ use in the classroom, only four observations out of 60 were consistent with these requirements. Unfortunately, the rest of the observed sessions demonstrate “a more instructionist form of pedagogy” (Morgan, 2010, p. 101). Even though all of the teachers referred to their way of using the IWB as engaging, the findings of the research demonstrate a teacher-centered approach to learning with the IWB. Additionally, students described only three activities as playing, while all the teachers stressed in their reflections the importance of play in learning (Morgan, 2010, p. 101). The teachers identified much value using the IWB for assessing students. The teachers believe that play and assessment via the IWB’s use should be researched in more detail. Throughout the study the students’ ability to quickly develop confidence when using the IWB was noted, although that needs to be explored further.

Morgan (2010) provides important suggestions for incorporating successfully the IWB with sociocultural principles. The author writes that representation, organization, communication and collaboration of ideas via the IWB are important (Morgan, 2010, p. 102). In addition, the IWB should be utilized for visualization and reflection in the classroom. However, the findings demonstrate that teachers tend to use the IWB in a more teacher-centered approach. Therefore, Morgan (2010) writes that more support should be provided to educators for using the IWB to the advantage of both teachers and students.

The previous research demonstrates that teachers and young students benefit from the incorporation of IWBs to their teaching and learning. Preston and Mowbray (2008) described successful strategies for IWBs’ use for lesson introduction, detailed modeling and extension, as well as for effective ways of engaging and assessing kindergarteners. Morgan’s (2010) study
encourages teachers to steer away from teacher-centered approach of teaching with IWBs. The authors see much value in learning through play that IWB’s support.

**Student-Centered and Visual Approach to the Interactive Whiteboard’s Use**

Indeed, the research demonstrates that the student-centered approach to teaching and learning with IWBs has a variety of benefits. The study conducted by Zittle (2004) emphasizes the importance for making the instruction more student-centered by adding manipulative and visual components to it. When doing so, students’ attention and subsequently achievement have shown improvement. Similarly, Solvie (2011) points out that students’ engagement improves when they manipulate the IWB. Bruce, McPherson, Sabeti and Flynn (2011) have found that visual and student-centered instruction supports teaching and learning. Finally, Beeland (2002) finds that student engagement increases when visual characteristics of the IWB are fully utilized. All of this research creates a foundation for understanding of how the IWB needs to be utilized by educators.

Zittle (2004) explored the effects of IWB’s lessons on the students’ achievement in geometry lessons on 3-dimensional cubes. The researcher concentrated on low performing Navajo students in his study with the purpose to find solutions to close the Native American achievement gap. The article highlights the need for improving teaching methods and strategies and for finding ways to make mathematics’ instruction student-centered and engaging. The study intended to demonstrate that students whose teachers used the interactive whiteboard for math instruction have higher test scores than the students whose teachers used the same lesson but on individual computers.

The researchers had 2 groups of students: the comparison group and the experimental group. The comparison group and the experimental group were exposed to the same geometry lessons,
with the distinction that the former group worked on individual computers, while in the latter one their teacher employed the tools of the interactive whiteboard. Pre- and post-assessments were used to compare the growth between 2 groups of students. Additionally, observations and interviews were conducted for further clarification of the students’ level of engagement in the classrooms with interactive whiteboards.

The sample consisted of 92 students (3rd and 4th graders), 53 of whom were included in the control group and 39 students in the experimental group. Most of the participants were Limited English Proficient (LEP) Navajo students from low income households, whose academic achievement was below the national average.

The results of the study confirm the hypothesis that using the IWB for mathematics instruction demonstrates students showing greater growth when pre- to post-test gains are compared with the results of the students that were using individual computers for the same lessons. There were found statistically important differences between the two groups of students. The average gain score for the IWB group was 20.76, while for the control group it was 11.48.

The findings demonstrate that students benefit from IWB lessons. It is a visual and very interactive tool that enhances students’ engagement and understanding of the academic concepts. Students whose teachers used the IWB for their math lessons outperformed students whose teachers did not. This innovative technology not only provides visual support, but actively engages students into the lesson by allowing to manipulate content on the board. One of the effective ways to make education more student-centered is to add visual and manipulative component to it, which could be done with well-developed IWB lessons.

Thus, Zittle (2004) confirms that students benefit from visual and student-centered approach to teaching and learning with IWBs. The following research also supports the notion that
physical manipulation of the objects on the board has a positive effect on student engagement, even though the author suggests that more research is needed in this area.

Solvie (2011) conducted research investigating variation in student attention between literacy instruction with and without the utilization of the IWB. The author intended to examine if IWB use in the classroom positively affects student attention. The researcher’s conclusions demonstrate that further research in this area of study will be highly beneficial.

Solvie (2011) explains that student attention is an important variable in early literacy skills acquisition. For the research, she defined attention as “looking at the speaker, looking at the digital whiteboard, looking at reading material, manipulating props and materials used to present material during the literacy lessons, and not manipulating other material that are not part of the literacy lesson” (Sovie, 2011, p.1).

The participants of the study were 16 first graders (six girls and ten boys) from a self-contained classroom in an elementary school in Minnesota. These students were at a wide range of reading levels. One teacher led both types of literacy lessons: with and without the IWB. Another teacher was observing and recording the data during the study.

During the 26 alternating (with and without the use of the IWB) lessons the observing teacher was recording the data. The data on student attention was collected during the whole group literacy instruction, which lasted 30 minutes. Before beginning the literacy lessons, the teacher revisited with the students the definition of attention. The observing teacher tallied the minutes when the students were attentive and the time when they were not paying attention during the lesson. At the end of the research, each participating student answered 10 interview questions about their attention and participation during literacy lessons.
The lessons with the IWB required the students to read aloud, write on the text displayed on the IWB, answer the questions about that text, write on the board with markers or fingers, as well as use various tools available with the use of this technology. The lessons without the IWB involved the students in reading text from a non-digital whiteboard and vocabulary words from cards. Both types of lessons required the students to apply the learned skill using reading books in the classroom.

The research demonstrates that the use of the IWB during literacy instruction does not significantly impact student attention. According to comparison of total time on task, 9 students slightly improved their attention and two students remained on the same level during the literacy lessons delivered with the help of the IWB. 5 students actually showed better results in attention during the lessons without the IWB.

Among the limitations of the study, Solvie (2011) mentions that it may have been beneficial to remove distractions, such as pencils, books, and cards, that interfered with students’ attention. In addition, the researcher notes that students’ placement during the lesson also could be an important factor in measuring student attention during lessons, which was not taken into consideration in this study. In addition, student versus teacher manipulation of the IWB’s tools was not recorded.

Therefore, in this study student attention did not show significant improvement when the IWB was included in the literacy lesson. There was a certain level of enthusiasm observed among the students with the integration of the IWB into the lessons; however, student engagement was obvious when they, and not the teacher, were the ones manipulating the board. The researcher suggests that further investigation is needed on student attention with such variables as student versus teacher manipulation of the IWB, as well as the length of the lesson.
Even though Solvie (2011) has not found significant impact in students’ attention with the IWB’s incorporation, the author observed strong correlation between students’ engagement and manipulation of the IWB. Another study, confirming that IWBs’ integration supports teaching and learning through visual and student-centered approaches, has been done by Bruce, McPherson, Sabeti and Flynn (2011).

Bruce (2011) conducted a study with the purpose to identify whether interactive whiteboards (IWB) “support teaching and learning” in mathematics, and if they did, the researchers were interested to see how did it look like (p. 439). The researchers also examined the role of gestures in the classrooms with IWB. They specifically looked at how physical gestures support visual learning with the technology. This study demonstrates that the IWB enriches instruction in math by making positive effect on student learning, communication and reasoning.

For the purpose of this research, the authors established criteria based terminology, which included such developed definitions for significant learning moments, productive instances, reproductive instances and problematic instances. According to Bruce et al. (2011), significant learning moments happen when students’ understanding enhances because of the IWB’s use (p. 434). During productive instances, the IWB plays a role in ideas and concepts’ development. As for reproductive instances can the IWB activities be easily replaced with other educational tools. Problematic instances refer to experiencing technological difficulties when using the IWB.

As noted by the authors, the research took place in Ontario, Canada. 2 case studies (Case Study A and Case Study B) involved collecting data from 2 classrooms during an 8 month period. Case Study A comprised of a teacher and 24 students, 11 and 12 years old. Case Study B involved a teacher and 29 students of 10 and 11 years old. Both Case Studies’ teachers have received support and training in IWB’s use.
Data was collected in the form of “20 detailed field notes of observed lessons, transcribed teacher interviews, 18 student interviews, over 12 hours of videotaped math lessons, and 46 student surveys” (Bruce et al., 2011, p. 437). Furthermore, the researchers categorized the data as productive, reproductive, and problematic instances. The data analysis consisted of 5 steps: revision of the gathered data, coding (productive, problematic, and reproductive), video analysis and coding, matching the codes to interviews, and gesture analysis (Bruce et al., 2011, p. 438).

The results of the study revealed that the IWB supports teaching and learning. The researchers recorded 692 (89% of all coding) productive instances of IWB use, while only 15 (2% of all coding) reproductive and 71 (9% of all coding) problematic. During productive instances teachers relied on various tools of the IWB and internet links. Even though student engagement was not the focus of the study, it was noted to be high.

The researchers clarify that the significant learning moments happen during productive instances. The study categorizes the significant learning moments as visual support for communication, shared student reasoning, and effective small group learning. Key mathematical concepts and procedures were delivered using highly visual tools and activities that the IWB offered. According to students’ responses, the IWB’s visual support had a positive effect on their learning. Students were able to reflect and share their thinking with facility on the IWB. It also helped to consolidate students’ learning via comparisons and discussions that the IWB supported (Bruce et al., 2011, p. 444). When comparing small group work, the groups that had an opportunity to use the IWB for the particular activities, came to the conclusion faster than the groups that did not use the IWB.

The researchers also looked at gesture influence in the classrooms with the IWB. The 2 episodes examined in this article demonstrate that the use of gestures with the IWB could vary
and depend on circumstances. However, in general, the IWB provides support to mathematical communication and reasoning through gestures (Bruce et al., 2011, p. 450).

The findings of this article demonstrate that the IWB supports students learning in mathematics. Students experience positive learning moments during the IWB’s instruction and use, because of visual and collaborative learning support it offers. In small group work students who used the IWB were more open to take risks and come to conclusions faster than the groups that did not work on the IWB. It is important to note, that both of the Case Studys’ teachers were very committed and planned student-centered instruction when using the IWB. Bruce et al. (2011) recommend that teachers should receive professional development that focuses on student-centered IWB instruction that supports student engagement.

Similarly to the previous study, Beeland (2002) has found that IWBs support students’ learning by increasing their engagement. However, the variable that has made the greatest impact on student engagement was the visual component of IWBs.

Beeland (2002) conducted a study with the purpose to determine whether the use of the IWB’s affects student engagement. The researcher also wanted to identify the instructional methods that bare the greatest impact on student engagement when using the IWB. Beeland (2012) explains that the IWB supports visual and auditory learning as well as allows physical interaction with the content. The author’s research for the study proves that the listed characteristics of the technology’s use in the contemporary classroom meet the needs of a wide range of learners.

Ten teachers and 197 students participated in the study. 197 students completed surveys and 20 students (two from each classroom) completed questionnaires, the purpose of which was to determine the level of student engagement and motivation during instruction. The surveys and
questionnaires provided answers to student attitude towards the IWB’s use. During lessons’
observation, the researcher took note of visual, auditory and physical utilization of the
technology. The teachers also completed surveys and questionnaires providing the reasoning
behind their decision to use the IWB for the specific lesson activity and their attitudes towards
the using of the IWB.

The research confirms that the use of the IWB has a positive effect on student engagement.
The answers on the survey’s questions about the engagement effects were distributed between
“agree” and “strongly agree”. The questions about the enjoyment of the IWB’s use shows most
of the students agree with them. The teachers’ answers provide similar information. They rated
the highest characteristics of the IWB’s use as interesting, relevant, appealing and involving.
Important, fascinating and needed characteristics have the lowest ratings, however, still scored in
the average range. As demonstrated by the students’ and teachers’ responses, the research
question about student engagement in the classroom with an IWB has been answered
affirmatively.

When the techniques of the IWB’s use in the classroom were compared to the survey’s
results, the researcher was able to explain to what degree the method of use affects student
engagement. Interestingly, the frequency of the physical interaction with the whiteboard was the
least important variable in determining the correlation with the level of engagement. The
students from the classes with the highest scores for student engagement had minimum or no
contact with the interactive whiteboard. These were also the classes that utilized the most
multimedia resources. The type of an activity or lesson could play a significant role on the level
of student engagement during a lesson developed for an interactive whiteboard. For instance, the
students that had lower ratings on their surveys were mostly using the IWBs for working with texts.

The results of the research demonstrate that student engagement increases with the use of IWBs. Specifically, the visual component that the IWB adds to the lesson plays a major role in students’ positive responses on attitude surveys and questionnaires. It should be noted that the type of activity could be among the primary reasons for the engagement level.

This section reviewed the effectiveness of the IWB use on students’ achievement in math and on their level of engagement. The main characteristics of the IWB that positively impact these variables were the visual and manipulative components of the IWB’s instruction. The studies confirm that student-centered approach to the IWB’s instruction requires manipulation of the objects on the board as well as highly visual representation of the learned content. However, according to Beeland (2002) the visual representation of content has a greater impact on student engagement than the manipulative attribute.

Following this, the final section will continue highlighting the importance of student-centered learning with the IWB; however, it will also address the effect of the frequency of this technology use on student achievement.

**The Effects of the Frequency of the Interactive Whiteboard’s use on Student Achievement**

The research articles in this section point out that the frequency of the IWB use bares significant importance on student achievement. Wuerzer (2008) studied the effects of daily literacy instruction with IWBs on English Language Learners achievement in this area. Swan, Schenker, Kratcoski and van’t Hooft (2007) examined student achievement in reading, language arts and mathematics when the teachers utilized IWBs. Both of the studies highlight the importance of the frequent use of this technology on student achievement.
In her research, Wuerzer (2008) explored the effects of IWBs’ use on the Limited English Proficient (LEP) students’ achievement in literacy during the school year. The purpose of the research was to find a new and efficient method of teaching high frequency words to LEP students. In order to be on level at the end of the academic year, students at Hillandale Elementary, where the project took place, have to be able to read and spell correctly 100 high frequency words. Therefore, English Language Learners are at a significant disadvantage when it comes to the school’s adapted North Carolina’s K-12 assessment.

The participants in the study were 2 second grade classes, one of which had access to the IWB, while the other did not. The classroom with the technology contained nine LEP students, and the classroom without the IWB had six LEP students. For the more detailed data analysis, researchers selected three female LEP students from each of the classrooms. These students had similar levels of English proficiency and came from Spanish dominant households.

Two second grade teachers, who participated in the research, taught the same material and followed the same thematic monthly plans with the difference of one teacher using the IWB daily for the spelling and writing activities, while the other did not.

For establishing the baseline students took a pretest of reading and writing 100 frequency words during the first two weeks of school. Additional spelling tests occurred weekly, and each seventh week students had a review test of the preceding 6 weeks’ words. Students had a lot of exposure and additional practice of spelling during the year. For instance, students participated in September, January and May Word Sprees competitions, where they had to spell words correctly in 5 minutes. Also, quarterly writing samples were collected and evaluated.
The second grade students from the classroom with the IWB used it daily for reading, spelling and writing sentences. The technology was also utilized for different spelling games, teacher modeling and internet access.

According to the Word Sprees results from September to May, 3 students who used the IWB outperformed in number of words they wrote (18.7 gain) the 3 students who did not have the technology (9.3 gain). When comparing the results of all LEP students participating in the research, the students from the classroom that did not have the IWB slightly outperformed (12.9 gain) the students who did (12.6 gain).

The results of the seventh week review test revealed an insignificant gain for the 3 focus students with the IWB (49%) when compared to the students that did not have the technology (46%). Similar results are found for the whole LEP participating group: 50.9% gain in the classroom with the interactive whiteboard and 49.6% gain in the classroom without.

In the reading assessment the 3 students that had an advantage of using the technology read all the words correctly and, therefore, had 100% accuracy. The 3 students from the classroom without the IWB had 93% accuracy in reading high frequency words. There was no significant gain found among all LEPs participating in the research students.

As for the writing samples, the 3 students that were using the IWB daily have demonstrated higher use of frequency words and higher consistency in correct spelling than the students that did not have the access to the technology.

Overall the 3 students using the IWB for reading, spelling and writing made significant growth in their English Language Proficiency. At the end of the school year, all of them were on level or above level in reading. Only one student was slightly below level in writing and math.
All LEP students who had the IWB in their classroom benefited from the daily use of it. Many of these students do not have access to technology at home. The exposure to different methods of learning made other significant positive differences for those students that are difficult to reflect with test scores.

Similarly, Swan et al. (2007) have studied the impact the IWB’s utilization make on student academic achievement. Their findings confirm the results of the previous research in the area of the frequency effects.

Swan et al. (2007) studied the effects of the teachers’ use of IWBs on students’ achievement in reading, language arts and mathematics. As a result of the study, the researchers intended to clarify if the use of IWBs affects positively students’ performance on standardized tests. The authors wanted to compare the test gains in math, reading and language arts between students whose teachers use IWBs outperform students whose teachers do not use them. In the process of the study the researchers had to investigate for the explanation of the test results’ differences among the classes that had IWBs.

The data used in the research was taken from the Ohio Achievement Test (OAT) in reading, language arts and mathematics for the 2006-2007 academic year. The analysis of variance (ANOVA) determined the difference between the students’ scores of the teachers who used the IWB and those who did not use them. The weekly online surveys completed by teachers using IWBs were considered in deciding whether the frequency of IWBs use and the level of engagement played a role in the differences in test results. In addition to the weekly surveys, the researchers had two focus groups that included the teachers who used IWBs. These teachers had an opportunity to share their attitudes and experience towards the effects of the IWB’s use in
their classrooms. Finally, the self-report data between the teachers, all of whom used this technology, was compared for the explanations of the differences in test results.

More than 3,000 students from Ohio district’s 11 elementary schools, 3 junior high schools and 1 alternative school participated in the research. Reportedly, 33% of the district’s student population are minorities, including 21% African-Americans and 8% of the students that live below the poverty line. Additionally, 72 teachers (15 males and 57 females) who used IWBS from grades 3-8 were involved in the study.

The findings in mathematics achievement and in reading achievement demonstrate that students from the classrooms where the teacher used the IWB slightly outperformed the students whose teacher did not have the technology. As researchers point out, the general results are important statistically and do not bear significant meaning. For example, the authors found statistically significant gains only in mathematics, and since the differences are small they do not bear important meaning. On the other hand, some statistically significant and meaningful differences are found at specific grade levels in mathematics (fourth and fifth grades) and reading/language arts fifth and eighth grades). The researchers explain that between the educators who used the IWB, the teachers that employed this technology tool more frequently (almost every day when compared to three times a week) and engagingly (student-centered), had students who significantly outperformed their peers with and without the access to IWBS.

The teachers who used IWBS and whose students’ scores were statistically significant and meaningful employed the technology more frequently and in a more engaging way. The study demonstrates that the usage of IWBs positively affects student achievement. However, it also shows that it is important to take into account how technology is being utilized by the teacher.
Creative and student-centered everyday instruction with the IWB creates a noticeable positive effect on students’ academic performance.

The Wuerzer (2008) study shows that LEP students benefit from the IWB’s incorporation into instruction. This technology reinforces student engagement and comprehension by adding a highly visual aspect to academic content. Daily and repetitive usage of the IWB helped to raise LEP students’ achievement in literacy. Swan et al. (2007) also maintain similar findings. However, it is important to note that the last article, in addition to emphasizing the importance of the frequent utilization of the technology by the teachers, confirms that a student-centered approach is crucial in teaching with IWBs for raising student achievement. Both of the studies help to develop a platform for beneficial evidence of every day usage of IWBs in teaching and learning.

Conclusion

With the goal to purposefully highlight and create a deep understanding of the effects of the IWB’s use on teaching and learning, the review of the literature has been divided into three sections.

In the first section the discussion centers on the use of the IWB with young students. According to Preston and Mowbray (2008), young students benefit from the use of the IWB in the classroom. The authors prove that the IWB is an effective technological tool for introducing lessons, revealing students’ background knowledge, giving detailed instructions, concluding lessons, and assessing students. Additionally, the IWB helps to differentiate teaching practice by providing additional venues for employment of innovative strategies and interactive activities. Morgan’s (2010) study supports a play-oriented approach to teaching and learning with the IWB
in the early education classrooms. Both articles reveal that interactive and student-centered utilization of the IWB enriches educational experiences of both teachers and students.

The second section explores in detail the advantages of student-centered and visual approach to the IWB’s use. Students that learn with the IWB demonstrate greater academic achievement in mathematics (Zittle, 2004). The researcher validates his findings by explaining that teachers developed interactive and visual activities and gave opportunities for students to manipulate the content on the board. Solvie (2011) also points out that student-centered methods, in other words, when students are the ones manipulating the objects on the IWB, enhance student engagement. Bruce et al. (2011) found that the IWB assists teaching and learning in mathematics by offering visual support for communication, sharing and comparing mathematical work. However, the researchers maintain that teachers’ commitment to creating student-centered lessons is significant when considering the results of their study. Beeland’s (2002) states that the visual component that the IWB adds to the lesson has a greater impact on students’ engagement than the physical interaction. All of the research in this section confirms that student-centered and visual teaching and learning with the IWB enhances student engagement and, therefore, achievement.

The third and final section of the literature review focuses on the research that has been done in the area on the effects of the frequency of the IWB’s use on student achievement. Wuerzer (2008) has found that LEP students’ literacy achievement improves when the IWB is utilized on a daily basis. Similarly, Swan et al. (2007) state that the frequent and engaging use of the IWB improves students’ scores in reading, language and mathematics. Even though the researchers point out the frequency as an important variable in the improvement of students’ achievement, it
is necessary to mention that they also stress the significance of the student-centered approach to teaching and learning with the IWB.

The 3 sections of the literature review help to deepen an understanding and build background knowledge about the effective uses of the IWB with students. The research confirms that students benefit from the IWB’s use. Every article in this chapter mentions that a student-centered approach, where students are the ones manipulating the content on the board, plays a significant role in the results of the research. The visual component that this technology offers is also an important variable in most of the research discussed above. Finally, the frequent use of the IWB has been found to be important as well, especially when combined with student-centered and visual approaches to teaching and learning with the IWB.

Chapter 3

Procedures for the Study

After reviewing the current studies about the use of the IWBs with young students, student-centered and visual approach to teaching and learning, and the effects of the frequency of the IWB’s use on students’ achievement, the researcher has developed a frequency and student-centered strategy for the IWB’s use during the phonemic awareness intervention.

Introduction

The study was conducted at a Midwestern public school. IWBs have been a quite recent addition to the everyday instruction at the school. In fact, this technology was first integrated in the 2010-2011 academic school year. With each subsequent year the number of IWBs in the building grew. During the 2012-2013 school year, the school has acquired 7 more IWBs reaching the total number of 13 IWBs in the building. The school’s administration plans to have this technology available in every classroom in the near future.
The integration of IWBs into the school’s daily instruction served as the motivation for the following research. The researcher participated in the professional development that focused on learning about the use of this technology in the classroom and provided training in the development of the engaging student-centered activities for IWB. The participation and successful completion of the professional development guaranteed the IWB’s placement and stay in the classroom where the research took place. The school district’s professional development program sponsored the training of teachers and the installation of IWBs in the classrooms of the teachers who participated in this professional development. The certificate of completion of the professional development is attached in the appendix C.

The following study intended to determine whether the frequency of manipulation of the IWB by the students during the small group phonemic instruction had a positive effect on students’ achievement in this area. The hypothesis was the students that had an opportunity to manipulate the tools of the IWB during the phonemic instruction would have higher assessment scores in phonemic awareness.

Description of Sample Population

The school’s enrollment for the 2012-2013 academic year was comprised of 578 students, which included 23% African American, 2% American Indian, 0.3% Asian, 64% Hispanic and 10% white students. 23% of students received special education services and 98% of students received free and reduced lunch. The school had 37% of English Language Learners (ELL) during that academic year.

The school operated within a bilingual developmental program. This program achieves bilingualism and biliteracy outcomes by providing the academic setting and instruction in the minority language. Starting at kindergarten, minority language students are exposed to the
instruction in their native language for 80-90% of the time. Each subsequent year the percentage of the minority language use diminishes, while the percentage of the majority language use increases. Developmental bilingual education has minority language development as its focus, especially in the early stages of the students’ education.

The SAGE classroom where the study took place had 29 Hispanic students and 2 teachers. The researcher was a lead teacher for 13 students. Close collaboration between the 2 classroom teachers and their students was observant.

13 Hispanic kindergarten students, 7 females and 6 males, participated in the study. The group was quite homogeneous, meaning that all of the students were on similar levels in their reading and writing skills. 12 students started the year in September, and only 1 student was transferred to this classroom in the middle of the academic year. The daily instruction was conducted in Spanish. Students received English as a Second Language (ESL) services for half an hour a day.

Students who participated in the study received 20 minutes of daily small group phonemic instruction with the use of the IWB. The developed phonemic activities for the IWB served as a literacy center for the letters of the unit focusing on sorting images, reading syllables and building words. All the instruction for all of the time occurred within 1 classroom.

**Description of Procedures Used**

The researcher determined 6 weeks for the duration of the study, which could be further divided into 2 stages. The kindergarten curriculum was an influential factor in planning for the duration and stage division of the study. The school, where the research took place, had kindergarten curriculum with 10 sequential literacy units; each of the units focused on a specific
theme, letters of the alphabet and high frequency words. Every unit lasted 3 weeks and was followed by the assessment. The following study covered 2 kindergarten curriculum units.

During the first stage of the study, or the first 3 weeks, the researcher used the IWB during small group phonemic instruction in a teacher-centered manner, meaning that the teacher, and not the students, was the one manipulating the board for the majority of the time. For the period of 20 minutes of a daily small group phonemic instruction, students had 1 or no opportunity at all to manipulate the content on the IWB. Each participating student had a chance to touch the objects on the IWB for the total of 3 times per week.

During the second stage of the study, or the second 3 weeks, the students manipulated the content on the IWB more frequently. The instruction was student-centered, meaning that every student had an opportunity to manipulate the content on the IWB for at least 3 times during the 20 minutes of small group daily phonemic instruction. By the end of the week, each student had a total of 15 chances to move the objects on the IWB.

Developed and utilized in the two stages of the research the IWB’s phonemic activities had the same purpose and characteristics. The two types of phonemic activities used in the research were sorting and word building. For the sorting activities, the researcher made a table with 5 columns with the titles corresponding to the 5 syllables: consonant of the week plus 5 Spanish vowels. Under the table the researcher put a variety of images that started with the syllables in the table. Students who participated in the study had to move and place pictures under the correct beginning syllable of the word corresponding to the image.

As for the word building IWB activity, the researcher placed an image in the center of the whiteboard screen with a blank rectangle beneath it, divided into squares for each letter of the word. There were letters available for the students to move and place into the correct squares to
make a word that corresponded to the image on the page. Each word had a focus letter of the week. The word building IWB activity had 1 image on the IWB’s screen, and to go to the following page, the participating students had to press the arrow sign on the bottom of the screen. The IWB’s sorting and word building activities used in this research are available in the appendix A of the study.

The group for the IWB literacy center consisted of 4 to 5 students. For the sorting activity students took turns to place an image into the correct column. The student had to read the syllable under which he or she placed an image as well as to name the image. For the word building activity, students took turns to place one letter into the correct square. The student not only had to move the letters into the correct square, but to tell the name of the letter and the sound it made. After the word was complete, students were required to count and name syllables and sounds in it. Physical movement was often paired with counting and naming syllables and sounds. The students applauded for each syllable and acted out a basketball game with an imagined ball bouncing from the floor for each sound and shooting into a basket when the whole word was pronounced. During the first stage of the study, the teacher was taking a lead in moving images and letters on the IWB. The students took turns in giving answers while the teacher reflected their answer on the IWB by moving images and letters. Throughout the second stage of the study, the students were the ones manipulating the content on the IWB.

**Description of Data Collection**

The study was conducted during 2 sequential kindergarten literacy units (unit 7 and unit 8). Throughout both stages of the study, the researcher collected the data via the units’ formal assessments and dictated assessments. The unit assessment came with the program, and the researcher developed the dictated assessment. The researcher used the same unit test and dictated
assessment for testing before and after the 3 week instructional period. Students who participated in the study took pre and post unit tests as well as pre and post dictated assessments. The researcher compared the test results for the growth of pre and post scores between the 2 unit tests and the 2 dictated assessments.

The units’ tests comprised of several parts, each of which was focusing on a specific literacy skill: listening comprehension, knowledge of high frequency words, phonemic awareness, and units’ vocabulary. For the purpose of the study, listening comprehension and units’ vocabulary parts of the tests were not included into consideration. Out of the total 27 questions of the test, only 17 assessed the phonemic awareness skills reinforced by the IWB’s utilization in the classroom. The dictated assessment comprised of 10 words that included 2 high frequency words and 8 words with alphabet letters of the unit.

The researcher conducted pre and post assessments with 3 or 4 students at a time. She recorded and tracked the progress of each student’s scores for the phonemic sections of the units’ assessments and dictated assessments. The data collection was confidential.

Additionally, students completed the attitude survey about the frequency of use of the IWB for the phonemic instruction. The researcher used the same survey before beginning the study and after completing it. The survey asked the students to color a happy (always), indifferent (sometimes) or sad (never) facial expression in response to the two questions: “Do you like using the IWB for learning to read?” and “Would you like to use more frequently the IWB for learning to read?” The researcher did not split students into groups to take the survey: all 13 students completed their surveys at the same assigned time.

The researcher kept a time log for each stage of the study to monitor the quantity of each student’s manipulation of the content on the IWB.
Chapter 4

Results

The researcher collected the data from 13 students throughout the period of 6 weeks. This chapter presents the data and its analysis in regards to the applied intervention. The focus of the intervention was the effects of the frequency of the IWB’s use on student achievement in phonemic awareness.

Introduction

The data were collected from 2 formal assessments, 2 dictated assessments and 1 attitude survey during 6 weeks. Each of the assessments and attitude survey were conducted prior and after the interventions (samples of assessments and survey are included in the appendix B). Students completed pre and post tests in small groups of 5, and all of the 13 students took the survey at a time. For all of the assessments the researcher made sure the students did the work individually. The students had dividing folders separating them from each other. The formal assessments took approximately 30 minutes; the dictated assessment took about 15 minutes and the survey took 5 to 10 minutes to complete.

The researcher used all student data in the study. The pre and post test results were compared and the growth in between them calculated. The average scores for pre and post assessments as well as for the growth were also calculated. The individual and average scores for each of the unit’s assessments and dictated assessments were compared and analyzed for the differences, similarities and possible patterns.

The data are presented across all students and organized into comprehensive tables. Among 13 students, 7 are females and 6 are males. In the tables this information is distinguished by
color: females’ results are found in pink columns, while males’ scores are located in white columns. There were no significant differences noticed between females and males’ results, therefore, the following analysis does not feature distinctions between genders. Student 2* has a star that distinguishes her from the rest of the group. She was a new addition to the classroom: student 2* started at the school in March of 2013.

This chapter is divided into 4 sections. First, the researcher presents and analyses the data from unit 7. The focus of the second section of this chapter is the analysis of the data from unit 8. In the third section, the researcher compares and analyzes the differences and similarities between the results from the two units. Lastly, the attitude survey results are presented and analyzed. During the detailed analysis of the results of the study, the purpose of the research served as an explanatory as well as an influential condition in the outcomes.

**Presentation and analysis of the data from unit 7**

During the 3 weeks of 20 minute daily phonemic instruction for the unit each student touched the content on the IWB approximately 9 times. All 13 students took the pretest before unit 7 was taught and took the same test (post test) after the study of the unit was finished.

The average for the pretest was calculated at 86.2%, the average for the post test was at 93.5%, resulting in the average growth of 7.31%. Student 2*, who was new to the class, had the lowest score on the pretest in the whole group (71%), but demonstrated considerable growth of 23%. Her low starting point could be explained by her late start in this classroom. Student 7 and student 10 had the same percentage for the pretest and the post test, 100% and 88% respectively.

Student 3, student 8 and student 13 had a drop in their post test. Student 13 had a negative growth of 12. He gained 100% on the pretest and received 88% for the post test. Student 13 was among the 2 students who scored the full percentage on the pretest. He was one of the strongest
students in the group. The negative growth on the test could be explained by the specifics of his emotional or physical state on that day, since he demonstrated consistent growth in all of his other assessments for this research.

Table 1. Unit 7: Formal Assessment.

<table>
<thead>
<tr>
<th>Students</th>
<th>Pretest %</th>
<th>Post test %</th>
<th>Growth %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student 1</td>
<td>82</td>
<td>94</td>
<td>12</td>
</tr>
<tr>
<td>Student 2*</td>
<td>71</td>
<td>94</td>
<td>23</td>
</tr>
<tr>
<td>Student 3</td>
<td>100</td>
<td>94</td>
<td>-6</td>
</tr>
<tr>
<td>Student 4</td>
<td>82</td>
<td>88</td>
<td>6</td>
</tr>
<tr>
<td>Student 5</td>
<td>88</td>
<td>100</td>
<td>12</td>
</tr>
<tr>
<td>Student 6</td>
<td>94</td>
<td>100</td>
<td>6</td>
</tr>
<tr>
<td>Student 7</td>
<td>100</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Student 8</td>
<td>88</td>
<td>82</td>
<td>-6</td>
</tr>
<tr>
<td>Student 9</td>
<td>76</td>
<td>94</td>
<td>18</td>
</tr>
<tr>
<td>Student 10</td>
<td>88</td>
<td>88</td>
<td>0</td>
</tr>
<tr>
<td>Student 11</td>
<td>76</td>
<td>100</td>
<td>24</td>
</tr>
<tr>
<td>Student 12</td>
<td>76</td>
<td>94</td>
<td>18</td>
</tr>
<tr>
<td>Student 13</td>
<td>100</td>
<td>88</td>
<td>-12</td>
</tr>
<tr>
<td><strong>AVERAGE</strong></td>
<td><strong>86.2</strong></td>
<td><strong>93.5</strong></td>
<td><strong>7.31</strong></td>
</tr>
</tbody>
</table>

Percentage of growth for unit 7 could be divided into 4 distinct categories. 3 students had negative growth, 4 students grew 0 to 9 points and 4 students grew 10 to 19 points. 2 students had a significant growth of 20-24 points. Overall, the majority of students showed good progress. 3 students had a perfect score on the pretest and 4 students also had gained a 100% on the post test.

Table 1A. Unit 7: Ranges of Growth.

<table>
<thead>
<tr>
<th>Percentage of Growth</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-12)--(-1)</td>
<td>3</td>
</tr>
<tr>
<td>0--9</td>
<td>4</td>
</tr>
<tr>
<td>10--19</td>
<td>4</td>
</tr>
<tr>
<td>20--24</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 1B. Unit 7: Number of Students with 100%.

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Post test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

The researcher developed the dictated assessment. Students had to write 10 words that the teacher dictated to them. Most of the students demonstrated considerable growth. The average for the pretest was 47.7 and for the post test it equaled to 75.4, resulting in 27.69 average for growth. Only student 12 did not show improvement, remaining with the same percentage for the pretest and the post test. None of the participants had negative growth in this type of assessment.

Table 2. Unit 7: Dictation.

<table>
<thead>
<tr>
<th>Students</th>
<th>Pretest %</th>
<th>Post test %</th>
<th>Growth %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student 1</td>
<td>40</td>
<td>60</td>
<td>20</td>
</tr>
<tr>
<td>Student 2*</td>
<td>40</td>
<td>60</td>
<td>20</td>
</tr>
<tr>
<td>Student 3</td>
<td>20</td>
<td>70</td>
<td>50</td>
</tr>
<tr>
<td>Student 4</td>
<td>60</td>
<td>70</td>
<td>10</td>
</tr>
<tr>
<td>Student 5</td>
<td>30</td>
<td>80</td>
<td>50</td>
</tr>
<tr>
<td>Student 6</td>
<td>40</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>Student 7</td>
<td>80</td>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>Student 8</td>
<td>40</td>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td>Student 9</td>
<td>40</td>
<td>90</td>
<td>50</td>
</tr>
<tr>
<td>Student 10</td>
<td>40</td>
<td>80</td>
<td>40</td>
</tr>
<tr>
<td>Student 11</td>
<td>60</td>
<td>100</td>
<td>40</td>
</tr>
<tr>
<td>Student 12</td>
<td>50</td>
<td>50</td>
<td>0</td>
</tr>
<tr>
<td>Student 13</td>
<td>80</td>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>47.7</td>
<td>75.4</td>
<td>27.69</td>
</tr>
</tbody>
</table>

Percentage of growth ranged between 0 and 50 points. 2 students had growth of 40% and 3 of 50%. None of the students received 100% on the pretest, but 3 gained a perfect score on the post test. All of the students but 1 demonstrated great gains in the phonemic awareness in the material for unit 7.
Table 2A. Unit 7: Ranges of Growth.

<table>
<thead>
<tr>
<th>Percentage of Growth</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>3</td>
</tr>
<tr>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>40</td>
<td>2</td>
</tr>
<tr>
<td>50</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 2B. Unit 7: Number of students with 100%.

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Post test</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

The growth for the dictated assessment was significantly higher than for the formal assessment for unit 7. In the dictated assessment students had to rely on the acquired phonemic skills since there were no options to choose from or images that aided in their response. This was the biggest difference between the two forms of the assessments. With that said, most of the students made significant growth as demonstrated by the results of the dictated assessment.

Presentation and analysis of the data from unit 8

During the 3 weeks of 20 minute daily phonemic instruction for the unit 8 each student touched the content on the IWB approximately 45 times. All 13 students took the pretest before unit 8 was taught and took the same test (post test) after the study of the unit was finished.

The average for the pretest was calculated at 87.6%, the average for the post test was at 98.2%, resulting in the average growth of 5.07%. Student 2* did not have the lowest score on the pretest (82%), and demonstrated considerable growth of 18%. Student 12 had the lowest pretest score of 65%, but reached 88% on the post test. In fact, he had the largest growth of 23%. Student 3
(94%), student 5 (100%), student 10 (100%) and student 13 (100%) had the same percentage for pretest and post test. In this unit’s assessment none of the participating students had a negative growth. Student 13, who had a negative growth of 12% on unit 7, had received 100% on unit 8 pretest and post test.

**Table 3.** Unit 8: Formal Assessment.

<table>
<thead>
<tr>
<th>Students</th>
<th>Pretest %</th>
<th>Post test %</th>
<th>Growth %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student 1</td>
<td>88</td>
<td>100</td>
<td>12</td>
</tr>
<tr>
<td>Student 2*</td>
<td>82</td>
<td>100</td>
<td>18</td>
</tr>
<tr>
<td>Student 3</td>
<td>94</td>
<td>94</td>
<td>0</td>
</tr>
<tr>
<td>Student 4</td>
<td>82</td>
<td>100</td>
<td>18</td>
</tr>
<tr>
<td>Student 5</td>
<td>100</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Student 6</td>
<td>88</td>
<td>94</td>
<td>6</td>
</tr>
<tr>
<td>Student 7</td>
<td>88</td>
<td>100</td>
<td>12</td>
</tr>
<tr>
<td>Student 8</td>
<td>88</td>
<td>100</td>
<td>12</td>
</tr>
<tr>
<td>Student 9</td>
<td>82</td>
<td>100</td>
<td>18</td>
</tr>
<tr>
<td>Student 10</td>
<td>100</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Student 11</td>
<td>82</td>
<td>100</td>
<td>18</td>
</tr>
<tr>
<td>Student 12</td>
<td>65</td>
<td>88</td>
<td>23</td>
</tr>
<tr>
<td>Student 13</td>
<td>100</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td><strong>AVERAGE</strong></td>
<td><strong>87.6</strong></td>
<td><strong>98.2</strong></td>
<td><strong>5.07</strong></td>
</tr>
</tbody>
</table>

The division for this unit’s percentage of growth was maintained from unit 7. No students had negative growth, 5 students grew 0 to 9 points and 7 students grew 10 to 19 points. 1 student had a significant growth of 20-24 points. The majority of students demonstrated good progress. 3 students had a perfect score on the pretest and 10 students had also gained a 100% on the post test.

**Table 3A.** Unit 8: Ranges of Growth.

<table>
<thead>
<tr>
<th>Percentage of Growth</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-12)--(-1)</td>
<td>0</td>
</tr>
<tr>
<td>0--9</td>
<td>5</td>
</tr>
<tr>
<td>10--19</td>
<td>7</td>
</tr>
<tr>
<td>20-24</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 3B. Unit 8: Number of Students with 100%.

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Post test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>10</td>
</tr>
</tbody>
</table>

In the dictated assessment, the majority of the students demonstrated considerable growth. The average for the pretest was 70.8 and for the post test it equaled to 90.8, resulting in a 9.63 average for growth. Students 4 and 11 did not show improvement, remaining with the same percentage for the pretest and the post test. None of the participants had negative growth in this type of assessment.

Table 4. Unit 8: Dictation.

<table>
<thead>
<tr>
<th>Students</th>
<th>Pretest %</th>
<th>Post test %</th>
<th>Growth %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student 1</td>
<td>70</td>
<td>90</td>
<td>20</td>
</tr>
<tr>
<td>Student 2*</td>
<td>70</td>
<td>80</td>
<td>10</td>
</tr>
<tr>
<td>Student 3</td>
<td>60</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>Student 4</td>
<td>80</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td>Student 5</td>
<td>70</td>
<td>100</td>
<td>30</td>
</tr>
<tr>
<td>Student 6</td>
<td>50</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>Student 7</td>
<td>80</td>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>Student 8</td>
<td>80</td>
<td>90</td>
<td>10</td>
</tr>
<tr>
<td>Student 9</td>
<td>60</td>
<td>100</td>
<td>40</td>
</tr>
<tr>
<td>Student 10</td>
<td>70</td>
<td>80</td>
<td>10</td>
</tr>
<tr>
<td>Student 11</td>
<td>90</td>
<td>90</td>
<td>0</td>
</tr>
<tr>
<td>Student 12</td>
<td>40</td>
<td>90</td>
<td>50</td>
</tr>
<tr>
<td>Student 13</td>
<td>100</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td><strong>AVERAGE</strong></td>
<td><strong>70.8</strong></td>
<td><strong>90.8</strong></td>
<td><strong>9.63</strong></td>
</tr>
</tbody>
</table>

Percentage of growth ranged between 0 and 50 points. 1 student had a growth of 40% and 2 students gained 50%. 1 student received 100% on the pretest, and 5 gained a perfect score on the post test. The majority of the students demonstrated great gains in the phonemic awareness in the material for unit 8.
Table 4A. Unit 8: Ranges of Growth.

<table>
<thead>
<tr>
<th>Percentage of Growth</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>6</td>
</tr>
<tr>
<td>20</td>
<td>3</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>50</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 4B. Unit 8: Number of Students with 100%.

<table>
<thead>
<tr>
<th>Pretest</th>
<th>Post Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

The growth for the dictated assessment was not significantly higher than for the formal assessment for the unit 8. Most of the participants had high scores on the pretest for the formal assessment and for the dictated assessment, giving them less room for point accumulation.

Analysis and comparison of the results

This study intended to determine whether the frequency of manipulation of the IWB by the students during the small group phonemic instruction had a positive effect on students’ achievement in this area. The students had an opportunity to manipulate the tools and content on the IWB during 20 minute small group phonemic instruction throughout 6 weeks of the study. During the first 3 weeks (unit 7), each student manipulated the objects on the IWB for approximate total of 9. Throughout the second 3 weeks (unit 8) of the study, each student had approximately 45 opportunities for manipulation. The difference in test results for both of the units is summarized below.

The averages for pretests and posttest of the formal assessments for unit 8 were slightly higher than for unit 7. However, the averages for pre dictation and post dictation for unit 8 were significantly higher than for unit 7. The higher starting point during the second stage of the
study, as shown in the pretests for unit 8, could explain the lower percentage of growth for this unit. It is necessary to point out none of the participating students had a negative percentage of growth for the formal assessment of unit 8, while for unit 7 there were 3 students in that range. In addition, the students’ number for the perfect score of 100% was higher during the second stage of the research. The post formal assessment for unit 7 had 4 students that scored 100%, while the post formal assessment for unit 8 had 10 students with the highest possible percentage. The post dictation assessment for unit 7 had 3 students with perfect score, and for unit 8—5 students.

The assessment results for the second stage of the research were higher in pre and post tests. The lower percentage of growth for the second 3 weeks of the study could be attributed to the highest pretest results.

Table 5. Comparison of the Averages of Formal Assessments and Dictations for Units 7 and 8.

<table>
<thead>
<tr>
<th>Pretest 7</th>
<th>Pretest 8</th>
<th>Post Test 7</th>
<th>Post Test 8</th>
<th>Test Growth 7</th>
<th>Test Growth 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>86.2</td>
<td>87.6</td>
<td>93.5</td>
<td>98.2</td>
<td>7.31</td>
<td>5.07</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pre Dictation 7</th>
<th>Pre Dictation 8</th>
<th>Post Dictation 7</th>
<th>Post Dictation 8</th>
<th>Dictation Growth 7</th>
<th>Dictation Growth 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>47.7</td>
<td>70.8</td>
<td>75.4</td>
<td>90.8</td>
<td>27.69</td>
<td>9.63</td>
</tr>
</tbody>
</table>

Table 6. Comparison of the Percentage of Growth for Units’ Formal Assessments.

<table>
<thead>
<tr>
<th>Percentage of Growth</th>
<th>Unit 7</th>
<th>Unit 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-12)—(-1)</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>0-9</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10-19</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>20-24</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 7. Comparison of the Percentage of Growth for Units’ Dictated Assessments.

<table>
<thead>
<tr>
<th>Percentage of Growth</th>
<th>Dictation 7</th>
<th>Dictation 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>20</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>40</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>50</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 8. Comparison of the Number of Students with 100% for Units 7 and 8.

<table>
<thead>
<tr>
<th>Pretest 7</th>
<th>Pretest 8</th>
<th>Post Test 7</th>
<th>Post Test 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Pre Dictation 7</td>
<td>Pre Dictation 8</td>
<td>Post Dictation 7</td>
<td>Post Dictation 8</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

Attitude surveys

Students who participated in the study completed the attitude survey about the frequency of use of the IWB for the phonemic instruction. The researcher used the same survey before beginning the study and after its completion. The survey asked the students to a color happy (always), indifferent (sometimes) or sad (never) facial expression in response to the two questions: “Do you like using the IWB for learning to read?” and “Would you like to use more frequently the IWB for learning to read?”

In the pre-intervention survey, all students colored the happy face for the first question. However, for the second question, student 7 and student 10 indicated they would sometimes welcome the increase of the IWB’s use for learning to read and write. In the post-intervention survey, all of the students colored a happy face for both of the questions. The increase in the IWB’s use during the second stage of the research had a positive effect on students’ attitude towards the more frequent utilization of this technology for learning to read and write.
Table 9. Attitude Survey.

<table>
<thead>
<tr>
<th>Students</th>
<th>Pre-Intervention</th>
<th>Post-Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st Question</td>
<td>2nd Question</td>
</tr>
<tr>
<td>Student 1</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>Student 2*</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>Student 3</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>Student 4</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>Student 5</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>Student 6</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>Student 7</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>Student 8</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>Student 9</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>Student 10</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>Student 11</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>Student 12</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>Student 13</td>
<td>☺</td>
<td>☺</td>
</tr>
</tbody>
</table>

☺ every time
☺ sometimes
☺ never

Conclusion

During the first stage of the intervention (unit 7) each student manipulated the content on the IWB approximately 9 times, while during the second stage of the research (unit 8) the frequency of manipulation equaled 45 times per student. Averages for the pretests and the post tests were higher for the unit 8. However, percentage of growth for unit 8 was lower than for unit 7. For the formal assessment of unit 7, 3 of the students performed with negative growth, while for unit 8 there were 0 students in that range. In addition, after the second stage of intervention, 10 students scored 100% on the post test compared to only 3 students with a perfect score for the first post test assessment. The frequency change in the IWB’s use did not have a significant effect on students’ attitudes.
Chapter 5
Conclusions

In the following final chapter of this study the data are summarized and analyzed in connection to existing research. The researcher explains the results and identifies strengths and limitations of the study. The results are also considered for the possibilities of further direction that this research can be taken.

Introduction

In the first section of the concluding chapter the researcher connects the results of the current study to existing research in this area. For clarity, the information in this section is presented according to the thematic division of Chapter 2. First, the researcher explains use of the IWB with young students. Second, the student-centered and visual approach to the IWB’s use is addressed. Finally, the researcher discusses the effects of the frequency of the IWB’s use on student achievement. Each part of this section connects the data yielded in the current research to summarized studies, found in Chapter 2.

The second section of the chapter provides explanations and conclusions of the data of the study. The third and fourth sections explain strengths and limitations of the research and give recommendations for future research.

Connections to existing research

Since the participants in the current study were kindergarteners, it was important to consider the research available on the use of the IWB with young students. Successful strategies for the IWB’s implementation in kindergarten for this research were based on the previous studies available in this area. Preston and Mowbray (2008) wrote that students were engaged and motivated by physically moving and representing objects on the IWB and by the visual component that this technology could offer. In the current study, the researcher also developed
IWB’s activities where students had to touch the board in order to move the content. The two types of phonemic activities used in the research were sorting and word building. In the sorting activity students had to move and place pictures under the correct beginning syllable of the word corresponding to the image. In the word building activity there were letters available for the students to move and place into the correct squares to make a word that corresponded to the image on the page. Each page of the phonemic literacy centers had an image or images designed for students to easily correlate the image to the word or syllable (please see appendix A). The IWB’s activities used in this research had characteristics described by Preston and Mowbray (2008) in their study. Students moved images and letters on the IWB, which provided manipulative and visual support for teaching and learning.

Preston and Mowbray (2008) also pointed out that the lessons created for the IWB helped to maintain a positive attitude amongst young students towards this technology. That finding may support why students had positive gains on the attitude survey, which was administered to them in the beginning and in the end of the current study. The increase in the frequency of the IWB’s use during the second stage of the research led to all of the students confirming that they would welcome a more frequent use of this technology. Preston and Mowbray (2008) also wrote that the IWB was an excellent tool for assessing students’ knowledge. In this study, the researcher noted that she was able to quickly test students’ understanding of the material by considering the ease or lack thereof with which a student was placing letters and images on the board into the correct place.

Another major strategy that was considered in the development of the current research was associated with teacher-centered verses student-centered approaches discussed by Morgan (2010). Morgan’s (2010) study encourages teachers to steer away from a teacher-centered
approach to teaching and learning with the IWB. Students need to be given more opportunities to manipulate the content on the board. “Instructional form of pedagogy” with the IWB did not appeal to students (Morgan, 2010, p.101). The current study examined the difference in students’ results and attitudes in regards to the frequency of the IWB’s use. The first stage was categorized by a teacher-centered approach while the second stage had a student-centered approach to the IWB’s utilization for phonemic instruction. The results of this study may confirm that when students have more opportunities to touch the content on the board, they are more engaged and, consequently, learn more. Frequent opportunities of manipulation of the content on the IWB correlate to a student-centered approach to teaching and learning with this technology.

Preston and Mowbray (2008) and Morgan (2010) found that young students did not need extensive and consistent explanations of how to use the tools of the IWB, but rather quickly developed confidence in their ability to use this technology. The researcher could also confirm that kindergarteners in her research became quite confident in their knowledge of the IWB’s major tools. After the initial modeling, the researcher did not have to repeat directions for the IWB’s use. During the second stage of the research students, and not the researcher, were leading the activities on the IWB. In addition to moving content on the IWB, students who participated in the study knew how to go to a different page, how to delete an object, and how to write on the board using the IWB’s pens and tools.

The second section of the previous research, which focused on a student-centered and visual approach to the IWB’s use in the classroom, could be compared to the approaches used in the current study. Zittle (2004) found that a student-centered and visual approach to teaching and learning with the IWB increased students’ attention and, therefore, academic achievement. Most of the participants in Zittle’s (2004) research were Limited English Proficient (LEP) Navajo
students. Zittle (2004) administered pre- and post-assessments, and students, who used the IWB for learning mathematical concepts, demonstrated greater growth on pre- and post-tests, than the students, who used personal computers for the same lessons. In the current study, ELL participated, and the researcher also used pre- and post-assessments. The results of the pre- and post-tests were greater during the second stage of the study, when the students had more chances to manipulate the content on the IWB. Even though only one student could manipulate the content on the board at a time, the rest of the students in the small literacy group were also exposed to the new concepts and skills through highly visual imaging that the IWB offered. In other words, all students in the group were active participants. That also could explain why in Zittle’s (2004) research the students who used individual computers scored lower on the tests when compared to the results gained from the student who manipulated the IWB.

Solvie (2011) focused specifically on examining variation in student attention between literacy instruction with and without the use of the IWB. Even though Solvie (2011) did not find that the use of the IWB significantly impacted student attention, the author noted that student engagement was obvious when they, and not the teacher, were manipulating the content on the IWB. The correlation between student engagement and manipulation of the IWB was obvious. For this study the researcher kept a time log to monitor the times each student had an opportunity to manipulate the content (please see appendix B). The second stage of the current study could be characterized as student-centered, meaning the students took over the phonemic literacy activities on the IWB. The participants were more engaged during the second stage of the research, which could be supported by higher pre- and post-test results as well as by positive growth in the responses to the second question of the attitude survey.
The research confirms that the use of the IWB supports and enriches teaching and learning. Bruce et al. (2011) identified significant learning moments as an increase in students’ understanding because of the IWB’s use. The study categorizes significant learning moments as visual support for communication, shared student reasoning and effective small group learning. Beeland (2002) also found out that the visual characteristic of the IWB was the catalyst to students’ engagement increasing. Similar to Bruce et al. (2011) and Beeland (2002), the researcher in this study found that the IWB’s visual support had a positive effect on students’ learning. All students in the IWB’s phonemic literacy center, and not only the ones manipulating the content on the board, were able to reflect on and share their thinking with the help of the IWB. Therefore, it could be concluded that the IWB provides visual and collaborative support for teaching and learning.

The third section of this chapter focuses specifically on the effects of the frequency of the IWB’s use on student achievement. Wuerzer (2008) researched the effects of daily literacy instruction with the IWB on ELLs’ achievement in this area. Limited English Proficient (LEP) students are at a significant disadvantage when it comes to standardized tests Wuerzer (2008). Adapting highly visual and manipulative tools to the daily instruction could have a positive impact on ELLs’ academic achievement. For instance, Wuerzer (2008) had findings that are very much aligned to the previously discussed research here: all LEP students benefited from the daily use of the IWB. The frequency of the IWB played an important role in Wuerzer’s (2008) research. Additionally, LEP students benefited from the use of technology, especially considering most of them did not have access to such resources at home. The exposure to technology daily made a significant positive difference for all ELLs. Similar conclusions could be drawn in the current research. The results confirmed that kindergarteners’ phonemic awareness knowledge
and skills have grown due to frequent manipulation of the IWB. The researcher had 4 students with a perfect score for the post-formal assessment of unit 7. 10 students out of the total of 13 scored 100% on the post-formal assessment of unit 8. The more frequent manipulation of the content on the IWB by the students during the second 3 weeks of the research could be a major factor in explaining the gain in the final results for the formal assessment of unit 8.

Similarly, Swan et al. (2007) have found that students benefit academically from the frequent use of the IWB. The teachers who used the IWB more frequently than other teachers had students with statistically significant scores on standardized tests in math, reading and language arts. Statistically significant and meaningful results were found in the classrooms where the educators used the IWB almost every day in an engaging student-centered manner. This study, as well as the other ones discussed previously, demonstrates that the use of the IWB has a positive effect on teaching and learning. Students’ academic performance and engagement level have increased especially when they were allowed to manipulate the content on the IWB more frequently. Frequency of manipulation and student-centered lessons could be quite interconnected characteristics of the successful IWB based lessons.

The researcher provided some connection to the previous studies with the purpose to elicit the findings of this research. The increase in assessment results during the second stage of the study could confirm that the IWB is an excellent tool for developing interactive, visual, student-centered lessons that eventually is demonstrated in students’ academic growth. The frequency of manipulation could be an important characteristic of a student-centered approach to teaching and learning. When students manipulated the content on the IWB more frequently they had higher post-test scores. In the following section the researcher will explain the results and conclusions of the study in the context of her classroom.
Explanations of results

The researcher conducted the study in two distinct stages with the purpose to identify if the frequency of manipulation of the content on the IWB played a significant role in the possibility of the difference of the results yielded between the two stages. During the first stage (unit 7) each student manipulated the content on the board about 9 times; while during the second stage (unit 8) students had approximately 45 opportunities to manipulate.

Before starting each unit, the researcher administered the pre-tests. The results of the pre-tests for unit 7 are lower than those from unit 8; especially this was true on the dictated assessment. The average for the pre-dictation for unit 7 was 47.7, and for unit 8—70.8. Such a significant difference in starting points between the two stages of the research could be explained by the sequencing of the units in the kindergarten curriculum. Each subsequent unit builds on the knowledge acquired during the previous unit. Students had time to work on phonemic strategies and skills during unit 7, which they later applied to the sequential material of unit 8.

In addition, it should be noted that the two units’ formal assessments and dictated assessments were quite different in difficulty, which could explain the significant disparity in their results. For instance, the average for the pre-formal assessment for unit 7 was 86.2 and the average for the pre-dictation was 47.7. The formal assessments that go with the kindergarten literacy units are multiple answer tests, where students have to select 1 correct answer from the 3 options given (please see appendix B). The dictated assessments, developed by the researcher, do not have options to choose from. The researcher dictated to students 10 words, which they had to write correctly, relying only on the skills and knowledge that they had acquired. Therefore, the dictated assessment is more difficult than the formal assessment, which is also reflected in the
results. In fact, the pre- and post- averages of the dictated assessment for both units are lower than the results for the formal assessments.

The researcher acquired the results for test growth subtracting the pre-assessments’ averages from post-assessments’ averages. The test growth for unit 7 was higher than for unit 8, especially for the dictated assessments. The dictation growth average for unit 7 was 27.69, and for unit 8—9.63. The explanation for this is rooted in that the pre- and post-assessments’ averages for unit 8 were higher than for unit 7. Again, it could be explained by the sequencing of curriculum units. However, it is necessary to point out that the pre- and post-test results for unit 8 were higher than for unit 7. The averages for the post-formal assessment and dictated assessment of unit 8 were 98.2 and 90.8 respectively. The averages for the post-formal and dictated assessment of unit 7 were 93.5 and 75.4. Students’ performances were better during the second stage of the research. That can be explained by the fact that students had 5 times more opportunities to manipulate the content on the IWB.

With all that said, test growth does not provide a comprehensive picture in explaining the results between the two stages of the research. Therefore, it is necessary to also look at the individual level of growth. 3 students had a negative growth for formal assessment of unit 7 while none of the students had a negative growth for unit 8. Also, there were 10 students and 5 students that scored 100% on post-formal and dictated assessments of unit 8 respectively, while only 4 and 3 students had the same results for the assessments of unit 7. Overall, students demonstrated higher academic gains during the second stage of the research. Each student had 45 opportunities to manipulate the content on the IWB compared to only 9 times during the first stage of the research. Student-centered instruction during the second stage of the research could be the catalyst of students’ higher performance.
The increased frequency of the IWB’s manipulation had a positive effect on students’ attitudes towards the use of this technology for learning to read and write. Every student responded that they always and even more frequently want to use the IWB for learning to read and write. This is a positive gain since the pre-attitude survey has 2 students that marked “sometimes” when asked if they would like to use the IWB more frequently. The attitude survey’s results could confirm that students enjoy using the IWB. There is a positive relationship between the greater frequency in the use of the IWB and student engagement.

This section has presented an explanation for the results of the current study. The following sections draw on this explanation in regards to the strengths and limitations, as well as recommendations for future research.

**Strengths and limitations**

The analysis of the current research in regards to the previously summarized studies, as well as explanation of the data available lead to the discussion of the strengths and limitations of this study. The strengths of the research are confined in beneficial technological addition to teaching and learning: the IWB facilitates student-centered instruction, as well as initiates the development of new methods of assessment. The major limitation of the study is its sequential unit staging and some aspects of data collection.

The primary strength of the current study is the utilization of the IWB technology into literacy lessons. According to Preston and Mowbray (2008), young students benefit from the use of the IWB in the classroom. The IWB is an effective technological tool that enriches teaching and learning. It facilitates instruction by providing visual support to lesson introduction, revealing students’ background knowledge, supporting scaffolding, assessment and conclusion of lessons. The IWB is an excellent instructional tool for engaging students and differentiation.
In their research, Zittle (2004), Solvie (2011), Bruce et al. (2011) and Beeland (2002) point out that manipulative and visual attributes of the IWB supports students’ engagement and positively affects academic achievement.

Student-centered instruction with the use of the IWB is another important strength of this study. During the second stage of the study the researcher used a more student-centered approach to teaching phonemic skills and strategies to students. In other words, students were the ones manipulating the highly visual content on the IWB. The IWB was used on a daily basis in the classroom where the research took place. Wuerzer (2008) and Swan et al. (2007) note that the frequency of the IWB’s use is an important variable in the improvement of students’ achievement. The results of the current study could confirm the previous findings in that area.

The strength of the research could also be found in the method of the assessments and the assessments themselves. The kindergarten curriculum does not require teachers to pre-test students, and only post-assessment is necessary. However, for this research, pre- and post-tests were administered, which provided more detailed information on students’ growth or the lack thereof. In addition, the researcher developed a dictated assessment, which gave a complete picture on students’ phonemic skills. The modification and addition of the assessments allowed more data to be collected and examined.

While the utilization of the IWB and the adaptation of the assessments could be considered as strengths of this research, there were also a few limitations in the study that are necessary to discuss here. One of the limitations discussed in the previous research was that IWB takes a lot of classroom space and could be a distraction for some of the students (Preston and Mowbray, 2008, p. 53). The researcher could also confirm that the IWB takes a lot of classroom space with lots of wires attached to the devices connected to the IWB. Some of the students who
participated in the study were distracted by the IWB’s center activities, finding it difficult to concentrate on their own group-center work.

Another significant limitation of this research could be found in the sequencing of the units, which could have a positive influence on the results of the study. The study was conducted in two distinct stages, unit 7 and unit 8. Each stage took three weeks and the biggest difference between them was the substantial increase in student manipulation of the content on the IWB during the second stage. Even though the elevated frequency could be an important variable in the positive effect on the results, it should not be taken out of consideration that students had developed and fortified some phonemic skills and strategies during the first stage of the research, which were transferred to the second. Therefore, the sequential characteristic of the data collection could also have been an important contributor in the increase in assessment scores for unit 8.

The possibility of conducting a parallel research with two groups of students studying the same unit material could be considered as an unethical distribution of the benefits. In that case 1 group would have had fewer opportunities to manipulate the content on the IWB while the other group would have had more chances to do so, which could have had a different set of data and with less variables to consider. In that case, the study could have been completed in 3 weeks. In that time period 2 groups of students would have studied the same unit’s material and would have practiced the same IWB’s activities. The only difference between the 2 groups of participants would have been the frequency of manipulation of the content on the IWB, which would have been the only variable to consider. However, in that case the group of students, who had more opportunities to manipulate the content on the board, could have benefited more than the other as the result of the research. That would have been an unfair consequence of the study.
for some of the students. In the interest of students, the researcher considered sequential units’ based research, where all of the students had equal opportunities to manipulate the content on the IWB.

Another limitation of the study is the small sample size of population. Only 13 students participated in the research, making it difficult to apply generalizations. Therefore, both the strengths and limitations of the study need to be put into the perspective of the small size of student sample for the research. This study, however, could be taken as an example for bettering future research. The following section discusses the recommendations for future research.

**Recommendations for future research**

The current study provides valuable information on the effects of the frequency of the IWB’s manipulation on students’ achievement in phonemic awareness in a bilingual kindergarten classroom. However, this research could be improved in several ways with the purpose to develop similar studies and with the possibility of greater generalizations to be applied to improving teaching and learning with the IWB. The following recommendations are based on students and teacher’s experience of the current study.

First of all, the researcher’s recommendation for future studies in this area is to find larger populations to participate. Only 13 students participated in this research, but in order to expand generalizations, it would be necessary to have more students and educators participating in similar research. This research was easily administered in the span of 6 weeks by the teacher herself. However, it is possible to extend the research to all kindergarten teachers at the school with the IWB. In that case, it could be necessary to use the same IWB’s phonemic activities and assessments in each classroom.
The second recommendation involves the IWB’s placement in the classroom. The IWB takes a lot of classroom space and could be quite distracting for students engaged in tasks that do not involve the IWB. A specially designated area for its placement should be assigned, carefully considering the internet connection and, most importantly, students’ placement during whole and small group instruction. It is important to put into prospective needs of special education students when placing the IWB in the classroom. The researcher found that the best place for the IWB is by the wall, perpendicular to the classroom’s blackboard or whiteboard. The classroom, where the research took place was quite spacious, and the researcher had some flexibility in deciding the IWB’s placement. However, classroom space and internet connection are crucial factors in deciding the IWB’s position.

The following recommendations are centered on assessments used in this research. The researcher also found that some modifications to the curriculum required assessments should be made in order to make a detailed examination of the effects of the study. In the course of the research, pre- and post-assessments were administered to students. The district adopted curriculum does not require testing student knowledge before teaching a literacy unit. However, pre- and post-assessments could often provide more detailed information to the educator about students’ academic growth or lack thereof. A pre-test marks the knowledge a student already has about the unit content, while a post-test demonstrates a student’s understanding of the material taught. The growth or lack thereof between pre- and post-test results could tell how effective teaching strategies were for a particular student. The researcher found that pre-testing a student’s knowledge helped to make a detailed analysis about the effects of the frequency of the content manipulation on the IWB.
The researcher recommends teachers develop their own additional assessments for units. Often, a teacher will simply use the district-provided assessments because the curriculum is accessible and the teacher is familiar with it. However, sometimes these assessments are not enough to describe a complete picture of students’ knowledge. The researcher found that unit tests were quite easy for some of her students and were too superficial. First of all, students had to choose 1 answer from 3 multiple choices already given to them. Second, some students could often guess the right answer. Therefore, as an addition to the district-required tests, the researcher developed a dictated assessment, where students were required to write 10 words with letters and sight words of the unit. In this assessment students did not have options to choose from: they relied specifically on the knowledge they gained during the unit’s instruction. The dictated assessment provided valid information on students’ pre- and post- knowledge of the material.

The assessments in this research were developed with the purpose of demonstrating the effects of the frequency of the IWB’s content manipulation on student achievement in phonemic awareness. The researcher and students had a positive experience with this technology during the whole academic year. However, more support should be provided to educators for using the IWB to the advantage of both teachers and students (Morgan, 2010). The researcher attended professional development provided by the district on the effective IWB’s use with young students, which helped her to prepare and adopt engaging activities, games and lessons for the IWB. Every teacher whose classroom has an IWB should have the opportunity to receive support and training in using this technology. It is important to note that training and teaching with the IWB should take a student-centered approach (Morgan, 2010). To initiate interest in similar research, the researcher will share the results of this study with her colleagues. The researcher
also hopes that her experience will encourage adoption by schools of this technology and will promote further research and development of the IWB’s interactive lessons.

Conclusion

This study presented the intervention and the results of the effects of the frequency of the IWB’s manipulation on students’ achievement in phonemic awareness in a bilingual kindergarten classroom. The researcher has found that students made significant growth when they had more chances to manipulate the content on the IWB. After the second stage of intervention, 10 students scored 100% on the post-test compared to only 3 students with a perfect score for the first post-test assessment. The researcher can conclude that a student-centered and frequent utilization of the IWB in the classroom for teaching and learning has a positive effect on students’ academic achievement in phonemic awareness. However, more research should still be done with the goal to better understand and develop successful strategies and methods of teaching and learning with the IWB with young students.
References


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Wuerzer, B. (2008). The Effectiveness of the SMART Board while instructing limited English proficient learners. Retrieved from

http://smarttech.com/Resources/Research+and+data/Research+Library


http://downloads01.smarttech.com/media/research/international_research/usa/ceerzittle.pdf
Appendix A

Unit 7: Jj, Yy; Unit 8: ñ, Ch, ch

Sorting Activities

Unit 7

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Word Building Activities

Unit 7

- a e i o u d n t j b l s m r y
- a e i o u d n t j b l s m r y
- a e i o u y d n t j b l s m r g
- u e a e i o u m s t p l f d n b j g r
- a e i o u m s t p l f n j d b
- e a e i o u m s t p l f n j d b
IWB, THE FREQUENCY OF MANIPULATION, AND STUDENT ACHIEVEMENT IN PHONETICS
IWB, THE FREQUENCY OF MANIPULATION, AND STUDENT ACHIEVEMENT IN PHONETICS

\[\text{a e i o u d n t j b l s m r y}\]

\[\text{a e i o u d n t j b l s m r y}\]

\[\text{a e i o y d n t j b l s m r y}\]

\[\text{a e i o y d n t j b l s m r y}\]

\[\text{a e i o u y d n t j b l s m g r}\]

\[\text{a e i o u y d n t j b l s m g r}\]
a e i o u d n t j b l s m r y
IWB, THE FREQUENCY OF MANIPULATION, AND STUDENT ACHIEVEMENT IN PHONETICS
Appendix B
Assessment of Unit 7

Comprensión auditiva
Identificar idea principal y detalles

La visita de Abuelita
Abuelita viene a visitarnos durante una semana. Viene a vernos cada primavera. Mamá nos dice qué podemos hacer para preparar las cosas. Todos tenemos una tarea. Mamá tiene la cama con sábanas limpias y Papá hornea un torta de manzana. Mi hermana recoge sus juguetes y yo le paso la aspiradora a la alfombra. Lo último que hacemos es poner flores frescas en el florero que está sobre la mesa. Ahora todo está listo y limpio para la visita de Abuelita.

Pasan a la página 120.
Check to see that all the children are on the correct page.
Señalen el número 1.

Voy a leer una pregunta. Escuchen la pregunta mientras la leen en voz alta: ¿Qué hace Mamá para preparar las cosas para la visita? Ahora miren los tres dibujos de esta fila. Rellenen el círculo debajo del dibujo correcto. ¿Cuál es la respuesta?

Have a child provide the answer.
Correcto. El primer dibujo de la fila muestra a Mamá viendo la cama con sábanas limpias. Debieron rellenar el círculo con la 3.
Check to see that each child has filled in the correct circle.
¿Tienen alguna pregunta?
Ahora volvemos a leer el cuento. Escuchen atentamente. Read the story aloud again.
Ahora señalen el número 1.
Check to see that all the children are at the correct place.

Ahora voy a leer otra pregunta. Escuchen la pregunta mientras la leen en voz alta: ¿Adónde va de visita Abuelita? Ahora miren los tres dibujos de esta fila. Rellenen el círculo debajo del dibujo que muestra la respuesta a la pregunta.

Comprensión auditiva
Distinguir entre la fantasía y la realidad; Palabras de uso frecuente
Pasen a la página 121.
Check to see that all the children are on the correct page.
Señalen el número 3.

Miren los dibujos de esta fila. Dos dibujos muestran algo que podría pasar en la vida real y un dibujo muestra algo de fantasía. Rellenen el círculo debajo del dibujo que muestra algo de fantasía.
Señalen el número 5.
Check to see that all the children are at the correct place.
Miren las tres palabras de esta fila. Rellenen el círculo debajo de la palabra que.

Comprensión auditiva
Identificar idea principal y detalles
Pasen a la página 122.
Check to see that all the children are on the correct page.
Señalen el número 4.

Pueden leer las oraciones. Rellenen el círculo debajo de la oración que explica lo que trata el dibujo.

Lean las oraciones. Rellenen el círculo debajo de la oración que explica lo que trata el dibujo.
Comprensión

Identificar el ambiente; Distinguir entre la fantasía y la realidad

Pase a la página 123. Check to see that all the children are on the correct page.

Señalen el número 6.
Check to see that all the children are at the correct place.
Miren los tres dibujos de esta fila. Rellenen el círculo que muestra dónde pertenece un payaso.
Señalen el número 7.
Check to see that all the children are at the correct place.
Miren los tres dibujos de esta fila. Un dibujo muestra algo que podría pasar en la vida real y dos dibujos muestran cosas de fantasía. Rellenen el círculo debajo del dibujo que muestra algo que podría pasar en la vida real.

Palabras de uso frecuente

por, gusta, con, quién

Pase a la página 124.
Check to see that all the children are on the correct page.

Señalen la letra S.
Check to see that all the children are at the correct place.
Write the first word from row 5 on the board followed by the three word choices with their answer circles (a,b,c). Hold up page 124, pointing to the first word in the row so the children can see.
Miren la primera palabra de esta fila. ¿Cuál es la palabra? Correcen la palabra ex pant. Miren las otras palabras de la fila. Voy a rellenar el círculo debajo de la palabra cuando la vean en la misma fila.

Fill in the circle b under the word para on the board.

Rellenen el círculo b debajo de la palabra para. Es la primera palabra de la fila. Ahora harán la mismo en sus papeles. Miren la primera palabra de la fila. Ahora rellenenn el círculo debajo de la palabra cuando la vean en la misma fila.
Check to see that all the children have filled in the circle b under the word para in row 5.

¿Tienen alguna pregunta?
Vamos a continuar haciendo lo mismo. Sigan las mismas instrucciones para las siguientes actividades. Miren la primera palabra de cada fila. Luego rellenenn el círculo debajo de la palabra cuando la vean en la misma fila.

Conciencia fonémica

Identificar /j/ inicial

Pase a la página 125.
Check to see that all the children are on the correct page.

Señalen la letra S.
Hold up page 125, pointing to the first row for all the children to see. Check to see that all the children are at the correct place.

Voy a decir una palabra: juguete. /j/ /g/ /u/ /e/ /t/. ¿Cuál es el primer sonido en la palabra juguete? Escuchen estos posibles respuestas: joya, camisa, luna. ¿Cuál responenda comienza con el mismo sonido que aparece al principio de juguete? Correcto. La palabra joya comienza con el mismo sonido que aparece al principio de juguete. Rellenen el círculo debajo del dibujo de la joya porque comienza con el mismo sonido que aparece al principio de juguete.
Check to see that all the children have filled in the circle a under the picture of the jewel in row 5.

¿Tienen alguna pregunta?
Ahora señalen el número 12.
Check to see that all the children are at the correct place.
Miren la sección 12. Voy a decir una palabra: jugar. /j/ /u/ /a/ /g/ /ar/. ¿Cuál es el primer sonido en la palabra jugar? Escuchen estas posibles respuestas: oso, plátano, jabón. Rellenen el círculo debajo de la palabra que comienza con el mismo sonido que aparece al principio de jugar.
Ahora señalen el número 13.
Check to see that all the children are at the correct place.
Conciencia fonémica

Identificar /AI/ inicial

Páginas a la página 126.
Señalen el número 14.
Check to see that all the children are at the correct place.

Check to see that all the children are at the correct place.

Miren la sección 14. ¿Voy a decir una palabra: yodo. /AI/. /AI/. Miren si es el primer sonido de la palabra yodo? Escuchen las posibles respuestas: xamono, yada, yama, yama, yamana. ¿Cuál respuesta comienza con el mismo sonido que aparece al principio de yodo? Correcto. La palabra yodo comienza con el mismo sonido que aparece al principio de yodo. Rellenen el círculo debajo del dibujo del yodo porque comienza con el mismo sonido que aparece al principio de yodo.

Señalen el número 15.
Check to see that all the children are at the correct place.

Miren la sección 15. Voy a decir una palabra: yoga, /AI/. /AI/ ¿Cuál es el primer sonido de la palabra yoga? Escuchen estas posibles respuestas: yaga, sana, sana, sana, sana. Rellenen el círculo debajo de la palabra que comienza con el mismo sonido que aparece al principio de yodo.

Conciencia fonémica

Identificar sílabas y palabras con /AI/ y /AI/

Páginas a la página 127.
Señalen el número 16.
Check to see that all the children are at the correct place.


Señalen el número 17.
Check to see that all the children are at the correct place.


Fonética

Identificar /AI/ inicial

Páginas a la página 128.
Check to see that all the children are at the correct place.
Señalen la letra S en la primera fila.
Check to see that all the children are at the correct place. Hold up page 128, pointing to the picture of the men picking up the toys in the first row.

Veo a un hombre que recoge los juguetes. Digan la palabra conmigo: juguetes. ¿Cuál es el primer sonido de la palabra? ¿Oyeron el sonido /AI/ al principio de juguetes? Rellenen el círculo debajo de la letra J.

Check to see that each child filled in the correct circle.

¿Tienen alguna pregunta?

Vamos a continuar haciéndolo tan para las secciones 19 y 20. Digan el número de cada dibujo. Luego rellenen el círculo debajo de la letra que representa el primer sonido en la palabra.

Fonética

Identificar /AI/ y inicial

Páginas a la página 129.
Check to see that all the children are at the correct place.
Señalen el número 21.
Check to see that all the children are at the correct place.

Veo un yate. Digan la palabra conmigo: yate. ¿Cuál es el primer sonido de la palabra? ¿Oyeron el sonido /AI/ al principio de yate? Rellenen el círculo debajo de la letra Y.

Señalen el número 22.
Check to see that all the children are at the correct place.
Vamos a continuar haciendo lo mismo con el primer dibujo de esta página. Digan el nombre del dibujo. Luego rellenen el círculo debajo de la letra que representa el primer sonido de la palabra.

**Fonética**

Identificar sílabas y palabras con /f/ y /v/

Páginas a la página 130.

Check to see that all the children are on the correct page.

Señalen el número 23.

Check to see that all the children are at the correct place.


¿Tienen alguna pregunta?

Señalen el número 24.

Check to see that all the children are at the correct place.

Ahora miren los tres dibujos de esta fila. Voy a decir las sílabas de una palabra: [koy nii]. ¿Qué palabra formamos al unir las sílabas? Correcto. Formamos la palabra cayón. Encierran en un círculo el dibujo que muestra un cayón.

**Vocabulario**

Comparación: alto, más alto, el más alto de todos

Páginas a la página 131.

Check to see that all the children are on the correct page.

Señalen la letra S.

Check to see that all the children are at the correct place.

Miren los tres dibujos de los edificios altos en esta fila. Tienen tamaños diferentes. Vamos a comparar los tamaños. El primer edificio es más alto que el segundo edificio. ¿Cuál dibujo muestra el edificio más alto de todos? Rellenen el círculo debajo del dibujo que muestra el edificio más alto de todos. ¿Cuál es la respuesta? Correcto, el edificio del último dibujo es el más alto de todos. Debieron rellenar el círculo con la c porque muestra el edificio más alto de todos.

Check to see that each child has filled in the circle with a c inside.

¿Tienen alguna pregunta?

Señalen el número 25.

Check to see that all the children are at the correct place.

Vamos a continuar haciendo lo mismo. Presten atención a las palabras que hacen la comparación y luego rellenen el círculo debajo del dibujo correcto. Miren los dibujos de los tres árboles en esta fila. ¿Cuál dibujo muestra el árbol más alto de todos? Rellenen el círculo debajo del dibujo más alto de todos.

¿Tienen alguna pregunta?

**Vocabulario**

Comparación: pequeño, más pequeño, el más pequeño de todos; largo, más largo, el más largo de todos

Páginas a la página 132.

Check to see that all the children are on the correct page.

Señalen el número 26.

Check to see that all the children are at the correct place.

Vamos a continuar haciendo lo mismo. Presten atención a las palabras que hacen la comparación y luego rellenen el círculo debajo del dibujo correcto. Miren los tres dibujos de los animales en esta fila. ¿Cuál dibujo muestra el animal más pequeño de todos? Rellenen el círculo debajo del animal más pequeño de todos.

Señalen el número 27.

Check to see that all the children are at the correct place.

Vamos a continuar haciendo lo mismo. Presten atención a las palabras que hacen la comparación y luego rellenen el círculo debajo del dibujo correcto. Miren los tres dibujos de las niñas en esta fila. ¿Cuál dibujo muestra la niña con el cabello más largo de todos? Rellenen el círculo debajo de la niña con el cabello más largo de todos.
Nombre

2.

3.

para  por  este

a   b   c

Controle el progreso
Evaluación de la unidad - Grado 6
Unidad 7
4. Yudi le da a la pelota. A Yudi le gusta el jitomate. Vamos con Yudi.

5. Yiye tiene el babero. Yoli está sola. Yiye está con Yoli.
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b j l

19.

j v n

20.

s e j
Nombre

21.

![Image of a sailboat with letters b, y, l]

22.

![Image of an egg with letters y, v, d]

--- 129 ---
Nombre

23.

\[a\] \[b\] \[c\]

24.

\[a\] \[b\] \[c\]
Nombre

26.

(a) 
(b) 
(c) 

27.

(a) 
(b) 
(c)
### Nombre

**GRADO K**

**Kindergarten • Unidad 7**

#### Tabla de evaluación del estudiante

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**Nuevos pasos**

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Assessment of Unit 8

Comprensión auditiva
Identificar el orden de los sucesos

¿Cómo crece una flor?
Alguna vez te has preguntado: "¿Cómo crece una flor?" Hay muchos tipos de flores, pero cada flor fue una semilla. Así es como crece una flor: Primero, la semilla se siembra en la tierra. Después, necesita agua y sol en abundancia. Después de varios días, puede que veas una hoja verde que comienza a brotar. Luego, más hojas aparecerán y la planta seguirá creciendo. Un capullo se formará. Al final, el capullo brotará y verás una linda flor!

Pasen a la página 140.
Check to see that all the children are on the correct page.
Señalen el número 2.
Check to see that all the children are at the correct place.
Miren las tres palabras de esta fila. Rellenen el círculo debajo de la palabra que.

Comprensión
Sacar conclusiones
Señalen el número 3.
Check to see that all the children are at the correct place.
Miren los dibujos de esta fila. Rellenen el círculo debajo del dibujo que muestra una maceta con tres semillas que han crecido.

Comprensión
Identificar el orden de los sucesos
Pasen a la página 141.
Check to see that all the children are on the correct page.
Señalen el número 4.
Check to see that all the children are at the correct place.
Miren los tres dibujos de esta fila. Rellenen el círculo debajo del dibujo que muestra lo que pasó primero.
Señalen el número 5.
Check to see that all the children are at the correct place.
Miren los tres dibujos de esta fila. Rellenen el círculo debajo del dibujo que muestra lo que pasó al final.

Comprensión
Sacar conclusiones; Volver a contar
Pasen a la página 143.
Check to see that all the children are on the correct page.
Señalen el número 6.
Check to see that all the children are at the correct place.
Miren los dibujos de esta fila. Rellenen el círculo debajo del dibujo que muestra a alguien que va a la playa.

Señalen el número 7.
Check to see that all the children are at the correct place.

Miren cada dibujo. Estos dibujos explican un cuento. Escuchan mientras leo tres oraciones. Una oración describirá el cuento. Rellenen el círculo debajo de la letra de la oración que describe el cuento. Ahora escuchen atentamente mientras leo las oraciones. 

Opción A: Jaime se prepara para montar bicicleta.
Opción B: Jaime va a una fiesta de cumpleaños. 
Opción C: Jaime va a la cama.

Palabras de uso frecuente
qué, grande, aquí, estaba

Pasen a la página 144.
Check to see that all the children are on the correct page.

Señalen la letra S.
Check to see that all the children are at the correct place.
Write the first word from row 5 on the board followed by the three word choices with their answer circles (a, b, c).
Hold up page 144, pointing to the first word in the row so the children can see.

Miren la primera palabra de esta fila. ¿Cuál es la palabra? Correcto, la palabra es por. Miren las otras palabras de la fila. Voy a rellenar el círculo debajo de la palabra cuando la vean en la misma fila.

Fill in the circle a under the word por on the board.

Releen el círculo debajo de la palabra por. Es la primera palabra de la fila. Ahora harán lo mismo en sus pápeles. Miren la primera palabra de la fila S. Ahora rellenren el círculo debajo de la palabra cuando la vean en la misma fila.

Check to see that all the children have filled in the circle a under the word por in row 5.
¿Tienen alguna pregunta?
Vamos a continuar haciendo lo mismo. Sigan las mismas instrucciones para las siguientes actividades.

Miren la primera palabra de cada fila. Luego rellenren el círculo debajo de la palabra cuando la vean en la misma fila.

Conciencia fonémica
Identificar /ich/ inicial

Pasen a la página 145.
Check to see that all the children are on the correct page.

Señalen la letra S.
Hold up page 145, pointing to the first row for all the children to see.
Check to see that all the children are at the correct place.

Voy a decir una palabra: chica. ¿Cuál es el primer sonido en la palabra chica? Escuchén estas respuestas: canguro, pato, chalco. ¿Cuál respuesta comienza con el mismo sonido que aparece al principio de chica? Correcto. La palabra chalco comienza con el mismo sonido que aparece al principio de chica.

Rellenen el círculo debajo del dibujo del chalco porque comienza con el mismo sonido que aparece al principio de chica.

Check to see that all the children have filled in the circle c under the picture of the text in row 5.
¿Tienen alguna pregunta?
Señalen el número 12.
Check to see that all the children are at the correct place.

Miren la sección 12. Voy a decir una palabra: chorro. ¿Cuál es el primer sonido en la palabra chorro? Escuchén estas respuestas: silla, chora, lapiz. Rellenen el círculo debajo de la palabra que comienza con el mismo sonido que aparece al principio de chorro.

Señalen el número 13.
Check to see that all the children are at the correct place.

Miren la sección 13. Voy a decir una palabra: chic. ¿Cuál es el primer sonido en la palabra chic? Escuchén estas respuestas: chupete, pepino, nabo. Rellenen el círculo debajo de la palabra que comienza con el mismo sonido que aparece al principio de chic.
Conciencia fonémica
Identificar /ñ/ medial
Pasen a la página 146.
Check to see that all the children are on the correct page.
Señalen el número 14.
Check to see that all the children are at the correct place.
Miren la sección 14. Voy a decir una palabra en partes: niña, /ñ/ /ñ/. ¿Cuál sonido oyen en la segunda parte de la palabra niña? Correcto, el sonido es /ñ/. Escuchen estas respuestas: conejo, piña, capullo, ¿Cuál respuesta tiene el mismo sonido que aparece en la segunda parte de niña? Sí, la palabra piña tiene el sonido /ñ/. Rellenen el círculo debajo del dibujo de la piña porque tiene el mismo sonido que aparece en la segunda parte de niña.
Señalen el número 15.
Check to see that all the children are at the correct place.
Miren la sección 15. Voy a decir una palabra en partes: pulso, /p/ /ñ/. ¿Cuál sonido oyen en la segunda parte de la palabra pulso? Correcto, el sonido es /ñ/. Escuchen estas respuestas: cama, bolsa, lecho, ¿Cuál respuesta tiene el mismo sonido que aparece en la segunda parte de pulso? Sí, la palabra lecho tiene el sonido /ñ/. Rellenen el círculo debajo del dibujo del lecho porque tiene el mismo sonido que aparece en la segunda parte de pulso.

Conciencia fonémica
Identificar sílabas y palabras con /ñ/ y /ñ/
Pasen a la página 147.
Check to see that all the children are on the correct page.
Señalen el número 16.
Check to see that all the children are at the correct place.
Señalen el número 17.
Check to see that all the children are at the correct place.
Miren la sección 17. Escuchen mientras digo las sílabas de la palabra fama: /f/ /m/. ¿Cuántas sílabas oyeron en la palabra fama? Digan la palabra lentamente. Rellenen el círculo debajo del dibujo que muestra cuántas sílabas oyeron en la palabra fama.

Fonética
Identificar /ch/ inicial
Pasen a la página 148.
Check to see that all the children are on the correct page.
Point to the letter S in the first row.
Check to see that all the children are at the correct place.
Hold up page 148, pointing to the picture of the pacifier in the first row.
Digan el nombre del dibujo consigno: chupete. ¿Cuál es el primer sonido de la palabra? ¿Oyeron el sonido /ch/ al principio de chupete? Rellenen el círculo debajo de la letra ch.
Check to see that each child filled in the correct circle.
¿Tienen alguna pregunta?
Vamos a continuar haciendo lo mismo para las secciones 19 y 20. Digan el nombre del dibujo. Luego rellenen el círculo debajo de la letra que representa el primer sonido en la palabra.

Fonética
Identificar /ñ/ medial
Pasen a la página 149.
Check to see that all the children are on the correct page.
Señalen el número 21.
Check to see that all the children are at the correct place.
Digan el nombre del dibujo consigno: niña. ¿Cuál sonido oyen en la segunda parte de la palabra niña? Correcto, el sonido es /ñ/. Rellenen el círculo debajo de la letra ñ.
Señalen el número 22.
Check to see that all the children are at the correct place.
Miren los tres dibujos de esta fila. Dos de los dibujos tienen el sonido /i/. El otro dibujo no tiene el sonido /i/ y no pertenece. Digan el nombre de cada dibujo. Presten atención a los sonidos. Luego rellenen el círculo debajo del dibujo que no pertenece.

Fonética
Identificar sílabas y palabras con /ch/ch y /th/th
Pasen a la página 150.
Check to see that all the children are on the correct page.
Señalen el número 23.
Check to see that all the children are at the correct place.
¿Tienen alguna pregunta?
Señalen el número 24.
Check to see that all the children are at the correct place.
Escuchen mientras digo las sílabas de una palabra: /mo/ /to/. ¿Qué palabra formamos cuando unimos las sílabas? Digan las sílabas lentamente. Correcto, formamos la palabra mocho. Rellenen el círculo debajo de la palabra mocho.

Vocabulario
Posición: en el medio, abajo
Pasen a la página 152.
Check to see that all the children are on the correct page.
Señalen el número 26.
Check to see that all the children are at the correct place.
Vamos a seguir las mismas instrucciones de la página anterior. Presten atención a la palabra que describe la posición y luego rellenen el círculo debajo del dibujo correcto. Miren los tres dibujos de los árboles. ¿Cuál dibujo muestra un pájaro en el medio? Rellenen el círculo debajo del dibujo que muestra el pájaro en el medio.
Señalen el número 27.
Check to see that all the children are at the correct place.
Miren los tres dibujos del tobogán. ¿Cuál dibujo muestra al niño que está abajo? Rellenen el círculo debajo del dibujo que muestra al niño que está abajo.
Nombre

S.

I.
Nombre _________________________________

2. con  quién  qué

3. a  b  c
Nombre __________________________________ __

4.

a) 

b) 

c) 

5.

a) 

b) 

c) 

Evaluación: Control del progreso
Evaluación de la unidad • Grado K
Unidad 8
Nombre ________________________________

6.

a b c

7.

A B C

Evaluación: Control del progreso
Evaluación de la unidad = Grado K
Unidad 6
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Evaluación: Control del progreso  
Evaluación de la unidad • Grado K  
Unidad B
14. Evaluación: Control del progreso
Evaluación de la unidad • Grado K
Unidad 8
Nombre

16.

17.

18.
Nombre

5.

¡ch j y!

19.

ñ ch p

20.

m d ch
21.

Nombre ____________________________

\[ \text{ch} \quad \text{ñ} \quad \text{n} \]

22.

\[ \begin{align*}
\text{a} & \quad \text{b} & \quad \text{c} \\
\end{align*} \]

Evaluación: Control del progreso
Evaluación de la unidad • Grado K
Unidad B
Nombre

23.

chivo

chupete

nacho

24.

ñame

moño

telaranya
Evaluación: Control del progreso
Evaluación de la unidad • Grado K
Unidad 8
Nombre __________________________

26. 

![Tree illustrations](image)

27. 

![Slide illustrations](image)
<table>
<thead>
<tr>
<th>Destrezas evaluadas</th>
<th>Número de respuestas correctas</th>
<th>Porcentaje de respuestas correctas</th>
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<tbody>
<tr>
<td>Comprensión auditiva</td>
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<tr>
<td>Identificar el orden de los sucesos 1</td>
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<tr>
<td>Palabra de uso frecuente 2</td>
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<td>Comprensión</td>
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<tr>
<td>Sacar conclusiones 3, 6</td>
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<td>Identificar el orden de los sucesos 4, 5</td>
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<td>Volver a contar 7</td>
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<td>Palabras de uso frecuente</td>
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<tr>
<td>qué 8</td>
<td>/17</td>
<td></td>
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<tr>
<td>grande 9</td>
<td>/8</td>
<td></td>
</tr>
<tr>
<td>aquí 10</td>
<td>/4</td>
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<td>estaba 11</td>
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<td>Conciencia fonémica</td>
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<tr>
<td>Identificar /ch/ inicial 12, 13</td>
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<tr>
<td>Identificar /l/ medial 14, 15</td>
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<tr>
<td>Identificar sílabas y palabras con /ch/ y /l/ 16, 17, 18</td>
<td>/7</td>
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<td>Fonética</td>
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<tr>
<td>Identificar /ch/ch inicial 19, 20</td>
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<td>Identificar /l/ medial 21, 22</td>
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<tr>
<td>Identificar sílabas y palabras con /ch/ch y /l/l 23, 24</td>
<td>/6</td>
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<td>Vocabulario</td>
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<tr>
<td>Posición: arriba/en el medio/abajo 25, 26, 27</td>
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<tr>
<td>Puntaje total de la Evaluación de la unidad</td>
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</tbody>
</table>

Nuevos pasos

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Evaluación: Control del progreso
Evaluación de la unidad • Grado K
Unidad 8
Dictated Assessment of Unit 7

Dictado

1. quién
2. con
3. tijeras
4. lujoso
5. espejo
6. naranja
7. yate
8. ayuda
9. payaso
10. joya

Dictated Assessment of Unit 8

Dictado

1. estaba
2. chupete
3. mochila
4. rancho
5. muchacho
6. montaña
7. otoño
8. muñeca
9. piñata
10. aquí
Attitude Survey

Name:

Date:

For the following questions, please color your answer.

1. I like using our interactive whiteboard for learning to read and write.

   - all the time
   - sometimes
   - never

2. I would like to use our interactive whiteboard more often for learning to read and write.

   - all the time
   - sometimes
   - never

THANK YOU!
Nombre:
Fecha:

Para las siguientes preguntas coloree sus respuestas, por favor.

1. A mí me gusta usar nuestro pizarrón interactivo para aprender leer y escribir.
   
   🌟  🎨  😞  
   siempre  a veces  nunca

2. A mí me gustaría usar nuestro pizarrón interactivo más frecuente para aprender leer y escribir.

   🌟  🎨  😞  
   siempre  a veces  nunca

¡GRACIAS!
IWB, THE FREQUENCY OF MANIPULATION, AND STUDENT ACHIEVEMENT IN PHONETICS

TIME LOG FOR UNIT 7

<table>
<thead>
<tr>
<th>Students</th>
<th>Week 1 3 days a week</th>
<th>Week 2 3 days a week</th>
<th>Week 3 3 days a week</th>
<th>Total</th>
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</thead>
<tbody>
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</tbody>
</table>

Each student has to have 3 checks for each week, receiving a total of 9 checks.
## TIME LOG FOR UNIT 8

<table>
<thead>
<tr>
<th>Manipulation of the Interactive Whiteboard</th>
<th>Students</th>
<th>Week 1 5 days a week</th>
<th>Week 2 5 days a week</th>
<th>Week 3 5 days a week</th>
<th>Total</th>
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</thead>
<tbody>
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</tbody>
</table>

Each student has to have at least 15 checks for each week, receiving a total of 45 checks.
CERTIFICATE OF COMPLETION

"If we teach today’s students as we taught yesterday’s, we rob them of tomorrow.”
John Dewey

Maria Prudnikovich
EARLY CHILDHOOD SMART BOARD COHORT 2012-2013
AND EARLY CHILDHOOD TECHNOLOGY SHOWCASE PRESENTER

The more powerful technology becomes, the more indispensable good teachers are.”

HIGHSCOPE COORDINATOR

DATE

TECHNOLOGY SPECIALIST

DATE