

The Effect of Exposure to See the Sound/Visual Phonics (STS/VP) in First Grade Literacy Instruction on Academic Assessment in Second Grade

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Abstract

The data were gathered from Common Core assessments administered three times per year to second grade students. Assent permission had been secured, per IRB agreement, from fifty-one parents. Their children were divided into two groups: those having had exposure to Visual Phonics in first grade, and those who did not.

Data analysis, using both descriptive and interpretive statistics, did not show any significant difference between the mean scores for the two groups across three assessment periods. Effect size also was generally small to moderate.

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The Effect of Exposure to See the Sound/Visual Phonics (STS/VP) in First Grade Literacy Instruction on Academic Assessment in Second Grade

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Key Words: Visual Phonics, literacy, second grade assessment, phonemic awareness

Abstract

Purpose: The purpose of this study was to determine whether exposure of See the Sound/Visual Phonics (STS/VP) in first grade would have an effect on selected second-grade literacy assessments. There is some evidence to suggest that the use of STS/VP as an adjunct to literacy instruction may increase decoding abilities of kindergarten and first grade students. We are unaware of evidence of the longevity of such an effect.

Subjects: Informed assent forms were secured from fifty-one children, randomly assigned to three second grades. Seventeen of the children had been in a first-grade class where literacy instruction was supplemented with STS/VP (experimental group). The remaining thirty-four children had been in two first grades where STS/VP was not used. (control group). All fifty-one children were identified by a district-assigned student number.

Method: Permission was secured, via agreed-upon St. Ambrose University IRB procedures approved on August 23, 2014. This permission was in the form of a signed assent form, in which parents allowed us to access results of district-wide assessments, as part of the Common Core state goals, for their child. The assessments were completed in the Fall, Winter, and Spring, and given to all students. Results from

four assessment instruments were used: Adaptive Reading, Curriculum-Based Measurement of Reading, Explanatory Performance Assessment, and District Unit Writing Assessment. Mean and standard deviation values for each assessment were generated for each group for the three assessment periods. Comparison scores were made of the Fall-Winter, Winter-Spring, and Fall-Spring assessment periods. Two types of assessment are presented. First, descriptive assessments, in terms of tables and charts, indicated no particular trend in the data. The second type of assessments were inferential. A one-way, between group, ANOVA was conducted to compare the effect of exposure in first grade to STS/VP on scores from District-Wide Assessments in second grade. In addition, effect size was measured, following the guidelines discussed by Cohen (1988).

Results/Discussion: Mean scores for both groups on the assessments were similar. This may indicate a lack of residual effect of first grade exposure to STS/VP on second grade literacy assessment. Results of the ANOVA indicated that the null hypothesis could not be rejected. This indicated scores from both groups were more alike than different. Effect size was small in all instances. It may also be that other forms of measurement, such as curriculum-based probes, may be more sensitive to differences resulting from use of STS/VP. Since many educators are using STS/VP as an adjunct to literacy instruction, it appears there is need for further data on whether this technique has lasting or transient benefit.

Literature Review

Typical literacy instruction in an early elementary classroom involves the use of auditory and visual stimuli. This method has proved successful for many children. However, the English language is one of exceptions rather than rules, with forty-five sounds associated with twenty-six letters. The accumulation of this sound/letter information may be very confusing to some children. What would happen if gestures, namely hand shapes, were added to that instruction? Would the storage of that information become more efficient? Would the retrieval become more accurate?

There is some evidence which suggests that gestures, used in conjunction with typical instruction, tend to promote learning (Cook & Goldin-Meadow, 2006). Novak, et al (2016) additionally infer that learners are more likely to profit from instruction when it is accompanied by gestures. Measurement of learning was done following instruction in algebra problem-solving. Students recalled more of the process to solve equations when instruction was accompanied with gesture.

See the Sound/Visual Phonics (STS/VP) can be viewed as a gestural system. Hand shapes are used to represent letter or letter combinations within the context of a word. In addition, written symbols are used as cuing mechanisms for spelling. We are in the process of gathering information about the use of STS/VP as an adjunct to literacy instruction, using both published and unpublished sources (Knox, et al, 2017).

There is, in addition, anecdotal information attesting to the veracity of STS/VP use with a variety of children with a variety of challenges. These include children who are hard of hearing or deaf (Trezek, Wang, Woods, Gampp, & Paul, 2007, for example), staffed into a special education setting (Atkinson-Cornwaite, 2012, for example), or have communication challenges (Dyke, Gergits, Veale, Anthony, & Smitley, 2009, for example).

We were able to find several papers, combined with our own research, which reported data gathered from the use of STS/VP with children in regular education. Especially interesting to this project were those studies dealing with preschool to first grade students, who were reportedly not at risk for reading problems. The studies varied in design, length of treatment, and use of controls. We were able to secure both published and unpublished material.

Slauson & Carrier (1992) reported results of a randomized controlled experiment involving forty kindergarten children. Thirty-two of the children were categorized as being “advanced” or “typically” developing, according to a district test. These children were randomly assigned to either a group receiving STS/VP as part of their literacy instruction, or to a group where this was not the case. The classroom teacher provided literacy instruction to both groups. The Woodcock-Johnson Revised Achievement Test was administered to all students at the end of the school year. Analysis of the results indicated an overall trend toward greater progress by students who were “taught STS hand signs, with the typical students improving most.” (Slauson

& Carrier, p.3).

Haarstad (2010) was a first-grade teacher in Minnesota. She divided her class of twenty students into three groups at the beginning of the school year. The groups were categorized as being upper, beginning, and nonreaders, based on her own assessment. She used a combination of daily phonics and STS/VP throughout the first semester of the school year. At the end of the semester she administered a posttest involving phonemic awareness skills, letter/sound knowledge, and vocabulary. The results of this descriptive study indicated enhanced improvement for all groups compared to previous years when STS/VP was not used.

Marron (2010), in a correlational study, used STS/VP to augment literacy instruction with three kindergarten students. Her program only lasted two weeks, consisting of literacy instruction using wordless books. In the end the children wrote the text to the books. Analysis consisted of comparisons of pre- and posttest results from both Dibels and a CBM probes. She did not characterize the results of these measures in terms of STS/VP use.

Carlson and Sorensen (2010) supplemented literacy instruction with STS/VP use with one preschool student. They used a multiple baseline design for this single-subject study, which lasted six weeks. They analyzed their data in terms of percent gains in sound segmentation and sound blending skills. They concluded that the greatest gains seemed to be in sound blending skills.

Meier, et al (2012) used retrospective data on literacy assessments done with two groups of kindergarten students. One group was in a classroom where the teacher did incorporate STS/VP into her literacy instruction. The other group was in a classroom where the teacher did not use this adjunctive instructional procedure. Data was gathered from phonemic awareness and CBM assessments which had been administered at the beginning and at the end of the school year. The differences were very minimal but did trend towards the children from the STS/VP group being at a higher reading level at the end of kindergarten compared to the other class.

Knox & Krupke (2015) have completed a year-long, random-controlled treatment study, comparing the single-word decoding abilities of two randomly-assigned groups of first grade students. One group was in a classroom where STS/VP was used. The other group did not use this technique. Probes were devised to measure progress in the acquisition, maintenance, and generalization of sound/letter information, using the District-mandated spelling program. Results did indicate that the children in the STS/VP group did have higher accuracy of correct identification of words. This was true for the whole group, for gender, and for literacy group enrollment. Plans are in progress for enrolling additional subjects to this research, as well as subject these data to statistical analyses.

The above review suggests that the addition of STS/VP to literacy instruction may enhance that instruction. This is probably more likely to happen during the early stages of literacy acquisition. Yet, what would be the long-range effect of STS/VP exposure? If first grade students could benefit from the addition of STS/VP in their classroom, would there be any carry-over effect to second grade literacy?

Purpose

The purpose of this study was whether exposure to STS/VP in first grade had an effect on second grade assessment results. This study was viewed as being very preliminary. Therefore, the following hypotheses were formed:

Null Hypothesis: There were no differences in the scores on District-Wide Assessments of second grade students, whether or not they had been exposed to STS/VP as an adjunct to first grade literacy instruction.

Alternative Hypothesis (1): There were differences in average scores on District-Wide Assessments of second grade students depending on whether they had been exposed to STS/VP as an adjunct to literacy instruction in first grade.

Method

Subjects

Seventy-five children were randomly assigned to three second grade classes. Twenty-four of those children had been in a first-grade class where STS/VP was used as an adjunct to literacy instruction. The other children were not exposed to STS/VP use. All three classes used the same literacy curriculum in first grade. The second-grade literacy program was standardized across the three classes. Two students had moved away from the attendance area. All students were identified by a number, which is randomly assigned to children in the school district. This number is used as long as the child is within the district.

Approval for this project was secured from the St. Ambrose University IRB. This was transmitted in an email from Carol DeVolder, IRB Chair, on August 23, 2014. Information letters were sent to the parents of all the children assigned to the three second grades. This explained the project and asked for their assent to access their student's district-wide assessment results. Access would follow the three- times-per year assessments administered to all students. Parents were assured that no child would be identified by name, and all data would be grouped. They were also assured that nonparticipation would have no bearing on their child's literacy program.

Fifty-one parents returned signed assent forms allowing access to their child's assessment data. Seventeen of the children had been in the first-grade class which used STS/VP. These would be designated the experimental group. The other thirty-three had been in other first grade classes and would be the control group. These numbers were in keeping with the 1:2 ratio of children exposed to STS/VP in first grade and those who were not.

District Assessments

The major comparisons used for this study were based on scores from District-wide assessments. Table 1 describes the four assessments.

Please Insert Table 1

Adaptive Reading and Curriculum-Based Measurement for Reading are both part of the Formative Assessment for Teachers (FAST), developed primarily at the University of Minnesota. These assessments have several purposes, including screening, progress monitoring, and to aid in the analysis of students' reading skills. There are several studies supporting the theoretical underpinnings of these assessments Ardoin, et. al, (2013), for example. Explanatory Performance Assessments were developed by Columbia University to coincide with the goals of Common Core. The District Unit Writing Assessments provide data on two important State Core writing goals, narrative and opinion.

The assessments were administered during the school year. The District Unit Writing Assessments were only administered once, in the Spring. The other three assessments were administered three times: Fall, Winter, and Spring. Assessment results for all fifty students were secured through the help of the assigned Instructional Strategist. She was extremely helpful in securing the scores, and printing reports based on those scores for the second-grade classes. All fifty children had responded to three of these assessment protocols during their kindergarten and first grade years. The District Writing assessment was new in second grade. This would indicate that responses on the assessments were a reliable estimation of certain literacy skills.

Results from the assessment protocols were transmitted in the form of reports, which documented assessment results for all second-grade students. The data from children with signed assent forms were used in the data analysis. The identification numbers of those children were used to differentiate the experimental from the control group.

In order to begin to test our hypotheses, the data were then compiled according to the assessment protocol. The data were then further compiled according to group, experimental and control.

Two types of descriptive analysis were performed. First, mean and standard deviation values were calculated for all children in each group, according to all four assessment protocols. These data were further analyzed in terms of assessment periods, fall, winter, and spring.

The second type of analysis compared the average change in assessment protocol for each group over the three assessment periods. Three of the four assessment protocols were administered multiple times during the school year. Comparison of the change data were then compiled comparing the assessment periods: Fall-Winter, Winter-Spring, and Fall-Spring.

Finally, two types of inferential statistical analyses were performed. A one-tailed ANOVA was calculated. Since this was viewed as a preliminary study, an alpha level of .10 was used in the calculations. These results will be reported for the three assessments (Adaptive Reading, Curriculum-based measure of Reading, and Explanatory Performance Assessment) which were administered to each student three times during the school year. District-wide Writing Assessment was only administered once, in the Spring. Comparison change data were also subjected to ANOVA analysis for the above three assessments.

Effect size, reported as Cohen's *d*, was calculated for the three assessments, during the Fall, Winter, and Spring assessment periods. Since there was a difference in the number of subjects in the experimental as compared to the control group, it was decided operationally to use the pooled standard deviation measure in the effect size calculation. Interpretation of effect size data were based on suggestions by Cohen (1988)

Results

District Wide Assessment Results

Mean and standard deviation for each assessment protocol.

Adaptive Reading

Table 2 presents the mean and standard deviation values for the scores of both groups on the Adaptive Reading (aReading) assessment. This assessment, which is part of the FAST protocol, takes between six and twenty minutes per student. It is administered online to students. The outcome of this assessment is a standard score measure. These are then used to monitor progress children make in acquiring literacy skills.

Please Insert Table 2

The control group children had higher average scores on the aReading protocol for both the Fall and Winter testing periods. The experimental group had a slightly higher mean score during the Spring testing than did the control group. The variability, as expressed by standard deviation, was greater for the experimental group children during the Fall and Winter testing periods. It was greater for the control group children during the Spring assessment period.

An analysis of variance showed that the effect of exposure to STS/VP in first grade did not have a significant effect on the results for aReading assessment protocol over three assessment periods, $F(1,4) = .0206$, $p = .8927$. Effect size values were: $d = .126$ for the Fall assessment; $d = .107$ for the Winter assessment; and $d = .050$ for the Spring assessment. These are judged to be small effects. On the basis of this analysis the null hypothesis is accepted as it pertains to the effect of first grade exposure to STS/VP on this assessment protocol.

CBM Universal Screening Protocol

The CBM-Universal Screening Protocol, also part of the FAST testing assessment package, is a one-minute oral reading assessment. Scoring is done by the teacher or the administrator of the protocol. Several measures result from this assessment, including median words read correctly, median errors per-minute, and overall percent accuracy. For purposes of this study, the measure of median number of words read correctly was used. The mean and standard deviation values are seen in Table 3. This seemed to show the most variation between children, both in the experimental and control group.

Please Insert Table 3

The above results indicate that throughout the year the children in the control group, on the average, had a higher mean number of words read, during the CBM-R screening, than the children in the experimental

group. Standard deviation values indicate that there appears to be less variation among the scores of children in the experimental group during the Winter and Spring assessment periods.

An analysis of variance showed much the same trend as for aReading, $F(1,4) = .3539$, $p = .583$. Effect size calculations were: $d = .230$ for the Fall assessment; $d = .150$ for the Winter assessment, and $d = .345$ for the Spring assessment. The null hypothesis is accepted for CBM Universal Screening. Effect size values were small for this measure.

Explanatory Performance Assessment

The Explanatory Performance Assessments were developed as part of the Reading and Writing Project at Columbia University, and is closely aligned with Common Core goals. Children are asked to listen to a piece of nonfiction writing. They are then asked to summarize the information in writing. Writing is then analyzed across several parameters, including reading, ideas and content, voice, word choice, sentence fluency, and conventions. Each parameter is judged on a scale of 1-4, according to a scoring rubric. The rubric can be interpreted as showing the student's proficiency across each of the seven parameters. A total score is then produced across all seven parameters, with a possible total score of 28. Table 4 presents the mean and standard deviation for the total scores of the experimental compared to the control group.

Please Insert Table 4

The children in the control group had higher total scores, on the average, during all three assessment periods. The experimental group children had less variation in their EPA Performance Assessment scores than did the control group children during the Winter and Spring assessment.

When these data were subjected to an analysis of variance, the results were much the same as the above two analyses, $F(1,4) = .307$, $p = .608$. Effect size calculations were: $d = .337$ for the Fall assessment, $d = .206$ for the Winter assessment, and $d = .297$ for the Spring assessment. On the basis of this analysis the null hypothesis is accepted. Effect size calculations indicate small effects between the groups.

District Writing Assessment

The District Writing Assessment asks a child to perform two types of writing. Narrative writing is thought to be text-inspired and is generally informational or explanatory. Opinion writing, on the other hand, is often argumentative. These two types of writing are mentioned in the Common Core, and the later state core goals. Total scores for both types of writing are compiled. The mean and standard deviation values for the two types of writing, for the experimental and compared to the control group children are presented in Table 5.

Please Insert Table 5

This assessment was done one time during the 2014-2015 school year. The scores of the children in the control group were slightly higher than for the children in the experimental group for both types of writing. The variation in the scores for children in the experimental group was lower for both the narrative and opinion protocols than for children in the control group. There was not enough data to subject these results to an analysis of variance. However, the trends in the data appeared to be much like those for the other three assessments. It is highly unlikely that we could reject our null hypothesis based on these data.

Average change for three assessment protocols across three assessment periods.

One way to compile these data would be to compute the average change in assessment scores during the school year. Three of the four assessment protocols were administered during the Fall, Winter, and Spring assessment periods. It is possible to compare those three periods in terms of average change for the experimental as compared to the control group children. Average change data for the three assessment protocols administered during the school year appear in Table 6.

Please Insert Table 6

In general, the change data indicates more similarity than difference between the two groups. The change in scores on all three assessments was greater for the Fall-Winter comparison than for the Winter-Spring period for both groups.

Discussion

The results indicate that on the basis of the results from the ANOVA the null hypothesis was accepted. Effect size measures indicated small differences between the means of scores for the two groups. Based on these results, there appears to be little carry-over effect of exposure to STS/VP in first grade to scores on assessments in second grade. However, this does not mean the results would be similar for other forms of data, CBM probes, for example. There are several possible explanations for the present results.

First, it may be that there is little residual effect of STS/VP exposure in first grade to second grade literacy achievement. Pairing STS/VP with typical literacy instruction has been shown to be helpful to some children in the regular education classroom, especially when skills such as phonemic awareness and decoding are being developed. Much of the positive effects have to do with the instructional efficacy with which the teacher uses STS/VP. Not all teachers use this technique. Therefore, not all children are exposed to this adjunctive instruction. It seems, however, from our data that this exposure may not be as important to the overall literacy progress. This may be the case when literacy progress is measured by District-wide assessment.

Second, it may be that other forms of assessment might be more sensitive to measurement of a residual effect. This might be the case if measurement was made repetitively during literacy instruction rather than three times per year. Teachers undoubtedly have these types of data, used to make informed decisions about progress monitoring. CBM probes are an example of such data sources. We do suspect that some children may continue to benefit from early exposure of STS/VP, even through second grade.

Third, there is a change in the emphasis of literacy programs, probably beginning around second grade. Many early skills, such as phonemic awareness and decoding, for example, are assumed. As new vocabulary is introduced through the literacy curriculum, the retrieval of these skills becomes important. It could be that assessments, such as those used in this school district, assume previous skill development rather than measuring it.

Finally, we do encourage more investigation into the longevity of STS/VP as an adjunct to literacy development. Many of the people who attend professional development meetings designed to teach this technique are employed in the regular education setting. Practice Based Evidence (PBE) studies documenting the experience of those attendees would be valuable in charting the longevity of STS/VP benefit. It is through that type of study, the effect that the addition of a gestural system to typical auditory-visual sound/letter development can be determined. It may be the effect is dependent on the efficacy with which an individual teacher employs STS/VP. These studies document “real world” solutions. Sharing that information would be very important, whether in published form, or between colleagues at a school.

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Tables

Table 1. Second Grade Assessment Protocols

Assessment Protocol	Administration	Purpose	Skills Assessed
Adaptive Reading (aReading)	Computer 6-20 minutes	Evaluate Performance Progress Monitoring Placement Reporting	Concepts of Print Phonological Awareness Phonics
Curriculum-Based Measurement for Reading (CBM Reading)	Students read from a paper copy One minute of oral reading Teacher marks errors 3-5 minutes	Use of grade level or instructional level material. Progress Monitoring	Oral Reading Rate Errors Oral Reading Fluency
Explanatory Performance Assessment (EPA)	Student listens to a nonfiction passage being read. Student summarizes information.	Used to determine proficiency level. Monitoring progress.	Reading Ideas and Content Organization Voice Word Choice Sentence Fluency Conventions
District Unit Writing Assessments	Students are asked to write.	Monitor progress. Report results in relation to Iowa Core goals for grade level.	Two measures: Narrative Opinion

Table 2. District Wide Assessment. Mean and standard deviation values for assessment results on the Adaptive Reading protocol, for three assessment periods, across both groups.

		Experimental Group	Control Group
Fall	Mean Score	476.125	478.5
	Standard Deviation	47.204	21.939
Winter	Mean Score	489.875	492.971
	Standard Deviation	21.633	17.594
Spring	Mean Score	500.563	499.647
	Standard Deviation	17.197	18.170

Table 3. District Wide Assessment. Mean and standard deviation values for CBM-R Universal Screening protocol, median words read correctly, for three assessment periods, experimental group children as compared to control group children.

		Experimental	Control
Fall	Mean	79.25	87.696
	Standard Deviation	38.907	34.332
Winter	Mean	104.875	115.909
	Standard Deviation	31.561	32.591
Spring	Mean	118.5625	129.030
	Standard Deviation	27.312	33.048

Table 4. District Wide Assessment. Mean and standard deviation values for ELA District Performance Assessments, total scores, for three assessment periods, experimental group children as compared to control group children.

		Experimental Group	Control Group
Fall	Mean	15.875	17.29
	Standard Deviation	4.24	4.17
Winter	Mean	20.625	21.46
	Standard Deviation	3.5	4.53
Spring	Mean	21.312	22.43
	Standard Deviation	3.62	3.90

Table 5. District Writing Assessment. Mean and standard deviation values for the District Unit Writing Assessments for the experimental group children compared to the control group children.

		Experimental Group	Control Group
Narrative	Mean	2.47	2.49
	Standard Deviation	.509	.669
Opinion	Mean	2.7	3.00
	Standard Deviation	.499	.613

Table 6. Comparisons of changes in mean scores for three district-wide assessments, for three comparison periods, for children in the experimental and control groups.

Assessment	Experimental	Control
Adaptive Reading		
Fall-Winter Winter-Spring Fall-Spring	+13 +11 +24	+13 +8 +21
CBM-R		
Fall-Winter Winter-Spring Fall-Spring	+25 +14 +39	+28 +14 +42
Explanatory Performance		
Fall-Winter Winter-Spring Fall-Spring	+5 +1 +6	+4 +1 +5