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A study exploring the value of using colored transparencies or lenses to increase reading scores

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A STUDY EXPLORING THE VALUE
OF USING COLORED TRANSPARENCIES OR LENSES
TO INCREASE READING SCORES

MASTER'S PROJECT

Submitted to the School of Education
University of Dayton, in Partial Fulfillment
of the Requirements for the Degree
Master of Science in Education

by

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Approved by:



Official Advisor

TABLE OF CONTENT

ACKNOWLEDGEMENTS v

DEDICATION vi

Chapter:

I. INTRODUCTION TO THE PROBLEM

 Background to the Study 1

 Problem Statement 1

 Assumptions 2

 Limitations 2

 Definitions of Terms 2

II. REVIEW OF RELATED LITERATURE

 Medical and Physical Conditions 3

 Reasons for Using Color-Enhanced Reading Aids 5

 Techniques for Incorporating Color Aids 7

 Impact of Using Color Aids on Student Achievement 8

III. PROCEDURE

 Subjects 9

 Setting 9

 Design 10

 Instrumentation 10

IV. RESULTS

 Presentation of Results 12

 Discussion of Results 16

V. SUMMARY, CONCLUSIONS & RECOMMENDATIONS

 Summary 18

 Conclusions 19

BIBLIOGRAPHY 20

LIST OF TABLES

TABLE I 14

TABLE II 15

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DEDICATION

I would like to dedicate this project
to Matthew and Mother, who are gone;
and to Johnathan, who gave me the will
to stay.

CHAPTER I

INTRODUCTION TO THE PROBLEM

Background to the Study

Many of the students in a learning disabilities unit are there because of severe reading problems. As a teacher of learning disabled students, this researcher has had the opportunity to use color overlays as an aid for students. Some students reported that the tinted overlays helped them see the printed text material more clearly. After reviewing more information relating to this area of visual enhancement, Irlen, (1987), the next practical step would be to use the tinted overlays in some type of structured situation. The purpose would be to see if an improvement of students reading scores could be obtained by using the tinted overlay sheets during reading assignments.

Tests done by ophthalmologists sometime indicate that there is nothing wrong with a person's eyes; yet, that student or adult continues to express symptoms of blurring, headaches, etc. when attempting to read Irlen, (1987) cited by Bald. When a student has been diagnosed as having difficulties with reading skills, perhaps a more detailed evaluation of the visual system could bring about help before the student falls so far behind that he needs placement in a special education unit.

Problem Statement

The purpose of this study was to compare and contrast the reading scores with the use of color transparencies.

Assumptions

It was assumed by this researcher that the teachers involved in the study did carry through with the use of color transparencies during each reading period. Another assumption that must be made is that each grade did indeed have the prescribed one hour reading instruction each day.

Limitations

Because there were three different teachers involved in this study, it cannot be documented that each grade level received the same level of reading instruction competency. The manner and approach would naturally vary from teacher to teacher. The use of the colored overlays was carried through for only one grading period, this placed a limit on the reliability of the study. Since each student did not receive an individual eye examination before the study, it cannot be certain that each student entered the study with normal vision.

Definitions of Terms

Color transparencies are color tinted vinyl sheets of approximately five inches by eight inches in size.

Scotopic sensitivity syndrome is a sensitivity to specific wavelengths of light that causes perceptual problems in people who may not otherwise need glasses.

Luminance is the relative quantity of light or brightness.

Regular classroom in this study refers to the regular grade level classrooms as opposed to a special education unit.

CHAPTER II

REVIEW OF RELATED LITERATURE

Medical and Physical Conditions Affecting Visual Images

In their study, King-Smith, et al (1986) questioned the interpretation of an acquired color defect. Since the genetic make-up of each individual is uniquely different, the acceptance and sensitivity of the cones and rods of the human eye might possibly interpret colors in differing manners. A study done by Atwood & Adler (1987) recognizes three general problem areas: photophobia, the inability to adjust to various lightning conditions, particularly fluorescent lights; visual resolution, the inability to see the "central" point of focus; and span of focus, the inability to perceive groups of words at the same time. Since dealing with fluorescent lightning is a situation that must be met by almost everyone, a problem in any of these areas could affect a subject's reading skills. The ability to follow along while others are reading, find specific words located on a page or locate the beginning and ending places of indented material or paragraphs affect a person's ability to read fluently and comprehend adequately.

The group of symptoms associated with problems stemming from lightning were first called "Scotopic sensitivity syndrone" by Irlen in a paper presented to the American Psychological Association at a convention in August 1983. In her paper Irlen noted that the relationship of photophobia to reading occurs because of the use of black print on white paper. King-Smith, (1987), and his colleagues stated

that it is not only the discrimination of various colors, but the degree of luminance as well. Sustained focus, the ability to do visual tasks with the eyes in a relaxed state and the objects in focus, is directly affected by the degree of luminance in the restricted area of vision. Robinson and Miles, (1987), in their study, contended that for those people who have experienced eye strain, neck tension, or headaches while reading, the problem may not stem from the reading process itself, but from the contrasted black print on white paper.

Erratic eye movement patterns in dyslexics have been linked to sequencing abilities (Pavlidid, 1986). Depth perception, blurring of vision, flashes of light are all associated with dyslexia and are conditions that affect a person's ability to function in a normal fashion (Irlen, 1987). In a recent study Fricker (1989) contended that a segment of the dyslexic population have visual perception distortion which differs from the dyslexia population as a whole. It is this segment of the dyslexic population that may need extensive evaluation to determine if a particular wave length of light is responsible for their reading problems.

The use of color enhanced and color coded materials has been demonstrated to aid such children in maintaining sustained visual images, which in turn, aids comprehension and retention of printed material. Some researchers suggested that the use of color tints and color coding will only aid in the immediate retention of materials, and not the long term memory (Voorhees, 1985).

Correlations have been found between fluorescent lighting and aggravated learning difficulties (Irlen, 1987). The general scope of Irlen's work is based on the premise that the ability to see print clearly and free of distortion is affected by the individual's ability to accommodate the black/white contrast in printed material (Irlen, 1989). The use of color tinted lenses or color overlays helps alleviate this sensitivity to luminance, wave lengths, and black/white contrast.

Reasons for Using Color-Enhanced Reading Aids

In a study done with pre-school children Perlmutter & Myers, (1976) noted more correct responses were made for color specific items. The children also showed reaction time differences for correct choices on color specific items presented in black and white and color. Better visual contact with printed material often translates into better encoding and comprehension of the content (Irlen, 1989). The speed and accuracy of reading can be improved when color-enhanced materials is in use in an organized fashion. Perception, a process in which understanding is being derived from what the eyes have seen to what the mind comprehends, is often the missing link in visual disabled students (Nyborg, 1982).

Many students experience problems in reading but do not seem to respond in a positive manner even when placed in remedial classes (Poplin, 1988). The use of color-enhanced reading aids can easily be incorporated into a regular classroom program, thus providing a remedial technique that is relative inexpensive and can be used before the more drastic step of placing a child into a special education class. By reducing the amount of light reflected from a printed page, sustaining

amounts of time doing actual reading are made possible for reading disabled people (Whiting, 1988). Because students are unable to adjust to various lighting conditions, they have difficulties keeping their place while reading and often skip over important material and tire quickly because of eye strain (Adler & Atwood, 1987). For this reason, it is imperative to use color-enhanced reading aids. Some students, especially younger males, have difficulties maintaining a concentrated focus on the blue/purple colors associated with ditto copies used in many classrooms (Bailes, 1990). By being aware of the benefits derived from using colored paper in place of the standard white, many young students may not fall behind in the early stages of reading development as is now the case (Whiting, 1988).

In a study carried out with fifth students, who were enrolled in remedial class in California, it was found that following a testing period of five months the twenty-five students who had been fitted with prescribed tinted lenses had gained significant benefits. Irlen reported:

that on the test of reading errors which were considered to be visual in origin, the experimental group's score improved from 5.9 to 0.9. The groups' score on signs of eye strain (including headaches, reports of word distortion, eye rubbing and excessive blinking and squinting) went from 6.4 to 1.0.

The scores of the twenty-five students who made up the comparison group remained virtually the same. The experimental group's time to read a given passage dropped from 28.2 to 21.3 seconds over the same time frame.

In regard to the results of studies such as these, this researcher feels there is a definite need to use color aids as a means of eliminating

all possible factors which might prohibit a student from achieving acceptable academic scores.

Techniques for Incorporating Color Aids

Students who have scotopic sensitivity syndrome will need a variety of aids available to help them function in the classroom. If possible, the use of natural or incandescent lights should be used. When fluorescent lights are in place, remove some of the tubes if possible. This will reduce both the flickering effect of the lights and the amount of illumination (Irlen & Lass, 1989).

Worksheets can be xeroxed onto colored paper; color lined paper tablets are available in blue, green, beige, pink and yellow. Classroom work and homework should be done on tinted paper. Some students may benefit from wearing tinted visors. These visors will reduce the amount of direct glare from overhead lighting. The use of colored chalk for writing on the chalkboard will reduce glare in that area. Colored highlighters in the appropriate colors can help enhance written material in workbooks and textbooks. Highlighters can help hold numbers in the columns in math problems (Lerner, 1981). Allowing students to use the colored rub off letters and numbers add not only color but tactile reinforcement. By making color aids available for students, instructors are enabling the students to take a responsible part in their learning process. This, in turn, will add to the student's sense of being in control of his/her academic future. By placing more responsibility for learning with the student, there is a much greater possibility that the color aids will be used consistently and with greater success.

Impact of Using Color Aids on Student Achievement

The expected impact upon students who benefit from color enhancement would manifest itself, hopefully, in better and improved reading performances and improved attitudes toward reading and reading assignments. Probably most important of all, would be a higher degree of self-esteem. What researchers do not know about learning styles may prove to be the missing link between effective instruction and academic achievement (Dunn, 1981). Once the cycle of failure and defeat has been broken, a student will often demonstrate a remarkable desire to prove his abilities not only to himself, but to others who have been aware of his struggles in the past.

In summary, the results of research on scotopic sensitivity syndrome seem to indicate that some changes in our diagnostic assessments may be needed. If this disabling condition can be identified and can be aided by the use of tinted lenses or overlays, teachers can take a step forward in meeting the needs of one segment of our population. These color aids can easily be incorporated into classroom activities and assignments. There are colored lenses available for those who wish to undergo the evaluation required for such prescriptions. For anyone with a severe reading problem, due to dyslexia, it should be encouraging to know that possibly there is something that can provide at least some degree of help to them.

CHAPTER III

PROCEDURE

Subjects

The students participating in this study were from the regular fourth, fifth, and sixth grade classrooms. Numerically, there were twenty-nine fourth graders, twenty-nine fifth graders, and twenty-two sixth graders. The classes were heterogeneous, with reading taught at the given grade level. The reading grade level of each student as of the beginning of the school year was determined for the purpose of identifying low-achievers in reading. These reading levels were taken from the Gates-MacGinitie Form K and L Reading Test which had been administered at the end of the previous school year (1989).

Setting

School Setting - The elementary school involved in this study has approximately two hundred fifty students enrolled in grades kindergarten through the sixth grade. This school is one of seven elementary school in the district; there is one junior high school and one high school in the district. The school is located in a small village in southeastern Ohio. Students come from backgrounds of basically low to middle class blue-collar workers. Average classroom size ranges from twenty-five to thirty students. Only the kindergarten and first grade have a teacher's aide.

Community Setting - The community that this study took place in is located in Southeastern Ohio. The community itself is a small village of approximately five hundred residents. The area receives most of its income from small businesses and coal mines.

Design

This study was conducted over a period of six weeks. The study was carried out during reading classes in the fourth, fifth, and sixth grade classrooms. Colored vinyl overlays were used by each child during reading class. The researcher visited each classroom and demonstrated how the overlay was to be used with reading material.

Instrumentation

The students in each of the classes involved in the study were given a reading evaluation at the end of the previous school year (1988-89). The results of this test, the Gates MacGinitie Reading Inventory, was used as a basis for determining those students who were reading near or above grade level, and those who were reading below grade level. For the purpose of this study, those students who were reading below mid-year at each grade level, were identified as low achievers. For example, a fourth grader taking the test in May 1989, should score at or near 4.9. If a student's score was 4.4 or below, he/she was designated as a low-achiever.

Each student's grades for the fourth six-weeks grading period were collected from the three teachers involved. These grades reflect the student's performance without the use of color overlays. At the

end of the fifth six-weeks period, grades were again obtained from the teachers. These grades reflected the student's scores while using the color overlays.

CHAPTER IV

RESULTS

Presentation of Results

The results of this study have been organized into tables which show the following: gains by grade level, gains by gender, and low achievers versus those reading at or above grade level.

Table one illustrates the results of using color overlays. The top row of the table designates the grade level and separates the totals of boys and girls at each level. The column at the left side of the table has three categories: gains, no gains, and no change. Under the column of fourth grade girls it can be seen that of sixteen girls in the fourth grade, eight showed gains using the color overlays, eight demonstrated no gain. None of the fourth grade girls' scores remained exactly the same. There are thirteen boys described under the column of fourth grade boys. Eight boys showed a gain, five boys did not have gains. Here again, as with the fourth grade girls, none of the boys' scores remained exactly the same as they had been the previous grading period.

The third column shows the results of the fifth grade girls. There were twelve girls in the fifth grade, only three actually showed gains using the color overlays; seven girls showed no gains. There were two girls who's scores remained exactly the same as when not using colored overlays. The fourth column reflects the fifth grade boys scores. Two boys had gains. thirteen did not show gains, and two boys scores remained the same as when not using the colored overlays.

The fifth column indicates that three sixth grade girls achieved gains using the overlays. Eight girls did not show gains and one girl had no change in her grades. The sixth and final column contains the numbers of sixth grade boys. Five boys demonstrated a gain with the overlays, four did not have gains and one boy's grades remained the same.

Table two is divided into four categories: Total number of girls with gains, total number of boys with gains, total number of boys and girls with gains, and total number of low-achievers with gains. Column one shows the percent of girls with gains in the study. Of a total of forty girls involved in this project, fourteen, or thirty-five percent had actual gains in their reading scores. Column two shows the percent of boys with gains. There were a total of forty boys in the fourth, fifth, and sixth grades; of these forty boys, fifteen, or thirty-eight percent showed a gain in reading scores using the color overlays. Column three combines boys and girls of all the grades; of the eighty students, twenty-nine or thirty-six percent had gains. The fourth and last column in table two indicates the outcome of those students identified as low-achievers. This column shows the percent gain of the combined low-achievers from all three grade levels. Forty-five students were identified as low-achievers, of these forty-five, twelve or twenty-seven percent showed a gain in reading scores using color overlays.

TABLE I

RESULTS OF USING COLOR OVERLAYS BY GENDER
AND GRADE REPORTED AS NUMBER WHO GAINED,
DID NOT GAIN, AND NO CHANGE.

	4th. gd. girls	4th. gd. boys	5th. gd. girls	5th. gd. boys	6th. gd. girls	6th. gd. boys
GAINS	8	8	3	2	3	5
NO GAINS	8	5	7	13	8	4
NO CHANGE	0	0	2	2	1	1

TABLE II

RESULT TOTALS OF THE PERCENT GAINS OF GIRLS,
BOYS, GIRLS & BOYS COMBINED, AND LOW-ACHIEVERS

Total Girls With Gains	Total Boys With Gains	Total Boys & Girls With Gains	Total Low Achievers With Gains
35	38	36	27

Discussion of Results

This researcher's results do not show large gains when the percent gains alone are reviewed. However, some aspects of this project differ from other studies done in this field. Table II shows a thirty-six percent gain when considering the total students involved. The use of color lenses or color overlays are primarily beneficial to those individuals who have scotopic sensitivity syndrome, or a form of dyslexia. For this project, the student population was heterogeneous, therefore the results would not be as significant as if the group of subjects had been selected because of their identified reading problems. In a study done by Winters (1987), there was no significant gain noted when using elementary children to test color overlays to aid in locating and circling a specific alphabet letter on three pages of mixed letters. However, Winters also was testing a cross section of children, not just reading disabled students.

In this researcher's project the students were allowed to randomly select the color overlay they would use. Robinson and Miles (1987) reported that the use of overlays chosen specifically for each student resulted in significant improvement over the use of randomly chosen overlays, for word matching, letter recognition, and number recognition tasks. In reality, when the correct color lenses or overlays are matched to the individual, improved results are more significant.

Another factor that may have affected the outcome of this study was the Pupil Performance Testing that was carried out during the time

this project was being conducted. These tests were given each morning during the regularly scheduled reading time. The tests were conducted over a two week time frame. All the teachers involved in this project relayed to this researcher the probability that the overall reading scores would be lower for this grading period due to the interruption caused by the testing. This interrupted reading class time, would in all probability, have affected the low-achieving students the most of all. This could be one of the contributing factors in the low percentage gains, (twenty-seven percent) by the low-achievers.

One item of interest is that the percent gained in the four groups in Table II is within a fairly close range, twenty-seven to thirty-eight percent. This would seem to indicate that the help provided by color overlays extends to both genders. The key to the success of color overlays may be in getting them into the hands of those students who are most benefited with their usage, the reading disabled (Whiting, 1988).

The information gleaned from this study leads this researcher to believe that the use of color overlays and lenses do have beneficial advantages to those who have scotopic sensitivity syndrome and some forms of dyslexia.

CHAPTER V

SUMMARY, CONCLUSIONS & RECOMMENDATIONS

Summary

As a teacher of learning disabled students, this researcher comes in daily contact with students who have tremendous difficulties reading. Even though the designated remedial techniques recommended by the professionals in this field are incorporated into the student's individual learning programs, many of them continue to struggle both mentally and physically every time printed material is placed before them. Losing their place when reading from a textbook is commonplace. Skipping words or complete lines often occurs when copying material from the chalkboard. Each time this occurs, valuable class time is lost getting the student back on track; the interruptions that take place also create barriers in comprehension and transference of material.

The use of color overlays has been discussed in learning disabilities literature and on television in recent years. This researcher, after hearing about this technique, tried the overlays in the learning disabilities unit at her school. The interest generated by that experiment was the basis for this study.

The purpose of this study was to compare and contrast the reading scores of students who had been exposed to reading instruction with the use of color transparencies.

The subjects in this study were from the regular fourth, fifth, and sixth grade classrooms of a small village school in southeastern Ohio.

The project was carried out for one six-weeks grading period. The students' beginning year reading level was determined by 1988-89 scores taken from the Gates-MacGinitie Reading Assessment. Each student's reading grade was recorded from the fourth grading period and then compared to the grade they received for the fifth grading period in which they used the colored overlays. The differences in these two grading period scores were arranged in tables for visual clarity.

Chapter IV provides explanation of the results of this study by grade and gender. The gains of girls and boys are given for each grade level. The number of students who did not show gains, and those whose scores remained exactly the same are also given in this table. Although overall gains were lower than had been expected, the gains were consistent throughout the population surveyed. The information gleaned from this study leads this researcher to believe that the use of color overlays and lenses can have beneficial advantages to those who have scotopic sensitivity syndrome and some forms of dyslexia.

Conclusions

As a result of this study, the following conclusions have been reached. The use of colored transparencies can help some students to obtain better scores in reading. The gains achieved by using colored transparencies are not limited to any particular segment of a classroom population. Since the use of color transparencies has, in other studies, been most beneficial to dyslexics, it could be used

as an informal test to help identify possible dyslexic students in a classroom setting.

Recommendations

The subject of colored lenses, colored transparencies and other color aides is becoming more popular among researchers and teachers who work with learning disabled people. Researchers and teachers see the tremendous efforts put forth by most learning disabled people, yet these efforts are often met with disappointment and failure to achieve. Seeing the unrelenting efforts of learning disabled students may be one reason why these professionals are searching for a physical solution to aid these subjects. The use of color lenses or transparencies can be tested in relatively simple surroundings. The outcome is immediate and individualized.

There are currently more than twenty visual clinics in the United States that can test for scotopic sensitivity syndrome and recommend appropriate color lenses and overlays. Perhaps what would benefit this area of research most, at this time, is a network among all those involved in this type of study so that data is more readily available to would-be researchers and documented cases could be reviewed by recognized professionals in the field of vision care and education.

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