

Spring 2018

A Pilot Study on the Correlation of Reading Improvement Using Colored Overlay Paper in Elementary Age Students with Reading Challenges

Tim Salyers
Old Dominion University

Follow this and additional works at: https://digitalcommons.odu.edu/ots_masters_projects



Part of the [Elementary Education Commons](#), and the [Language and Literacy Education Commons](#)

Recommended Citation

Salyers, Tim, "A Pilot Study on the Correlation of Reading Improvement Using Colored Overlay Paper in Elementary Age Students with Reading Challenges" (2018). *OTS Master's Level Projects & Papers*. 587. https://digitalcommons.odu.edu/ots_masters_projects/587

This Master's Project is brought to you for free and open access by the STEM Education & Professional Studies at ODU Digital Commons. It has been accepted for inclusion in OTS Master's Level Projects & Papers by an authorized administrator of ODU Digital Commons. For more information, please contact digitalcommons@odu.edu.

A PILOT STUDY ON THE CORRELATION OF READING IMPROVEMENT USING
COLORED OVERLAY PAPER IN ELEMENTARY AGE STUDENTS WITH READING
CHALLENGES

by

Tim Salyers

B.S. May 2008, Old Dominion University

M.S. May 2010, Old Dominion University

A Research Study Submitted to the Faculty of
Old Dominion University in Partial fulfillment of the
Requirements for the Degree of:
MASTER OF SCIENCE

OCCUPATIONAL AND TECHNICAL STUDIES

OLD DOMINION UNIVERSITY

May 2018

Approved by:

Karina Arcaute, Ph.D.
SEPS 636 Instructor

ABSTRACT

A PILOT STUDY ON THE CORRELATION OF READING IMPROVEMENT USING COLORED OVERLAY PAPER IN ELEMENTARY AGE STUDENTS WITH READING CHALLENGES

Tim Salyers

Old Dominion University, 2018

Co-directors: Dr. Philip Reed, Dr. John Ritz, and Dr. Karina Arcaute

This study examined the use of colored overlay on reading abilities of students with reading deficits in the 5th grade at Lebanon Elementary School during the 2013-2014 school year. This study was guided by the previous research of which has shown that the use of colored overlay increases the reading abilities of students challenged by their reading deficits. The study was a quasi-experimental quantitative pilot research that compared the reading level before and after colored overlay paper was placed over reading passages in a sample size of six 5th grade students. These students were between nine and eleven years of age, white males and over 80% of them were from coal mining families and considered low-income.

Results from this pilot study indicate that there is a difference in students' reading achievement when using colored overlay paper in reading exercises. A 12.5% improvement in reading scores grade was found when using colored overlay. Although there is a noticeable instantaneous improvement in reading scores and comprehension

when using colored overlay paper in students with reading deficits, there is still a need for experimentation with a larger and more varied group of students, as this pilot study was limited to six students in the 5th grade.

ACKNOWLEDGEMENTS

The researcher would like to thank all of those who helped provide a template for this study. Particularly a huge thank you to the students that donated their time and dedicated themselves to seeking resources that would assist them in their reading endeavors. The researcher would also like to thank Dr. Phillip Reed and Dr. John Ritz for his patience and guidance along with Dr. Karina Arcaute through the complete journey of this research paper.

Tim Salyers

TABLE OF CONTENTS

Abstract	ii
Acknowledgements	iv
List of Tables.....	vii
List of Figures.....	
Chapter 1	1
Introduction	3
Statement of Problem.....	3
Research Objective.....	.3
Background and Significance.....	4
Limitations.....	5
Assumptions.....	6
Definition of Terms	7
Summary and Overview	8
Chapter 2	10
Review of Literature.....	10
Impact of Reading Deficits in the School Setting.....	10
Using Colored Overlays in Reading Exercises.....	11
Limitations of Using Colored Overlay.....	12
Assets of Using Colored Overlay.....	13
Reading Improvement Strategies.....	15
Summary.....	16
Chapter 3	17
Methods and Procedures.....	17
Population	17
Components of Reading Practice at Lebanon Elementary.....	18

Research Variables.....	18
Research Instruments.....	18
Methods of Data Collection.....	19
Statistical Analysis.....	20
Summary.....	20
Chapter 4	21
Findings.....	21
Results.....	25
Summary.....	25
Chapter 5	26
Summary, Conclusions, and Recommendations.....	27
References.....	29

LIST OF TABLES

Table 1. Reading Scores With and Without Colored Overlay.....	20
Table 2. t-test of reading scores with and without using the colored overlay assuming unequal variances.....	22

LIST OF FIGURES

Figure 1. Average reading scores with and without colored overlay.....	21
--	----

CHAPTER 1

INTRODUCTION

Studies by Reis, and McCoach (2008) have shown students demonstrating reading challenges, made attempts to improve reading skills with experience they gained from previous time spent in their studies. This study demonstrated the students utilizing various strategies (scaffold reading, help from the teacher's aide, peer tutoring and phonics) all had benefits that improved reading skills when the strategy was matched to the right student. The study strengthened the belief that each student learns in ways that are unique to themselves (Reis & McCoach, 2008).

The U.S. Department of Education (1999) carried out reading research for students exhibiting reading deficits in their reading abilities. To begin with, black words were presented on white index cards and white words were presented on black index cards. In the third set of cards, both black and white letters were printed with a colored (red blue, or pink) background. Reading assignments from the appropriate grade level were broken down and the letters were put in the background of the cards. There was a substantial increase in comprehension using the highlighted story for all students. This led the researchers to determine specific colors added to the students understanding of the reading task.

According to Sinclair, R. (1998), color has an impact on helping children stay focused for longer periods of time, therefore increasing attentiveness to detail and improving comprehension. Comprehension is affected when attention is given to the

fluency of words as they are read and background color may be a key to increasing reading comprehension, especially in reading challenged students.

Six of the students were in the special education classroom that worked with slow readers while receiving tutoring from peers and teachers aids for all subjects in their curriculum. The students received a marginal amount of One-on-one instruction from the teacher and the teacher's aide because of the large number of students the teacher worked with. The Teacher- to-Student ratio restricted the personal hands-on assistance from the teacher that the students needed. Unfortunately for the students, this unintended neglect resulted in the falling farther and farther behind in their class work. According to Tomkins (2010) lack of reading ability makes it very difficult to succeed in courses that students take. Lack of reading ability affects the understanding of directions for math word problems (Tomkins, 2010).

Reading presents a difficulty in comprehension for the students with reading disabilities. The students tend to have a short attention span. According to Irlen (1991), some students with reading challenges have their reading difficulty compounded because of pattern glare that causes eye-strain, perceptual distortions, and illusions of shapes or colors, thus discouraging the challenged reader to concentrate on the reading material (Irlen, 1991). According to Evans, Wilkins, Busby, & Jeanes (2001) when students with reading challenges wear spectacles tinted with certain colors, the students have various reduction resulting from eyestrain and headaches. Colored overlay has shown to eliminate symptoms and increase reading speed in students with reading challenges (Wilkins et al., 2001). Students that face reading challenges need assistance identifying helpful strategies. Colored overlay paper has made a difference in reading

speed and understanding the reading material and word problems in many cases (Irlen, 2001). Maclachlan (1993) reports that students with autism also benefit from colored overlay because of their ability to focus on tiny minute details. He also reported that children who benefit from overlays are twice more likely to come from families with a history of migraine headaches, (Maclachlan, 1993).

Statement of the Problem

The purpose of the problem was to determine the academic effect achieved by reading ability directly related to literacy. The National Assessment of Adult Literacy (NAAL), defines literacy as "using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential". With today's society being information-based, students' who lack reading ability will be face with a challenge. This study is particularly interested in the lack of reading ability exhibited by 5th grade by students at Lebanon Elementary School. The purpose of the study is to determine if by using a simple tool, a colored overlay paper, during the course of exercises, there is an improvement in the students' reading ability.

Research Objective

The following research objectives guide the activities in the study:

- 1.) To research the effect of poor reading skills on a student's ability to fulfill assigned reading exercises,
- 2.) Investigate the effect of poor reading skills on a student's ability to do reading exercises and instructions associated with their studies. The National Center for

Education Statistics on Adult Literacy, found the United States was ranked 23rd in reading ability when compared to other major countries of the world.

BACKGROUND AND SIGNIFICANCE

With today's society being information-based, students' who lack reading abilities will be faced with numerous challenges. All subjects require reading skills. Ouellette (2006) states "reading does not only involve decoding and visual recognition: The end goal is comprehension." Many factors influence a person's ability to read the text and comprehend what they are reading; visual processing being one. Increasing visual processing by incorporating colored overlays into the students (with reading challenges) exercise is one strategy to improve reading fluency and comprehension of reading material (Ouelette, 2006).

According to Wilkins et al. (2001), reading requires the use of external and internal stimuli to explore the world around us. Over the years, the use of color for visually enhancing a person's reading ability, has undergone a transformation from the use of colored chalk on chalkboards to using black ink on colored paper. The ability of the eyes of a student to perceive the text through various colors of colored overlay paper serves to enhance the enhancement and understanding of the text being read (Wilkins et al., 2001).

Jeanes (1977) used the intuitive overlays in several small-scale studies in county primary schools. Researchers presented different colored overlays. The teachers presented each of the colors in turn and allowed children to choose the one that improved the clarity of text. About one half of the children reported beneficial perceptual effects with the chosen overlay (Jeanes, 1977). He observed that students prefer and

function better with particular colors. The study could not generalize on a particular color that was the right option for all student. Jeanes observed that the light colored overlays had better results and were chosen by students when they were given a choice. The most selected colors or the colors that produced better results were light pink, blue, and orange (Jeanes, 1977).

Irlen (1991) reported that one cognitive ability influenced by color processing is reading. Certain environments not conducive to reading can provoke pattern glare that causes eyestrain, perceptual distortions such as blurring and illusions of shapes or colors on the page. The term Meares- Irlen syndrome refers to the signs and symptoms of visual stress that are associated with discomfort when reading. Individuals with Meares- Irlen syndrome often report that the perceptual distortions they experience when they read are reduced when text was illuminated by the light of a particular optimal color (Irlen, 1991).

Parents, teachers, and staff all realize the importance of reading to succeed in school. It is always helpful if there is some assistance or tools that instructors can use when working with students to improve reading skills. Therefore, by implementing a form of help that heightens the student's attention, reading can become less of a burden and more of a positive learning process. A colored overlay may stimulate the students mind and imagination by the ways it highlights the text and presents it in a more identifiable form.

Limitations

The limitations of this study were as follows:

- This Pilot study was limited to a low number of students (six) which may not provide adequate data generalize solutions.
- This study was limited to Lebanon Elementary School, a small school in Southwestern Virginia and may not represent students from other school systems.
- The study was limited to the 2013-2014 school year.

Assumptions

This research was based on the following assumptions:

1. This pilot study contains research that displays reading improvement when reading challenged students in the 5th grade incorporate a light colored overlay paper over their reading assignments.
2. Being able to read directions for assignments, passages for understanding, and creating a report results in improved class performance.
3. The use of colored overlay paper enhances a student's ability to comprehend coursework.
4. Increased comprehension reduces the inhibition of the student when being introduced to new material.

This study was carried out in a 6 week. As part of the activities in the study, students were asked to read a passage based on a 3rd grade level story, and read the instructions to a math problem, also on a 3rd grade level without an overlay. The students were allowed to choose overlay paper from a selection of 3 colors (light blue,

pink, and green). Data with the number of correct words and missed words was recorded on word document. The students gave a written statement describing how the colored overlay paper changed or did not change the way they approached reading exercises. The students also described their approach to word problems related to math. The examiner analyzed the final data using a simple t-test to measure the change in the students reading abilities and understanding while using the colored overlay paper.

Definition of Terms

The following terms used throughout the study are defined as follows:

- 1). Colored overlay paper- Transparent sheets of various colored paper placed over regular test sheet that allows the user to see the text and background more distinctly.
- 2). Cloze procedures- Activities that require students to fill in blank spaces with text of their choice in a sentence with a certain pattern of words missing (such as every fifth word). This text needs to fit in and stay with the meaning of the sentence or passage. Example: Spaghetti has many carbs, _____ it also contains good energy sources.
- 3). Students with reading deficits- Students assessed as having reading difficulty and are on a lower reading ability than their classmates of the same age group. Some of these common disabilities in students with reading deficits include dyslexia, language processing disorder, visual perception and visual motor deficit, and Meares-Irlen syndrome, among others.

- 4). Elementary students- Students schooled together in grades four through seven.
- 5). Benchmark test- Criterion with which to compare other test assessments.
- 6). Teachers' aides- Trained professionals that assist the teacher in needed areas of class with students requiring extra support.

Summary and Overview

This study will examine the use of colored overlay on reading abilities of students in the 5th grade at Lebanon Elementary School. This study is guided by the previous research of Irlin (1991) which has shown that the use of colored overlay increases the reading abilities of students challenged by their reading deficits. This study will build on the study (Irlin, 1991). This study was comprised of a small (six) number of students during the 2013-2014 school year. The studies assumptions include that use of colored overlay paper enhances a student's ability to comprehend coursework and increased comprehension reduces the inhibition of the student when being introduced to new material, as well as being able to read directions for assignments ad passages for understanding and creating reports, results in improved class performance.

A review of the literature is provided in Chapter II in an attempt to identify previous works in the effects of colored overlay on reading abilities to guide the research, as well as the struggles of students lacking reading skills, and the importance of developing programs that assist in the success of these students. Chapter III details the methods and procedures used to collect the data required to complete the study. The findings of the study are presented in Chapter V. Chapter V is a summary of the research in addition to the conclusion and the recommendations of the study.

CHAPTER 2

REVIEW OF LITERATURE

The review of literature incorporated in this project provides the base for the pilot study. While the research on colored overlay paper and what effect it may have had when students used it to read was the focus of this study, there are additional areas of how the research results would affect the attitude or ability to face reading challenges that came from this success. This chapter contains information on the students with reading deficits, their struggles with reading, and the importance of developing successful programs using colored overlay paper to help meet the needs that assist these students to be on a leveled playing field.

Impact of Reading Deficits in the School Settings

For many years, educators and researchers have noted the relation between improved reading comprehension and scholastic achievement (Anderson et al., 1985). Research has suggested that several factors, including classroom environment, socioeconomic status, and teacher training, play a major role in the lower rates of literacy and achievement often experienced by students with “reading deficits” (Anderson et al., 1985).

Ludlow, Wilkins, and Heaton (2006) shared that despite years of reform and research, few researchers have specially addressed the diverse needs of readers with reading challenges if traditional means were not successful. (Ludlow et al., 2006) suggest that to promote reading improvement, non-traditional assistance and tools need to be incorporated into the curriculum for reading challenged students. To achieve

growth in students' reading skills and ensure later school success, teachers must provide all students with appropriately challenging material along with the assistance that will allow them to be successful.

Reis, Eckert, and McCoache (2008) addressed the problem that students exhibiting reading deficits face, as there are a large number of these students that do not continue their education after high school. The students face stress from entering an environment where students' are expected to be ready to meet the challenges of understanding a huge proportion of the curriculum and instructions without having teacher or peer supervision. Poor readers as adults do not like to read, struggle with comprehension, have a limited vocabulary, are unfamiliar with sentence structure, and may have other language weaknesses. Although farmers and biologists have manipulated the environments of plants and animals in an attempt to create bigger and healthier products for market, little has been done with regard to improving the capability and production of a more fluent, comprehending reader. Strategies are available to increase a person's ability to read and comprehend, one of which is the use of color. (Reis et al., 2008).

Using Colored Overlays in Reading Exercises

Irlen (1991) reported that reading is a cognitive ability that is proven to be influenced by colored overlay paper. Reading can provoke pattern glare that causes eyestrain, perceptual distortions such as burring or apparent movement of letters, and illusions of shapes or colors on the page. The term Meares-Irlen syndrome refers to the signs and symptoms of visual stress associated with discomfort when reading. The individuals that have reading challenges affected by this syndrome, report that the

perceptual distortions they experience when reading are reduced when the test is illuminated with colored overlay paper (Irlen, 1991). According to Wilkins et al. (1994) color overlays are transparent colored plastic sheets placed over printed tests without interfering with their clarity in Wilkins study. Participants in the Wilkins Study self-selected the overlay that they perceive best improves the clarity of the printed text. Participants can use a single overlay or they can use stronger colors in the form of double overlays. Research using this test has shown that 25% of students with reading challenges improved their reading speed and comprehension of the text using colored overlays (Wilkins et al., 1994).

LIMITATIONS OF USING COLORED OVERLAY

Henderson, Tsogka, and Snowling (2013) stated that it was difficult to measure whether the usage of overlays in students with “reading deficits” was successful. It is unclear in the absence of a casual theory, if overlays increase reading performance or improve comfort during reading. Indeed, the mechanisms that underlie visual stress and the benefit from colored filters remain unclear. Visual stress (the experience of visual distortions and discomfort during prolonged reading) is frequently identified and alleviated with colored overlays or lenses. Previous studies have associated visual stress with reading disabilities and as a consequence, colored overlays are sometimes distributed to children and adults with experiencing reading difficulties. However, this practice remains controversial. Henderson et al. (2012) carried out research on whether overlays have advantages and reliable benefits for reading in undergraduate students with and without reading challenges. Both groups read jumbled text faster with a colored

overlay than without. However, colored overlay did not improve reading rate or comprehension of connected text in that study. The improvement in reading speed with an overlay was not found to be reliable and was of significant variation among students with below age reading ability. These results leave in question the value of colored overlays as a tool for identifying visual stress or reading disabilities and as a form of remediation for the reading difficulties associated with these reading challenges (Henderson et al. 2012).

Assets of Using Colored overlay

According to Wilkins et al. (2001) studies carried out with students facing reading challenges have shown that the benefit of overlays is not simply due to placebo effects. One research design compared reading rate with no overlay, with a chosen overlay, with a pink overlay, and a pink overlay that was identical except that it was labeled “scientific prototype”. Students thought the prototype was new and combined all the colors and that they would be the first to use it. However, the findings from the study showed that improvements in reading were only in those who had chosen a colored overlay and with no placebo effect identified (Wilkins et al., 2001).

Jeanes et al. (1997) demonstrated the benefits of overlays in a one-minute test, the Rate of Reading Test. The test consisted of a passage of text read aloud as quickly as possible for one minute. The score was the number of words correctly read. The passage consisted of ten lines each comprising the same 15 common words in a different random order. These are familiar to poor readers who are therefore prepared

to undertake the challenge of reading. The random order ensures that no word can be guessed from the context; each word must be seen to be read. The absence of any meaning has the advantage children are often unaware of their errors of omission and transposition of words. The text is printed in a small typeface, closely spaced, in order to increase the visual difficulty. In this study, 25% of the students increased their average rate of reading while using an overlay voluntarily as opposed to those that did not (Jeanes et al. 1997).

According to Henderson et al. (2012) the experience of visual distortions and discomfort during prolonged reading is frequently identified and alleviated with colored overlays. Using the Wilkins Rate of Reading Test (WRRT) which tests the impact of intuitive overlays on reading, there was a show of marked improvement. Readers improved their reading rate by 25%. The WRRT consisted of four texts of randomly ordered high-frequency words which are read with and without overlays. It was reported approximately 50% of their sample of primary and secondary aged children showed improvements in reading rate on the WRRT with the overlays (Henderson et al., 2012).

According to Smith and Wilkins (2007) a measurement in reading speed using colored overlays with students having reading challenges and visual stress were tested in random order. They reported a significant increase in speed with the intuitive overlay which offered a choice of 30 colors. The student's reading speed increased by 5% or more. The sample of students increased their reading skills by approximately 35% by students already having reading difficulty (Smith and Wilkins, 2007).

Reading Improvement Strategies

According to Reis et al. (2008) reading improvement is based on the enrichment of reading practices, attitudes, and the use of tools or strategies that aid the students with reading deficits (Reis et al., 2008). Classroom strategies of using the colored overlay paper have been very beneficial to many students that struggle with reading challenges. The combined use of repetition and using overlays helps in developing a sense of confidence as the same exercises are repeated. Although the passages and terms students read may not be identical, the passages are rated at the same reading level. By using the overlays the instructor finds it gives the student new perspectives on how they look at a passage or a set of instructions. In many cases, students can comprehend and distinguish the text for the first time because of their ability to separate it individually. This raises the student excitement level as they are finally able to see the same thing that the other students have seen all along.

According to Ozgen (2004) the goal of all students as they take classes simply shows their desire to better themselves and gain new skills. There are four skills needed to complete elementary school and proceed to middle school. Without proper reading skills students struggle to comprehend effectively the ability to process information being read and derive meaning from the material.

1. There has to be a desire and willingness on the part of the student to have success in their studies.
2. There has to be time designated to spend finishing the work for the classes they are participating in.
3. There has to be a dedication to attendance and promptness in attending classes.

4. There has to be an internal fortitude that helps drive the students even if they do not have success on their first attempt at a test or class (Ozgen, 2004).

Summary

The review of literature identified studies that support or dispute the benefit of the use of colored overlays. Most of these studies have shown that the use of colored overlays has a positive effect on students with reading deficits at all age groups. The varied colors that the overlays come in can give the student a different perspective and view of the text they are reading. The colored overlay highlights the text by changing its boldness and giving a different background color that seems to make the text stand out. However, there has been a lot of research that disagrees with the benefit of colored overlays. Another issue with the use of overlays in the field, is that teachers sometimes find it difficult to keep a supply of overlay for every reading assignment or math exercise.

CHAPTER 3

METHODS AND PROCEDURES

This was a quasi-experimental quantitative pilot research study that compared the reading level of students before and after colored overlay paper was placed over their reading passages. The students that participated in this research attended Lebanon Elementary School in Lebanon, VA. The students were from the 5th grade. The steps that were taken to gather the data used in the study are discussed in this chapter. Population, Research Variables, Instrument Design, Methods of Data Collection, and Statistical Analysis are the topics that will be addressed.

Population

The convenience sample in this research study volunteered its participation. Participants were students were taking classes at Lebanon Elementary School. The students were in a classroom setting and were presented with assignments by teacher and aides at scheduled times. During the school year 2013-2014, there were six students with reading disabilities in the 5th grade, all six of them needed extra instruction. These students were between nine and eleven years of age. For this study, the participants were six of the students in need of extra instruction. The students' demographics were all white males and over 80% of them were from coal mining families and considered low-income.

Components of Reading Practice at Lebanon Elementary

The reading resources used at Lebanon Elementary School are composed of daily oral language, shared reading, guided reading, independent reading practice, and tutoring by instructor. The student does oral language activities daily to practice grammar, cloze activities and spelling on their own study time. These reading exercises are occasionally performed with the presence of a peer if so desired. Shared reading is done in peer homogeneous groups where the teacher meets with the group twice weekly. Guided reading groups are led by an aide that prepares students' to a more one-on-one setting with the teacher. The skills taught during guided reading are reading strategies, annotation, comprehension, spelling, and grammar. Independent skills are a repetition of the skills the student has accomplished during the week. The student and teacher meet for a writer's workshop and the students practice their writing by using models and examples. A component of reading is associated with each of these activities.

Research Variables

The experimental group consisted of six 5th grade students, between nine and eleven years of age, white males. The reading level before and after colored overlay paper was placed over 2-paragraph reading passages and was then compared.

Research Instruments

Reading is the basis for all learning. According to Tomkins (2010) there are five important factors reading contributes to development of the whole student.

1. Word identification- Capable readers seem to have a large bank of words that they recognize instantly and automatically because it is impossible to stop and analyze every word they read.
2. Fluency- Fluency is a product of capable readers. They read quickly and with expression. Three components of fluency are reading speed, word recognition, and prosody.
3. Vocabulary- Readers at a higher level have a larger vocabulary than readers at a lower level. They learn words at amazing rates, 7-10 per day.
4. Comprehension- Readers use their experiences and the text to construct comprehension, a meaning useful for a specific purpose.
5. Motivation- Capable readers are motivated. They become engaged while reading and expect to be successful. Motivation is intrinsic; it involves feeling self-confident and viewing the activity as pleasurable (Tomkins, pp-123-124, 2010).

In addition to the 2-paragraph reading passage and the worked math problems given to participants to read, a cloze test was used to complement the colored overlay comparison.

Methods of Data Collection

The researcher collected the cloze test data and recorded the grades on a Word document. The research incorporated the previous benchmark test as the baseline. The students were required to read passages from their textbooks from class. The reading exercises were on a third grade level with the 5th word in each sentence missing. The students used this information to obtain their answers. Each student began the pilot research with 100% as their grade.

The experimental group read passages of similar difficulty from the textbooks, but the second time they used the colored overlay. The errors during reading consisted of missed words from the reading assignments, skipped, or incorrectly read words. Each mistake represented 5% of the total. The sum of the mistakes was totaled and taken from 100%

Statistical Analysis

A t-test with a 5% significance level will be used to determine if there is a difference between reading scores. The t-test will assume unequal variances.

Summary

The research incorporated colored overlay paper into the reading exercises of six 5th grade students with reading deficits. The students were classified as low income students from coal mining families. The students performed reading exercises with and without using colored overlay. The use of a t-test determined if there was a statistically significant difference between the mean score reading values with and without using the colored overlay.

CHAPTER 4

Findings

This research study was a quasi-experimental quantitative pilot research study to determine the difference using colored overlay paper during reading exercises and math instruction readings that involved six 5th grade students.

Class Grades Comparisons

The data collected reported individual reading grades (for two sessions), one before the colored overlay and one after each student had eight reading session grades (see Table 1). The average score for before and after the overlay use was calculated and used to get the t-ratio. Figure 1 shows the calculated average reading scores with and without the colored overlay.

Table 1. Reading Scores With and Without Colored Overlay

	Without Colored Paper Overlay	With Colored Paper Overlay	Difference
	72	92	20.0
	66	88	22.0
	79	86	7.0
	78	83	5.0
	73	89	16.0
	82	87	5.0
Average	75	87.5	12.5
Variance	33.6	9.1	60.3
Standard Deviation	5.80	3.02	7.77

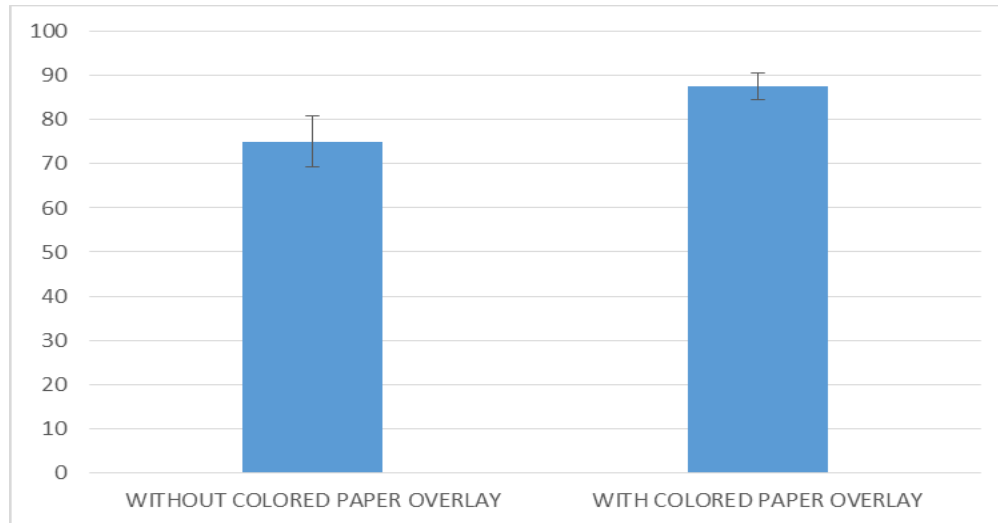


Figure 1. Average reading scores with and without colored overlay. Error bars represent ± 1 standard deviation.

RESULTS

T-test results showed that when comparing the groups the p value is 0.0007 which indicates that the 12.5 difference is statistically significant. The degree of freedom was 8. The t-test determined that the 12.5 differences is statistically significant at a confidence level of 5 % (see Table 2). The assumption of unequal variance is appropriate as it can be seen on Table 1, the calculated variances are different. The variance for the sample with colored overlay is larger (33.6) than the variance for the sample with colored overlay (9.1).

Table-2: t-test of reading scores with and without using the colored overlay assuming unequal variances.

	Without Colored Overlay Paper	With Colored Overlay Paper
Mean	75	87.5
Variance	33.6	9.1
Observations	6	6
Hypothesized Mean Difference	0	
Degrees of Freedom	8	
t-Stat	-4.68567002	
P(T<=t) one- tail	0.00078515	
t-critical one- tail	1.85954804	
P(T<=t) Critical two- tail	0.0015703	
T critical two-tail	2.30600414	

Summary

Results from this pilot study indicate that there is a difference in students' reading achievement when using colored overlay paper in reading exercises. A 12.5% improvement in reading scores grade was found when using colored overlay. Although there is a noticeable instantaneous improvement in reading scores and comprehension when using colored overlay paper in student's with reading deficits, there is still a need for experimentation with a larger and more varied group of students, as this pilot study was limited to six students in the 5th grade.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECCOMENDATIONS

Using colored overlays or colored filters change the way eyes perceive the spectral content of light (Irlen, 1991). The use of colored paper, colored overlays, and colored filters may increase reading comprehension simply by taking away the distraction of a white background and putting the focus on the print, improving reading comprehension for all kinds of readers. In this pilot study 5th grade age students using colored overlays show improvements in reading assignments compared to reading exercises not using colored overlays. The improvement was significant as there was a 12.5% increase in the reading scores.

Students experiencing visual discomfort while reading would also experience perceptual distortions in their reading accuracy and fluency. Colored overlays relieve much of this stress from these reading challenges. There are no generally accepted criteria for how much faster someone should read with an overlay, or for what period of time the person has to use the overlay over in order to show permanent improvement. Remarkably the 5th graders in this study not only showed immediate improvement, but increased reading speed and comprehension during successive sessions.

Conclusions

Results from this pilot study indicate that there is a difference in students' reading achievement when using colored overlay paper in reading exercises. A 12.5% improvement in reading scores grade was found when using colored overlay. Although is a noticeable instantaneous improvement in reading scores and comprehension when

using colored overlay paper in students with reading deficits, there is still a need for experimentation with a larger and more varied group of students, as this pilot study was limited to six students in the 5th grade.

Recommendations

It is necessary to develop intervention that will prove effective to improve reading. Teachers and schools have deadlines to meet and scores to accomplish on their Standard of Learning, but some students are at a disadvantage by their reading levels. The calendar year for school systems has an agenda and outline of what to teach and when to teach it (scope and sequence). However, if the students having reading challenges are lagging behind the rest of their class. It is difficult to match their reading level.

Based on these research findings, further research is needed to determine the quantity of improvement using colored overlays, not only on the reading, but also in all subjects that have a reading portion contained in the assignment. Reading is the base of all learning. Using colored overlay paper in reading assignments may be a simple solution to improve reading challenges in students. Additional studies on the effect of colored overlay paper are necessary. Some recommendations for future studies in the effect of colored overlay paper are:

- 1.) Executing a thorough evaluation to determine reading challenges among students to help determine if there are visual deficits involved or just reading challenges.

- 2.) Reevaluate the schedule for reading exercises to determine if twice weekly is enough time to evaluate and help improve upon student reading.
- 3.) Based on the results of this study, a more meticulous investigation is needed to identify any cultural or economic bias that may be part of the reading success of the students. This school contains a high percentage (90%) of low-income students that live in isolated communities. This may contribute to their lack of access to reading material.
- 4.) Recommendation that colored overlays are available to any student that improves their reading comprehension and speed when using these overlays to test for reading deficits.
- 5.) The inclusion of one teacher's aide specializing in reading to assist each elementary grade to serve any student that may need one-on-one instruction with reading assignments.

REFERENCES

Best, Charles (2015). *Donors choose: How technology facilitated a new funding model.*

Stanford Business Graduate School: Stanford, California.

Henderson, L., Tsogka, N., and Snowling, M. (2012). Questioning the benefits that

Colored overlays can have for reading in students with and without dyslexia.

Journal of Research in Special Educational Needs, 13, (1), 57-65.

Irlen, H. (1991). *Reading Through Colors: Overcoming Dyslexia and Other Reading*

Disabilities Through the Irlen Method. New York: Avery

Ludlow, A., Wilkins, A., and Heaton, P. (2006). The effect of colored overlay

on reading ability in children with Autism. *Journal of Autism and Developmental*

Disorders, 36, (4), 507-524. DOI 10.1007/s10803-006-0090-5

Ozgen, E. (2004). Language, learning, and color perception. *Current Directions in*

Psychological Science, 13 (3), 95-98.

Ouelette, G.P. (2006). What's meaning got to do with it: The role of vocabulary in word

Reading and reading comprehension. *Journal of Educational Psychology, 98(3),*

554-566.

Reis, S., Eckert, R., and McCoach, B. (2008). Using enrichment reading practices to

increase reading fluency, comprehension, and attitudes. *The Journal*

of Educational Research, 15, (2), 299-315.

Sinclair, R. (1998). Differential test performance from differently colored paper: White paper works best. *Teaching of Psychology*, 31, (2), 111-112.

Smith, L. and Wilkins, A. (2007). How many colors are necessary to increase the reading speed of children with visual stress? A comparison of two systems. *Journal of Research in Reading*, 30, (3), 332-343.

Tompkins, G. (2010). *What's Important in Reading?* Boston: Pearson Allyn Bacon/Prentice Hall.

U.S. Department of Education. (1999). *Start early, finish strong. How to help every child become a reader* (pp. 17-29.) Washington, D.C.

U.S. Department of Education (2001). *A guide to reading for parents*. Washington, DC

Wilkins, A., Lewis, E., Smith, F., Rowland, E., and Tweedie, W. (2001). Colored overlays and their benefit for reading. *Journal of Research in Reading*, 24, (1), 42-64.