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Teaching See the Sound Visual Phonics to Deaf and Hard of Hearing Kindergarteners

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Teaching See the Sound Visual Phonics to Deaf and Hard of
Hearing Kindergarteners

Research Paper

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By

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Abstract

The purpose of this study is to investigate the effect of a manual phonics intervention program on the phonics acquisition skills of kindergarten students with hearing impairments.

Recent research of deaf and hard of hearing (DHH) students who received See the Sound Visual Phonics (SSVP) as an intervention alongside phonics instruction programs indicated an improvement in grapheme-phoneme correspondence regardless of types of hearing loss. Ye, W., Sychala, H., Harris, R. S., & Oetting, T. L. (2013) report that there is a lack of research investigating the explicit instruction of phonic skills to DHH students and its subsequent impact on reading achievement.

This study will provide additional data to add to the growing research on the use of SSVP to improve grapheme-phoneme correspondence.

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Chapter One: introduction

The National Reading Panel (2000) advocates for teaching a sequential set of phonic elements and taking advantage of incidental opportunities during reading instruction to draw students' attention to phonetic structures. They also conclude that students need to be systematically and explicitly taught to blend and break down words to improve their ability to read and write. Schirmer and McGough (2005) highlight the question – is phonemic awareness training effective for deaf readers? They discovered in their research that although it has been proven that for hearing readers the use of phonics is significantly beneficial, the same cannot be said for deaf readers, as there is a lack of research on the effectiveness of these strategies with that population. This study seeks to research the effectiveness of a single strategy on the acquisition of phonics skills for deaf or hard of hearing students (DHH).

Statement of the problem

Paul (1998) states that students who are deaf /hard of hearing historically graduate high school with a reading comprehension level close to 4th grade (as cited in Neilson, 2005). Wang, Trezek, Luckner, and Paul (2008) attribute this consistent lack of progress to the omission in teaching phonemic awareness and phonics. Easterbrooks, Lederberg, Miller, Bergeron, and Connor (2008) state that teaching grapheme-phoneme awareness to DHH students has not been a priority (as cited in Beal-Alvarez (2012)). The National Reading Panel (2000) suggests phonemic awareness training benefits not only word reading but also reading comprehension. This author contends that the omission of teaching phonic skills to DHH students may have contributed to the perpetual poor reading performance of such students.

Purpose of the study

The purpose of this study is to investigate the effect of a manual phonics acquisition intervention program on the letter sound recognition of kindergarten students with hearing impairments in elementary schools in a rural mid-Atlantic state. The students continued their participation in instruction learning the hand cues of See the Sound Visual Phonics to identify letter sounds -phonemes.

Rationale for the study

In 2008, Wang, Trezek, Luckner, and Paul focused on a question asked twenty years ago by Hanson (1989, p.85), “Is reading different for deaf individuals?” The authors investigated the research related to this question from several paradigms – the negative, the positive and the undecided. They gathered information from Brueggemann (2004) and Ladd (2003) who conclude that due to the differences in how deaf people think and learn, they have no need to understand the phonological structures of the written word as they can assign meaning to text directly from fingerspelling or sign.

On the converse side of this argument Wang et al. (2008) refer to Paul’s work from 2001, 2003 and 2008 which makes a comparison between deaf and hearing learners stating that they are similar in that they require the same skills to decode, but the deaf learners are significantly delayed in their acquisition of these decoding skills. Adams (1990), as cited in Wang et al. (2008), concludes that in order to read it is not essential to hear and articulate phonemes, but more essential is the ability to understand that they are the building blocks of language and mastering the ability to manipulate them is the key to reading. The National Reading Panel (2000) suggested that explicit and systematic phonics instruction should begin in kindergarten

and first grade. Wang et al. (2008) concur that this is also very important for students who are deaf or hard of hearing.

Both Wang et al. (2008) and Schirmer & McGough (2005) lament on the significant lack of research related to the reading acquisition of deaf individuals. Wang et al. (2008) describe how students who are deaf or hard of hearing with little useful residual hearing really had not benefitted in any way from phonics instruction, until recent investigations into the use of alternative methods of visual phonics in addition to traditional phonic teaching.

The use of visual cues to enhance speech production is not a new concept. Wang et al. (2008) refer back to the seminal work by Conrad (1979) who validated the use of hand signs to represent sounds. They suggested that speech reading and Visual Phonics or Cued Speech have the potential to give deaf or hard of hearing students access to the phoneme level of English. They conclude that instruction based upon phonemic awareness and phonics is indeed appropriate for deaf and hard of hearing students and there needs to be a groundswell of research and rethinking of current educational practice to use visual strategies to enhance reading instruction in today's schools.

Research Question

Does participation in a manual phonics program increase the ability of kindergarten students with hearing impairments to decode and blend regular phonetic words?

Chapter Two: literature review

The key to reading instruction is combining known effective instructional curricula and strategies that include the components of phonemic awareness, phonics, vocabulary, fluency, and comprehension for a complete reading curriculum (Zugel, 2012). In the following literature review the place of phonics instruction will be discussed and compared against the effects of teaching reading through whole language. Ehri, Nunes, Stahl, and Willows (2001) explain the difference between phonemic awareness, the ability to identify sound structures within words, and phonics which is the ability to identify letter sounds and their written counterparts, this is also known as phoneme-grapheme correspondence (phoneme – sound, grapheme-letter) . It is this author’s opinion that direct instruction in phonemic awareness and phonics is essential in the early stages of teaching reading to give students, especially those to whom reading does not come easily, the opportunity to access the written word independently.

Deaf and hard of hearing students by nature of their impairment have difficulty making connections with phonemic awareness and phonics in general. However, reading is inextricably linked to the spoken word and thus it is this author’s belief that the ability to decode written English through the understanding of phoneme-grapheme correspondence is essential in learning to read. Consequently, students who are deaf or hard of hearing require specialized instruction which allows them to access the ‘sound’ of written English.

The Place of Phonics Instruction

The National Reading Panel (2000) conducted a meta-analysis of peer-reviewed studies related to the teaching of phonics. They concluded that systematic phonics instruction was ‘highly beneficial’ to students learning to read and students in kindergarten and 1st grade are

capable of learning phonemic and phonics concepts. They go on to say that a combination of phonemic awareness and phonics instruction will benefit early readers.

Manyak (2008) reiterates the point that phonemic awareness is central to acquisition of the 'alphabetic principle' that is, phonic knowledge. He lists the benefits of phonic knowledge as the ability to decode and blend words, to spell phonetically and learn sight words reliably. He goes on to emphasize the need for teachers to understand phonemic awareness in order to teach it effectively. Following an empirical study of effective phonic teaching Shapiro and Solity (2008) suggested that short, frequent sessions of phonological training may significantly impact students experiencing reading difficulties.

Hempstall (1996) (as cited by Bowey, 2006) describes whole language as the holistic teaching of reading throughout the language curriculum without explicit phonics teaching. Bowey (2006) goes on to explain that a whole language curriculum provides a print rich environment, it assumes that children acquire knowledge and skill through reading for meaning using 'real books' (published children's stories) with little explicit phonics teaching. Fletcher and Francis (1997) (as cited by Beverly, 2009) say that to immerse children in a print rich environment without instruction in letter-sound correspondences and practice in decodable text is to doom a large percentage of children to reading failure.

Opponents to the use of phonics instruction suggest that the English language is too irregular for it to be beneficial, Bowey (2006) reflects that 80% of English is rule based which therefore negates that argument. Cassidy, Valadez, and Garrett (2010) illustrate the need for phonics teaching rather than a purely whole language approach when following the states adoption of the whole language concept California 's literacy scores dropped to the bottom of national rankings on National Assessment of Educational Progress tests during the early 1990s.

In contrast, following the National Reading Panel (2000) assessment of major studies in the United States, they concluded that phonemic awareness training benefits not only word calling but also comprehension. They purport that systematic phonics instruction has a more significant impact on reading ability than programs that do not include a phonic teaching element. However, Krashen (2009) pointed out that the National reading panel failed to note in their analysis that although students who receive intensive phonic training perform better on decoding assessments they do not out-perform students on measures of reading comprehension. Carson, Gillon, Boustead, Nippold, and Troia (2013) also reported in their study that students who received phonemic awareness training performed better on end of year reading and spelling assessments than their untrained peers. This is in direct contrast to the extensive study performed by Hatcher, Hulme, and Snowling (2004) who, contrary to their expectations, found that phonological training improved phonics skills but these did not translate into improvement in literacy skills.

Bowey (2006) advocates for the explicit teaching of letter-sound patterns to early readers but reiterates the advice of phonics advocates that these skills should not be taught in isolation. Shapiro and Solity (2008) advocate for early interventions of intensive phonological training given either individually or to small groups that targets the phonological core deficit in poor readers. This type of intervention should be integrated into everyday classroom environments with the aim of elevating reading achievement suggest Carson et al. (2013).

The National Reading Panel (2000) reports phonics instruction is designed for beginning or struggling readers. They go on to say that the goal of phonics programs is to give students the ability to master the alphabetic code so that they can read to comprehend. They further report that reading programs that include a phonic element have a more significant impact on the literacy skills of students than those that do not. Foorman (2007) warns from her research that

although phonemic awareness and phonics instruction can raise the performance of struggling readers it may actually hold back the progress of students who have already mastered the alphabetic principle. Krashen (2009) also warns, following the analysis of the Reading First intervention, that instruction in decoding is a first step but heavy, systematic phonics instruction is unnecessary. He explains that studies of this program revealed that students who received high interest, comprehensible reading instruction performed better on reading assessments than those students who received reading instruction with an emphasis on decoding skills. Smith (2004) (as cited in Krashen, 2009) states that a small amount of consciously learned knowledge of the rules of phonics can help in the beginning stages of reading to make texts comprehensible, but maintains that a reader's ability to decode complex words is the result of reading not the cause. The National Reading Panel (2000) reported that the optimal instruction period for phonemic awareness and phonics instruction was less than a total of twenty hours. They also advise teachers to differentiate instruction to suit the needs of the students.

Cox (2008) describes the goal of differentiation is to maximize the capacity of each learner by teaching in ways that help all learners. She goes on to explain that a differentiated classroom has clear goals, the students are grouped flexibly and individual growth is emphasized. As referred to earlier Foorman (2007) is cautious about teaching phonics to everyone, it is this author's contention that in a truly differentiated classroom this fear could be allayed. Following extensive research Rock, Gregg, Ellis, and Gable (2008) state that differentiation "is not a passing fad; it is a revolution - a fundamentally different way to teach students with diverse learning and behavioral needs."

Teaching Phonics to Deaf and Hard of Hearing Students

Manyak (2008) states that students need to understand the alphabetic principle, that letters represent phonemes in speech, and that phonemic awareness is central to this understanding. Anthony and Lonigan (2004) concur with this statement and add that knowledge of the alphabetic principle is a good predictor of reading ability of hearing children, but Kyle and Harris (2011) document that DHH children frequently learn very few grapheme-phoneme (letter-sound) correspondences in their early education. Narr (2006) explains that phonemic awareness is the use of sound identification, sound blending, segmenting, and sound manipulation. Easterbrooks and Stephenson (2006) refer on several occasions to the poor phonic knowledge of DHH students and the possibility of inadequate instruction in phonic level skills. Wang, Trezek, Luckner, and Paul (2008) state that students who have difficulty reading may attribute this difficulty to a lack of phonemic awareness.

The National Reading Panel (2000) reported that phonemic awareness is very significant in predicting future reading achievement. Nielsen and Luetke-Stahlman (2002) suggest that although DHH students may not be able to hear words and sounds clearly, this should not preclude them from being taught about the sound base of written English. Paul, (1998) (as cited in Nielsen and Luetke-Stahlman (2002) advocates for the development of good decoding skills as quick word identification skills allows a reader to comprehend the text they are reading. Nielsen and Luetke-Stahlman (2002) also state that the ability to rhyme was also a good predictor of future reading ability. Guardino, Syverud, Joyner, Nicols, and King (2011) state some DHH students have several barriers to acquiring letter-sound association and phonemic awareness. They do not have the same access to auditory clues and some visual clues from speech production are very similar for sounds like 'f' and 'v'.

Marschark, Spencer, Adams, and Sapere (2011) postulate that only by understanding the differences in the needs of DHH students can educators begin to effectively teach them. They advocate for the matching of teaching materials and methods more to the strengths and needs of the students rather than assuming that once the barrier of communication has been removed that the DHH children can learn the same as their hearing peers. These authors explain that many DHH students do not readily make connections between personal knowledge and new information or between concepts. Therefore they need to be taught the skill of making connections possibly through using graphic organizers. Marschark, Spencer, Adams, and Sapere (2011) emphasize the need to ensure that the students develop this skill automatically so that they make connections during teaching. These authors also advocate for the students to improve their meta-cognition, which is, self-monitoring their understanding and comprehension. They also suggest that presenting information in visuo-spatial rather than sequential terms will also assist many DHH students in acquiring new information.

Narr (2006) explains that hearing students have the ability to match words they are decoding with those from their ever increasing internal word banks. They have the advantage of reading the same language in which they communicate. However, they go on to say not all DHH students have this access to hearing the spoken word through audition alone and therefore modification of teaching methodology will be required. The National Reading Panel (2000) acknowledge that students with hearing impairments will require “explicit, systematic and meaningful” instruction.

Nielsen and Luetke-Stahlman (2002) stress that initially students can rely on memory of sight words but in order to make progress in reading they need to develop phonological awareness. Marschark, Spencer, Adams, and Sapere (2011) however, note that students with cochlea

implants that were fitted during the pre-lingual stage of development, may demonstrate better language development than their deaf peers. Narr (2006) adds to this that DHH students are further disadvantaged as they enter school either delayed or with limited exposure to spoken language. Consequently, they say, these students are learning to read at the same time they are learning to speak English.

Marschark, Spencer, Adams, and Sapere (2011) also note that in order for students to succeed, teachers need to explain what is expected during each class and why, and ensure that the student comprehends the directions. They caution that to date there are no interventions that have reliably improved the reading achievement of the DHH population.

See the Sound Visual Phonics

Jennifer S. Beal-Alvarez, Amy R. Lederberg, Susan R. Easterbrooks (2012) quote the definition of Visual Phonics from the International Communication Learning Institute, 1982, that “Visual Phonics is a multisensory instructional tool designed to clarify the sound–symbol relationship between spoken English and print”. They go on to explain how the use of hand and finger cues symbolizes the phonemes of spoken language. Thus, allowing the student to “see” the sounds in addition to or instead of "hearing" the sounds.

Montgomery (2008) states it is different from other visual phonic programs as it uses hand cues and written symbols to represent the sounds of the phonemes. She advocates for only using the visual cues and written symbols when the student requires additional support to make the “sound-to-print connection”. She emphasizes that See the Sound Visual Phonics (SSVP) is different from other visual phonic programs as the hand cues are directly linked to the oral production of the English sounds.

Narr (2008) produced a very clear comparison of the similarity and differences between Visual Phonics and Cued speech. The similarity being, that both are a visual representation of English. The differences include Visual phonics is not a communication system whereas cued speech is, the minimal unit of a 'cue' in visual phonic is a phoneme whereas in cued speech it is a syllable. Cued speech is for DHH students to learn both receptive and expressive language and, visual phonics is for any struggling student to understand phonological and phonemic elements leading to reading acquisition. Narr and Cawthon (2011) state that the articulation of the phonic sounds represented by the hand cues is 'helpful but not required.'

Waddy-Smith and Wilson, 2003 (as cited in Smith & Wang, 2010) explain that the primary goals of visual phonics are to improve reading through the development of phonological awareness and to improve speech through the development of articulation. Ye, Spychala, Harris, and Oetting (2013) state that SSVP does not claim to be a reading curriculum or a communication tool but an intervention tool to supplement other phonic programs. They go on to explain that acquisition of phonemic awareness and phonic skills do not have to be tied to one form of communication they can be represented orally or visually. In Leybaert & Charlier's study in 1996 (as cited by Nielsen and Luetke-Stahlman, 2002) they explained that students who receive some form of cued speech attained higher levels of reading achievement than those who did not. Narr and Cawthon (2011) and Smith and Wang (2010) state that the use of multisensory strategies appear to be effective in teaching phonological awareness to students who are deaf or hard of hearing (DHH). Trezek and Malmgren, 2005 provided evidence of the success of combining auditory and visual strategies to teach phonic skills (as cited in Beal-Alvarez, Lederberg & Easterbrooks, 2012).

Narr and Cawthon (2011) state that the International Communications Learning Institute (ICLI), the organization that owns the rights to Visual Phonics, maintains strict controls on only allowing educational staff trained by their official trainers to use the program so that the integrity of the method is maintained. Montgomery (2008) explains that the kinesthetic feature of SSVP resonates with students as it creates muscle memory. In reflection of their studies several authors state that the use of SSVP alongside a Direct Instruction phonic based program and a language rich environment improved the early reading skills of preschool DHH students (Beal-Alvarez, Lederberg, and Easterbrooks (2012); Guardino et al. (2011) and Ye et al. (2013). Ye et al., 2013 also noted that previous off-task behaviors reduced once the students began to see the significance of the Visual Phonics. Narr and Cawthon (2011) explain that Visual Phonics is a tool to be used as a support for existing curricula as it provides auditory information in an accessible way to visual learners. Other than this support, the methods used in SSVP have no other guidelines.

Montgomery (2008) advocates for the use of Visual Phonics as part of the tiered intervention for Response To Intervention stating, that one of the key impacts is that it can be used as much or as little as the student requires its support. The author clarifies that it is not a program or a curriculum but a strategy to represent sounds visually. Guardino et al. (2011) explain that during their observations students who were in the initial stages of developing phonemic awareness use the hand cues of SSVP more consistently than those students who had mastered the basics and now just needed the support of Visual Phonics for clarification and correction of misidentifications.

Allen et al. (2009) and Miller and Clark (2011) suggest that phonemic awareness and phonic based strategies may not be critical for acquisition of reading skills (as cited in Narr & Cawthon,

2011; Marschark, Spencer, Adams & Sapere, 2010; Syverud, Guardino & Selznick, 2009 & Ye et al., 2013). They claim that there is a lack of consensus on the best way to approach teaching reading to deaf and hard of hearing students. Trezek & Wang, 2006 (as cited in Smith & Wang, 2010) show indications that the use of Visual Phonics as an intervention tool alongside research based phonic programs showing gains on standardized tests regardless of hearing loss or communication mode of the students. Narr and Cawthon (2011) explain that in their study it is imperative to understand the perceived efficacy teachers have of the use of SSVP in order to address the research-to-practice gap. They discovered that experienced users of Visual phonics tended to agree more strongly with the statement that they saw improvement in student's phonemic awareness following the use of SSVP.

Ye et al. (2013) noted in the follow up to their study that although none of the participants continued the use of Visual Phonics and each was receiving a different phonic curriculum the skills gained during the research period had been sustained as shown by scores on developmental reading assessments which indicated that the students studied were reading at or above the level of their hearing peers. Beal-Alvarez (2012) found that in a replica study of the use of Visual Phonics alongside a phonic program named Foundations they effectively taught grapheme-phoneme correspondence to DHH preschoolers who maintained the knowledge over multiple replications.

Recent research of DHH students who received See the Sound Visual Phonics as an intervention alongside phonics instruction programs indicated an improvement in grapheme-phoneme correspondence regardless of types of hearing loss. Wang Ye et al. (2013) report that there is a lack of research investigating the explicit instruction of phonic skills to DHH students and its subsequent impact on reading achievement. They reflect that researchers (Beal-Alvarez

et al., 2011; Guardino et al, 2011; Waddy-Smith & Wilson, 2003) have been adding to the research base but the limited number of these studies warrants more attention to research in this area. Both Syverud, Guardino, and Selznick (2009) and (Smith and Wang (2010)) reflect at the conclusion of their studies the need for more empirical data and generalization of research into the use of See the Sound Visual Phonics. Narr (2011) calls for the validation of teachers' self-reported data to understand how teachers are using See the Sound Visual Phonics.

Conclusion

It is this authors contention that kindergarten students with hearing impairments who receive See the Sound Visual Phonics instruction are better able to segment and blend regular phonetic words than kindergarten students with hearing impairments who do not receive such instruction.

Although there is a long standing discussion between proponents for whole language versus phonics instruction a, general consensus is that phonemic awareness and phonics instruction is beneficial for beginning and struggling readers when it is presented to small groups in short, intensive interventions in a classroom setting as an integral part of a more comprehensive reading program.

Several researchers have referred to the under-developed grapheme-phoneme knowledge of DHH students and that this may contribute to poor reading skills. Suggestions have been made that direct instruction in phonics would benefit DHH students in acquisition in word calling and thus potentially increasing comprehension skills. Some researchers go on to suggest that this should be done through a visuo-spatial method in order to optimize all sensory input during instruction. However, Marschark, Spencer, Adams, and Sapere (2011) caution that to date no such intervention exists.

Chapter Three: methods

Hypothesis

Kindergarten students with hearing impairment who receive See the Sound Visual Phonics instruction are more successful in phonic assessments than when they do not receive such an intervention.

Setting and participants

The population identified for this study are deaf or hard of hearing kindergarten students. The target population is localized to a mid-Atlantic state and, the accessible population is to be drawn specifically from two rural school counties. The participants will be male and female of indiscriminate race.

The sampling method to be used will be purposive sampling in that a sample that is believed to be representative of the given population was selected. DHH students make up less than 1% of the general population. The advantage of this type of sampling is that there is a clear selection criterion; kindergarten, deaf or hard of hearing. The disadvantage is that this sample size is small and will probably not be able to be generalized. Teacher participants are all qualified teachers of the deaf and hard of hearing and are the regular teacher or itinerant teacher who normally works with the selected students.

Variables

The constructs related to this study will be the teaching style of the teachers in the test sites, students' ability and degree of hearing loss. Neither the constructs of teacher effectiveness nor student ability are being measured during this study but ultimately may affect the outcome and thus present limitations to the study. The construct of hearing loss will be recorded on the

anonymous data sheet and will be generalized to mild, moderate or severe according to the student's Individual Education Plan (IEP).

The categorical independent variable is using See the Sound Visual Phonics and the quantitative dependent variable is the score on the kindergarten sections 'Phonemic Awareness D and E' of the West Virginia Informal Reading Inventory (see appendix). The measurement scale used will be of the ratio type which will allow the respondents to be ranked using equal measure including a defined measure of zero – as it is possible for a respondent to obtain a score of "0". The use of See the Sound Visual Phonics influence on the retention of phonic knowledge requires a causal-comparative study. See the Sound Visual Phonics is the categorical independent variable with a quantitative dependent variable of the scores from the modified form of the WV Reading Inventory. The controls used will be trying to match the age, grade level, hearing age and types of hearing loss. The limitations to this study will include being unable to make these matches – in trying to use homogeneous subgroups these may turn out to be individuals due to the low incidence of students with hearing loss.

Threats to validity

Threats to the internal validity of the study were testing – the time period for the treatment was only about 4 weeks and the use of the same pre and posttest, however this author does not consider this to be a significant threat due to the young age of the participants. Another internal threat to validity was differential selection – the students had DHH in common but the varying degrees of hearing loss, location of education setting and differences in teachers may have affected test results. External validity threats referring to the generalizability of the study were difficult to pinpoint as the study was focused on a very small, yet important, population.

Treatment

The teacher participants who will be implementing the measure have been trained to use See the Sound Visual Phonics by International Communication Learning Institute endorsed instructors. They are fluent in the hand cues matched to each phoneme used in the English language which are taught through phonic programs. The teacher participants will administer a pre-test both with and without manual communication. The treatment group will then receive SSVP to enhance phonics instruction for 4 weeks. The treatment group will then receive the posttest – a replica of the pre-test – using the taught hand cues.

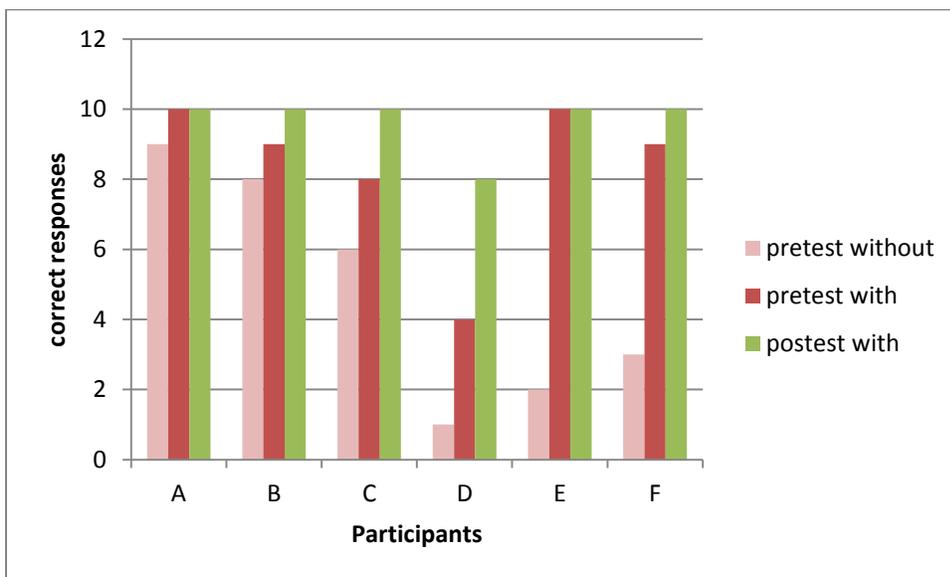
Measures

The West Virginia Informal Reading Assessment (2003) will be used to assess phonic knowledge and phonemic awareness (see appendix). The manual states that current reading research ‘undergirds’ the indicators of this assessment. The teacher participant will be using three sections of this measure. Phonemic awareness section D: Matching beginning sound to word/phoneme isolation – the directions, “I am going to say some words. I want you to tell me the beginning sound of the word,” will be said and/or signed to the student. There will be a demonstration and a practice item before the recording of responses begins. There are 10 target words. Section E of the phonemic awareness section follows the same pattern but the response is to identify the final sound of the target words.

Chapter Four: results

This study was designed to ascertain the effect of the use of See the Sound Visual Phonics (SSVP) with kindergarten students who have hearing impairments. The students had different levels of hearing loss ranging from mild/moderate to profound. The ages ranged from 5 years 7 months to 7 years 2 months. Phonics education occurred daily for each of the participants but the use of SSVP during instruction varied from one 30 minute session per week to five 15 minute sessions per week. The pretest was administered twice; once without SSVP and once with, the individual results from pre and posttests are shown below.

Figure 4.1. Initial Letter Sound Recognition



These results were converted into statistical data, using a t-Test: paired two sample for means, as represented in table 4.1.

Table 4.1. Initial Letter Sound Recognition

	<i>pretest without</i>	<i>posttest with</i>
Mean	4.83	9.67
Variance	10.97	0.67
Observations	6	6
Hypothesized Mean Difference	0	
t Stat	-4.05	
P(T<=t) two-tail	0.01	
t Critical two-tail	2.57	

The reported *t* statistic is – 4.05 with a 95% CI. This indicates that the use of SSVP is statistically significant at $p < 0.05$ when used with deaf and hard of hearing students.

Figure 4.2. Final Letter Sound Recognition

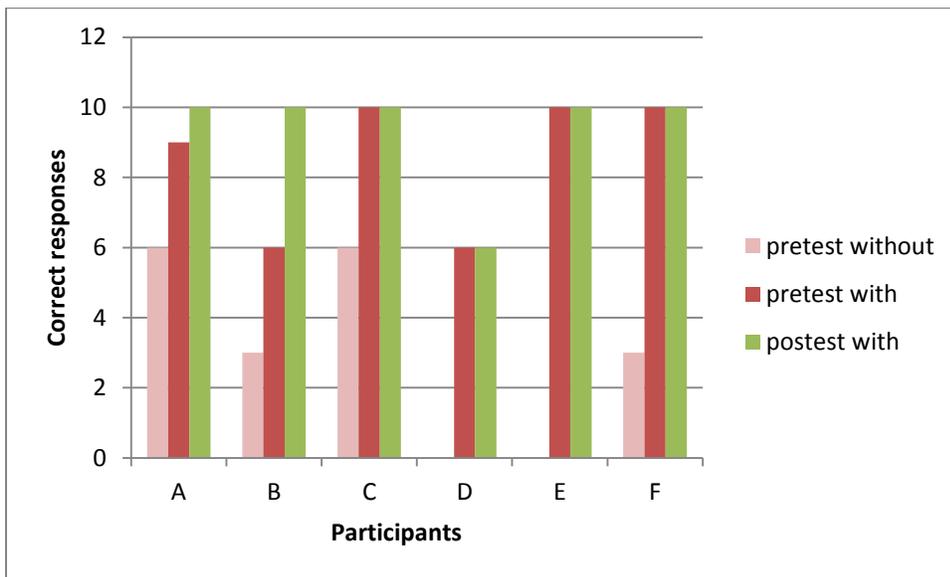


Figure 4.2 reflects the success of the initial letter sound test results were repeated in the final letter sound test. The statistical analysis of this data is shown in table 2 below;

Table 4.2. Final Letter Sound Recognition

	<i>pretest without</i>	<i>posttest with</i>
Mean	3	9.33
Variance	7.2	2.67
Observations	6	6
Hypothesized Mean Difference	0	
t Stat	-6.89	
P(T<=t) two-tail	0.001	
t Critical two-tail	2.57	

The reported *t* statistic is - 6.89 with a 95% CI. This indicates that the use of SSVP is statistically significant at $p < 0.05$ when used with deaf and hard of hearing students.

There is a further important interpretation of the results from this study. The results from the final letter sound assessment are used as an example comparing the pretest without using SSVP to the pretest using SSVP, the data analysis from this is shown in table 4.3,

Table 4.3. Pretest Comparison of Final Letter Sound Recognition

	<i>pretest without</i>	<i>pretest with</i>
Mean	3	8.5
Variance	7.2	3.9
Observations	6	6
Hypothesized Mean Difference	0	
t Stat	-4.92	
P(T<=t) two-tail	0.01	
t Critical two-tail	2.57	

The reported *t* statistic is - 4.92 with a 95% CI. This indicates that the use of SSVP is statistically significant at $p < 0.05$ when used with deaf and hard of hearing students. Two participants, E and F, who had mastered the assessments at pretest were given a supplementary assignment of learning consonant blends in isolation. Although these students made

improvements the sample size was so small that it was not statistically relevant. It is important to note at this point that although these results have statistical significance they have limited generalizability due to the small study sample.

Limitations of the study

This study was limited due to a number of factors. The first of which was the small size of the study sample leading to low generalizability. The second was the short time period involved in the study due to inclement weather that resulted in the closing of the schools in the study for more than 20 days. Further limitations were the disparity of hearing impairments and differences in the number and length of the treatment delivery sessions.

Chapter Five: discussion

This research focused on the use of See the Sound Visual Phonics as an intervention to supplement phonics curricula used in the general education setting. By conducting this research the aim was to find if deaf or hard of hearing kindergarteners were able to assimilate and communicate their knowledge of sound letter relations more effectively when using the SSVP intervention.

As referred to earlier, the National Reading Panel (2000) stated the importance of phonics education for beginning and struggling readers. They also advised that teachers differentiate for individual students' needs. The results from this study indicate that the use of SSVP is a significant intervention for kindergarten students who are deaf or hard of hearing. Although the time spent using the intervention differed between participants, the difference in results between tests show the benefit of even a weekly input of the intervention.

All of the participants had different levels of hearing loss. They also had different types of assistive devices including; behind the ear hearing aids, cochlea implants and BAHA devices most used in conjunction with personal FM systems. A further difference between participants was the use of three different phonics instruction programs. These differences could be considered threats to validity. However, even with these variables, the results show that the use of the SSVP is a common factor that may have resulted in the statistically significant improvement of letter sound relationship knowledge and communication.

The results from both the initial letter sound and final letter sounds assessments showed a statistical significance of -4.05 and -6.89 respectively indicating that the use of SSVP had a positive effect on the participants' achievement. It is important to observe at this point, that

although this statistical significance occurred with the assessment results from pretest to posttest, they are not a true reflection of the students' rate of learning.

When the assessment was presented on the same day, first without SSVP and then with SSVP, the difference shown between students' achievement in final letter sound recognition was statistically significant. The t statistic for this was -4.92. The impact of the intervention made a considerable difference to the teacher's and student's communication of the required target sounds. The significance of this is reflected in figure 4.2 were participant E who scored 0% on the final sound pretest without SSVP improved to 100% when SSVP was used.

In an education environment without SSVP some of these participants will have failed the test and be deemed to only have achieved partial mastery or novice in letter sound knowledge. This would then place them inappropriately in intervention groups with students who have not yet made grapheme-phoneme (letter sound) connections. These students with an intervention such as SSVP can access and demonstrate their grapheme-phoneme knowledge and thus impact the pace and rigor of their future education.

Paul (1998) laments on the fact that many children with hearing impairments graduate high school with only fourth grade reading levels (as cited in Neilson, 2005). The National Reading Panel (2000) suggest that students who have good acquisition of grapheme-phoneme relationships are more likely to have good reading comprehension skills. It is this author's contention that if teachers choose to use See the Sound Visual Phonics to support children who are deaf or hard of hearing, they may advance the acquisition of these students' phonics skills. This in turn may significantly impact the future acquisition of reading comprehension skills and therefore students who are deaf or hard of hearing may graduate with comprehension skills at a level beyond fourth grade.

The results of this research reflect the results of that conducted by Wang Ye et. al. (2013), Guardino et. al. (2011) and Beal-Alvarez et. al. (2011). Although, due to the small population concerned with the study material it is difficult to generalize the results but the intent of this research was to add to the mounting empirical data that may lead to generalizability of these multiple studies.

In conclusion, it appears from this research study that the use of SSVP may have a significant impact on the ability of student who are deaf or hard of hearing to assimilate and communicate their knowledge of grapheme-phoneme relationships. In order to further the data collection towards the goal of generalizability future studies may include; a comparison between weekly or daily intervention periods, the use of SSVP against not using it in classes that include hearing impaired students, the impact of the use of SSVP with students learning different spellings of phonemes or the use of SSVP as an Intensive Level of intervention with general education students in the Response To Intervention model.

Appendix

Figure A1 West Virginia Informal Reading Inventory part D

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Phonemic Awareness
D. Matching Beginning Sound
to Word/Phoneme Isolation

Directions: Individual Assessment - Oral - K^E

"I am going to say some words. I want you to tell me the beginning sound of the word."

Demonstration:

"If I say the word *five*, you would say /f/. /F/ is the first sound you hear in *five*."

Practice:

"Tell me the sound you hear at the beginning of *cat*. Tell me the sound you hear at the beginning of *ride*."

Response Code:

+ Correct = 1
- Incorrect = 0

Assessment:

	Words	Response	Comments
1.	man	_____	_____
2.	bike	_____	_____
3.	sat	_____	_____
4.	rest	_____	_____
5.	tug	_____	_____
6.	hide	_____	_____
7.	car	_____	_____
8.	fun	_____	_____
9.	girl	_____	_____
10.	look	_____	_____

Score:

Score: _____

3- 4	Emergent
5- 6	Partial Mastery
7- 8	Mastery
9-10	Distinguished

Figure A2 West Virginia Informal Reading Inventory part E

15

Phonemic Awareness
E. Matching Final
Sound to Word/Phoneme Isolation

Directions: Individual Assessment - Oral - K^E

"I am going to say some words. I want you to tell me the sound you hear at the end of each word."

Demonstration:

"If I say the word *fan* you would say /n/. /N/ is the last sound you hear at the end of the word *fan*."

Practice:

"Tell me the sound you hear at the end of *jet*. Tell me the sound you hear at the end of *nap*."

Response Code:

+ Correct = 1
- Incorrect = 0

Assessment:

	Words	Response	Comments
1.	girl	_____	_____
2.	light	_____	_____
3.	good	_____	_____
4.	job	_____	_____
5.	pass	_____	_____
6.	rug	_____	_____
7.	milk	_____	_____
8.	even	_____	_____
9.	lunch	_____	_____
10.	rain	_____	_____

Score: _____

Score: _____

3- 4	Emergent
5- 6	Partial Mastery
7- 8	Mastery
9-10	Distinguished

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