

VISION SCREENING OF
ELEMENTARY SCHOOL CHILDREN
IN THE GREENVILLE, MI SCHOOL DISTRICT

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ABSTRACT

This project was designed to enhance the level of vision screening available to elementary school children. Because effective models such as the Modified Clinical Technique are cost prohibitive for many school districts, we proposed procedures for an in-school screening utilizing teachers and other school personnel. Results indicate that the procedures selected for the screening were valid due to the fact that most students who failed the screening did not pass two or more tests. Also, the teachers were very good at recognizing the students who needed visual evaluation. Fifty five percent of the students failed the screening. The screening was able to identify children with visual difficulties who had already passed the state's health department program. However, some problems were noted where the lay screening personnel let subjective factors come into play while interpreting tests and determining referrals.

elementary school vision screening program that: could be administered by school personnel, would be valid, would be more comprehensive than the state's vision screening program, would heighten awareness of the school's staff to signs and symptoms of vision problems, would be accessible to teachers and students in a timely and convenient manner, and would be cost effective.

METHODS

Subjects

In order to evaluate the screening program, the data collected at one of the four elementary schools in Greenville, Michigan was reviewed. At the sight used for this analysis, 210 children were seen for an initial screening. To be eligible for this evaluation, these 210 students must have been identified by classroom or reading teachers as possibly having visual or vision related learning problems. These children must also have passed the health department's vision screening. The students were in grades kindergarten through fourth grade.

Procedure

Within the school, a vision screening team consisting of three individuals participated in training sessions which covered terminology, rationale, screening philosophy, testing procedures, and hands-on experience with the testing procedures. The screenings were performed in the reading center of the school and typically took twenty minutes per student.

The test battery included the following:

- 1) History from classroom and reading teachers, parents, and the student
- 2) External ocular health assessment
- 3) Pupils, including symmetry and direct reflexes
- 4) Monocular distance visual acuity using either the Snellen Chart or Broken wheel test
- 5) Monocular near visual acuity using either a Reduced Snellen Chart or a Child's Recognition Chart
- 6) Distance and Near acuity retested with a +1.50 lens

- 7) Pursuits
- 8) Nearpoint of convergence
- 9) Color vision using the Ishihara color vision plates
- 10) Developmental Eye Movements test
- 11) Random Dot E stereopsis at 1.5 meters
- 12) Near phorias using a Maddox rod and Thorington card

The pass/fail criteria for referral included the following:

HISTORY

- Pass- No significant symptoms
- Refer- Parent reports: Eyes misaligned
Complaints of frequent headaches
Other significant complaints
- Teacher reports: Eyes misaligned
Excessive tearing/rubbing
Frequent headaches
Evidence of blur/diplopia
Significant postural or other behavioral evidence
- Student reports: Complaints of headaches, diplopia, eyeaches

EXTERNAL

- Pass- No significant abnormality observed
- Refer- Any observed redness, swelling, crust/flakes
Irregular or unequal pupils with no previous examination
Absent direct pupillary reflex

ACUITY

- Pass- None of the following present
- Refer- Acuity in either eye, distance or near, worse than 20/30
Acuity at distance better than 20/40 with plus lenses

MUSCLE

- Pass- None of the following present
- Refer- Inability to track in all directions (restricted movement)
Convergence nearpoint further than 7 inches
DEM ratio standard score below 85

ALIGNMENT

Pass- None of the following present
Refer- No stereopsis elicited
Phoria: Greater than 6 eso
Greater than 10 exo
Greater than 1 1/2 right hyper or left hyper

COLOR VISION

Report as pass or fail

Any student who failed one or more test was referred for a complete vision examination. No student was referred only because of a failure of the color vision testing.

RESULTS

Of the 210 students who participated in the vision screening, 116 failed (or 55.2%) while 94 passed (or 44.8%). Of the students who failed the screening, only 15 (7.1%) failed only one part of the screening. Therefore, most of the failing students (91.9%) failed between two and six tests (Table 2).

When the number of failures for each specific test was calculated, it was noted that the most frequently failed test was pursuits at 58.6%. The second most commonly failed test of the screening was visual acuity (35.2%). In decreasing order, the percentage of students who failed each test was: DEM (31.6%), History (26.6%), Nearpoint of convergence (14.8%), Color Vision (11.5%), Stereopsis (10.9%), Phoria (10.4%), and external ocular health (2.4%).

Of the students whose gender was indicated on the screening forms, 45.5% were female while 54.5% were male. The difference between the percentage of males who failed the screening vs. the percentage of females who failed was not significant. 40.7% of the females failed one or more components of the screening compared to 42.3% of the male students.

CONCLUSIONS

The results of the screening showed that that teachers were quite good at identifying students who need visual evaluation. This is demonstrated by the fact that of the 210 students whom they had referred for the screening, 55% failed one or more components. It is important to remember that all of the students in this study had already passed the state-required vision screening program. One explanation for the teachers accuracy in identifying students may be that there was an increase in sensitivity and awareness of visual problems. This heightened sensitivity would most likely be brought about by the availability of the screening program in the school. When the program began, all of the elementary teachers were invited to attend an information session which gave them information on the screening itself and also on the signs and symptoms of common visual problems.

Because all of the students in this study had previously passed the state's vision screening program, the high number of referrals shows that the state program is not effective in determining all of the students who require further visual evaluations. Many students who may falsely pass the the cursory state screening miss being referred for treatment of visual difficulties which may impair their classroom performances. A recommendation for a comprehensive eye examination was made to the parents of all the students who failed this screening.

The procedures which were selected for the screening- including history, external inspection, pupils, monocular distance and near visual acuity, pursuits, nearpoint of convergence, color vision, DEM, RDE stereopsis, and near phorias- appear to valid. This conclusion is made due to the fact that 90% of the students who failed the screening failed more than just one screening procedure. However, because the students who failed were not referred to one or two specific eye care practitioners, it was not possible to retrieve the records of their complete exams. Therefore, statistical analysis of specificity and sensitivity could not be completed.

The screening accomplished most of the goals that were set. It was valid, more comprehensive than the State of Michigan's vision screening program, inexpensive, and easily accessible. The screening also served to heighten the awareness of the school's staff to the signs and

symptoms of visual problems. Another goal which was accomplished was the ability to use the school's staff as screeners. However, this did offer a few problems due to the subjectiveness of the screeners. One example of this includes the most frequently failed test- pursuits. 58.6% of the students failed pursuits. This value is artificially high due to fact that the screeners were subjectively assessing how smooth the pursuits were rather than screening for restrictions and gross abnormalities in eye movements.

Another drawback of using lay personnel to perform the screening was seen when some students who failed one or more of the tests were graded as passing and not referred. The original plan was to fail and refer any student who failed any part of the screening. The screeners let subjective factors about the students and the student's parents interfere with the decision to refer.

This screening appears to be a valid, cost effective means of further identifying students who need to be referred for a comprehensive eye examination by an eye care professional. Further training of the lay screening personnel has been on-going in order to increase the accuracy of the screening.

Table 1

**STANDARDS OF REFERRAL IN THE
MICHIGAN SCHOOL VISION SCREENING PROGRAM (7)**

GRADES 1 TO 12

Test 1-- Visual Acuity

Inability to read correctly four out of six 20/30 Snellen E symbols with either eye.

Test 2-- Plus Lens

Ability to read correctly at least four out of six 20/20 Snellen E symbols with either eye while using a 1.75 diopter plus lens.

Test 3-- Phoria

Far-Point (20 feet):

Hyperphoria	1.5 prism diopters
Esophoria	6 prism diopters
Exophoria	4 prism diopters

Near-Point -- grades 9-12 only

Hyperphoria	1.5 prism diopters
Esophoria	6 prism diopters
Exophoria	8 prism diopters

Note: Children are referred only if they fail an initial test and a retest given one week later.

Table 2

NUMBER OF TESTS FAILED
BY STUDENTS FAILING THE SCREENING

<u>Number of tests failed</u>	<u>Number of students</u>
1	15
2	45
3	31
4	21
5	4
6	1

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