AN ANALYSIS OF THE MEREDITH JUNIOR HIGH SCHOOL
STUDENTS' VISUAL DEFECTS AND A COMPARISON
OF VISION SCREENING METHODS

A Field Report
Presented to
The Graduate Division
Drake University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science of Education

by
Alice Karlen Bowling
August 1965
AN ANALYSIS OF THE MEREDITH JUNIOR HIGH SCHOOL
STUDENTS' VISUAL DEFECTS AND A COMPARISON
OF VISION SCREENING METHODS

by

Alice Karlen Bowling

Approved by Committee:

[Signature]
Chairman

[Signature]
Dean of the Graduate Division
# Table of Contents

## Chapter I. Introduction
- The Problem ........................................... 1
  - Statement of the problem .............................. 1
  - Importance of the study ................................ 1
  - Limitations .............................................. 2
- Procedures Used ......................................... 2
- Definition of Term Used .................................. 3
- Review of the Literature ................................ 3
  - The Snellen Test ........................................ 4
  - Betts series ............................................. 7
  - The Massachusetts Vision Test ........................ 8
  - The Ortho-Rater and Sight Screener ................... 9
  - The Titmus School Vision Test ......................... 11
  - Recommended Vision Screening Method ................ 11

## Chapter II. Visual Defects of Meredith Junior High School Students, Des Moines, Iowa, 1963-64.
- Introduction .............................................. 13
- Student's Visual Defects .................................. 13
  - A Comparison of Screening Methods .................... 22

## Chapter III. Summary, Conclusions, and Recommendations
- Summary .................................................... 25
- Conclusions ............................................... 26
- Recommendations ......................................... 28

## Bibliography ............................................. 29
## LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Grade and Number of Meredith Junior High Students in Vision Survey, Des Moines, Iowa, 1964</td>
<td>14</td>
</tr>
<tr>
<td>II. Number and Percentage of Meredith Junior High Students with Previously Identified Vision Defects, Des Moines, Iowa, 1964</td>
<td>15</td>
</tr>
<tr>
<td>III. Number of Meredith Junior High Students Who Failed Parts of the Vision Screening Test, Des Moines, Iowa, 1964</td>
<td>16</td>
</tr>
<tr>
<td>IV. Vision Defects of 143 Seventh-Grade Boys of Meredith Junior High, Des Moines, Iowa, 1962-64</td>
<td>17</td>
</tr>
<tr>
<td>V. Vision Defects of 145 Seventh-Grade Girls of Meredith Junior High, Des Moines, Iowa, 1962-64</td>
<td>18</td>
</tr>
<tr>
<td>VI. Vision Defects of 120 Eighth-Grade Boys of Meredith Junior High, Des Moines, Iowa, 1961-64</td>
<td>19</td>
</tr>
<tr>
<td>VII. Vision Defects of 130 Eighth-Grade Girls of Meredith Junior High, Des Moines, Iowa, 1961-64</td>
<td>20</td>
</tr>
<tr>
<td>VIII. Vision Defects of 102 Ninth-Grade Boys of Meredith Junior High, Des Moines, Iowa, 1960-64</td>
<td>21</td>
</tr>
<tr>
<td>IX. Vision Defects of 86 Ninth-Grade Girls of Meredith Junior High, Des Moines, Iowa, 1960-64</td>
<td>22</td>
</tr>
<tr>
<td>X. Comparison of Number Vision Defects Recognized by Snellen Test and Titmus Test, by Grade, 1964</td>
<td>23</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

I. THE PROBLEM

Statement of the problem. The purpose of this study was to (1) review a survey of the visual defects of students attending Meredith Junior High School in Des Moines, Iowa; (2) review research findings concerning vision screening methods; and (3) compare the method used at Meredith Junior High School with approved methods as shown by research findings.

Importance of the study. Vision is the primary avenue to education. The degree of skill and efficiency any individual attains in the use of his eyes determines in large measure how fully he is able to develop and utilize his intellectual potential. More than eighty-five per cent of all our impressions from the outside world are obtained through vision. Today education relies more and more on pictorial expressions and perceptual activities.

The ultimate success of the learning process in our culture is to a large extent dependent upon efficient visual functionings.

We might think of efficient visual functioning as an aspect of our health, and like any aspect of our health it must be checked periodically and with the best equipment available. Visual functioning is dynamic and should
not be presumed to remain at a fixed level.¹

The visual problem deserves the most dedicated attention of those who share the responsibility for the welfare of the child. The development of the stereoscopic vision screening instruments by the various optical companies has focused attention on the screening methods used in the schools.

Limitations. This study was limited to a review of a survey of Meredith Junior High School students during April and May of 1964.

II. PROCEDURES USED

The data in this graduate project have been derived from the following: (1) A review was made of a survey conducted by the writer in April and May of 1964 of the visual defects of students attending Meredith Junior High School in Des Moines, Iowa; (2) a careful search of the literature was made in order to ascertain current recommendations for effective vision screening methods by authorities; and (3) a comparison was made of the vision screening method used at Meredith Junior High School with the approved methods as shown by research.

III. DEFINITION OF TERM USED

In order to enable the reader to have a better understanding, the following term was defined as used in this study:

Screening. Screening is a procedure used to test students' vision.

IV. REVIEW OF THE LITERATURE

Many studies of school vision screening methods and procedures have been made. These studies have attempted to find the most efficient screening method for locating those children who may have eye abnormalities. Much has been written in regard to the recommendations for a good eye health program. This review briefly summarizes the general history of the vision screening methods and some of the significant studies.

The demands upon vision have changed; advances in technology and automation have contributed to the vast amount of knowledge to be learned. Schools have television classes, teaching machines, more reading, and more close work for the pupils. The schools are concerned about the pupils' vision, as most learning is acquired through vision.

Vision screening methods have posed a problem for
the schools for many years. The ideal situation would be to require a comprehensive eye examination for each child before he enters school. Because this is not possible, the periodic school screening tests are helpful in locating children needing eye care. Screening tests serve only to indicate possible need of care; they are not diagnostic.\(^1\)

**The Snellen Test.** The simple Snellen wall chart was devised in 1862 to test distance visual acuity. This has been the principal method used by schools for vision screening since 1899, when the first vision screening program was initiated in schools. The vision program came into the schools because defective vision was considered the predominant cause of unsatisfactory school progress.

Numerous studies have been made to test the reliability of the Snellen test.

Blackhurst and Austin's study of vision screening methods reported that 92 to 95 per cent of the children failing the Snellen test actually require eye care, but 53 per cent of those who actually needed professional attention will pass undetected. The Michigan State Department of Health recommends a test for visual acuity be given every year and

a battery of tests be used in grades 1, 3, 5, 7, 9, and 11. At present five instruments are accepted for use in Michigan. These are: (1) The American Optical Massachusetts Vision Test, (2) Bausch and Lomb School Test, (3) Keystone Michigan School Test, (4) Titmus Optical School and Preschool Tests, and (5) Welch-Allyn Massachusetts Vision Test. These instruments have a battery of tests which include a modified form of the Snellen test.

Lohmann pointed out that if the Snellen test were administered properly the results would agree with clinical judgment as closely as any of the multiple-procedure test findings. Few children needing eye care are missed and the problem of over-referral was less.

The National Society for the Prevention of Blindness recommends annual testing for central distance visual acuity using the Snellen chart combined with careful teacher observation for eye symptoms as a basic vision screening for all school children. A color discrimination test should be given at least once during the child's school life; this information

---


would be valuable for vocational counseling. ¹

Belloc reported on a survey of school vision screening practices in fifty states and four territories made by the California Department of Public Health. Nine states reported no particular test was specified; only the Snellen wall chart was accepted in eighteen states; eight states used the Snellen wall chart along with devices which use the Snellen process such as the projector or translucent chart; one or more of the Snellen devices, one or more of the stereo devices, and the Massachusetts Vision Test were used in seventeen states; two states used only the Massachusetts Vision Test; the plus sphere for hyperopia was required in four states, but eleven reported that this test was usually done; one state required a muscle balance or binocular fusion but eight states recorded they have done this. Screening was done each year in the elementary grades in most of the states, but in the typical state screening was not done in the high schools. ²

Yasuna made an evaluation of vision screening methods and reported:

The Snellen test indicated those children displaying myopia, high refractive errors, and amblyopias due to various causes. It did not detect the hyperopic child,

¹Ibid., p. 55.

who might be having serious reading difficulties, or muscle defects such as troias or high phorias.1

Some complaints of the Snellen test are: (1) illumination requirements, (2) memorizing of the chart letters by students, (3) additional chore for classroom teacher, (4) amount of space required for testing, and (5) apathy of the public, educators, and medical profession.2

Betts series. The great concern that vision was the functional cause of reading difficulties brought about the advance in screening methods. About 1934 E. A. Betts, a reading specialist, became interested in the screening method and devised a series of slides to test visual functions and visual acuity. He released these slides to the Keystone View Company and they made the first commercial stereoscopic vision testing instrument.3

Dr. Lancaster and the Massachusetts Department of Public Health made an evaluation study using the Telebinocular instrument of the Betts series. He found a high rate of


over-referrals, and on the basis of this study the American Medical Association did not accept the test.¹

The Massachusetts Vision Test. The Massachusetts Department of Health became active in studies of the vision screening methods and in 1940 developed a binocular, stereoscopic instrument with a battery of three tests known as the Massachusetts Vision Test. The battery of tests has corrected the objectionable features of the Betts series and was approved by the American Medical Association in 1947.

The battery consists of: (1) tests for distance central visual acuity with an illuminated Snellen E chart; (2) a plus-lens test for hyperopia in which the visual acuity is checked with the student wearing a pair of plus lenses; (3) tests for vertical and horizontal muscle imbalance at reading distance.²

Gutman reported on the Oregon study made in 1954 of the comparison of two vision screening methods, the Massachusetts Vision Test and the Snellen test coupled with observation. The observation was made while administering the test for symptoms of strabismus, squinting, peering, head tilt, or complaint of headache, blurring or double vision. The tests were administered by a nurse-consultant or classroom teacher. The following results were reported:

1. Vision screening by trained operator yielded 27 per cent basic failures on Massachusetts test and 29 per cent on Snellen test plus observation.

2. The Snellen test alone yielded 12 per cent basic failures when performed by teachers, as compared to 17.5 per cent when conducted by the special operator and 16 per cent by the same operator on the abbreviated Snellen test which is Part I MVT.

3. Sixty per cent of all basic failures were derived from the Snellen test and Part I MVT, with 85 per cent of them judged in need of care in the opinion of physicians and optometrists alike.

4. Sixty-four per cent of failures on Parts II and III MVT and 60 per cent on observation were judged in need of care, with the wide variation between physicians and optometrists.

5. Seventy-five per cent of the cases for whom physicians recommended care were referred on failure of either Snellen test or Part I of the Massachusetts test.

6. Myopia accounted for one-quarter of the professional diagnoses and received 90 per cent correction or care; hyperopia, which comprised nearly half of all diagnoses, merited care in 82 per cent of hyperopic astigmatism but only 40 per cent of simple hyperopia.

The Snellen test and Part I of the Massachusetts test are efficient and do not give over-referral.

The Ortho-Rater and Sight Screener. The Ortho-Rater and the Sight Screener are instruments with modifications of the other vision tests. These were developed in 1940, and presented a question as to the reliability of the instrument test and the wall chart test. Altman and Rowland made a

---


2Ibid.
study to determine the relationship between scores, using
the Ortho-Rater and a wall chart with the same series for visual
acuity. The scores had a correlation of 0.94, which was evi-
dence of the identity of the visual abilities measured by the
two methods.\(^1\)

By this time many vision procedures were in use. A
study was made in St. Louis in 1948 and 1949 to determine the
efficiency of the various methods. This included the follow-
ing: (1) teacher judgment, (2) the Snellen test, (3) the
Massachusetts Vision Test, (4) Keystone View Company Tele-
binocular Test, (5) the Ortho-Rater, (6) the Sight-Screener
Test, and (7) the Near Vision Test. The efficiency of the
various screening methods in correlation with the ophthal-
molgists' judgments does not permit a conclusion that any one
of the methods was more efficient than the others. This
points to a need for improvement in vision screening methods
in the schools.\(^2\)

In 1957 Dukelow reported:

The screening methods which were found in St. Louis
study to have the highest correlation with opthalmic findings

\(^1\)D. A. Gordon, J. Zeidner, H. J. Zagorski, and J. E.
Uhlaner, "A Psychometric Evaluation of Ortho-Rater and Wall-
(May, 1954), 699.

\(^2\)M. M. Crane, F. M. Foote, R. G. Scobee, and E. L. Green,
Screening School Children for Visual Defects, United States
Department of Health, Education, and Welfare, Children's Bureau
pp. 1-92.
were the Snellen test for central distance vision acuity and the Massachusetts Vision Test. These are also the two methods which are recommended by the Joint Committee on Health Problems in Education of the National Education Association and the American Medical Association.1

The Titmus School Vision Test. The Titmus School Vision Tester, a stereoscopic screening instrument, has recently been put on the market. The instrument has a battery of tests similar to the Massachusetts Vision Test. The State Departments of Health in Michigan, Massachusetts, and New York have approved the instrument for use in their schools.2

In reviewing the literature no studies or statistics were available on the visual defects of junior high school students.

Recommended Vision Screening Method. The literature was reviewed to determine recommended vision screening methods. A review of the literature has indicated that the following is the minimum school vision screening method and has been used for the purpose of this study. Each student should have: (1) an annual vision screening alternating the use of the Snellen test for central distance visual acuity with the


Massachusetts Vision Test, and (2) a color discrimination test at least once during the student's school experience. Many of the studies indicated the need for improvement in vision screening methods in the schools.

**Meredith Junior High School Vision Screening Method.**

At Meredith Junior High School a vision screening test for central distance visual acuity using the Snellen wall chart is administered to all ninth grade students, any Meredith student new to the Des Moines school system, and students referred to the nurse by the teachers or parents.
CHAPTER II

VISUAL DEFECTS OF MEREDITH JUNIOR HIGH SCHOOL STUDENTS,
DES MOINES, IOWA, 1963-64

I. INTRODUCTION

A survey was made of the 726 students in the Meredith Junior High School, Des Moines, Iowa, during April and May of 1964. All vision screening was done by the writer of this report, who was a school nurse. Permission was granted by the Des Moines Independent Community School District to use the Titmus Optical School Vision Tester, a stereoscopic instrument. The Titmus Tester was used in this vision screening survey. The students having glasses were tested without their glasses. The battery of tests used in this survey consisted of: (1) the Snellen E test for visual acuity to locate the myopic student, (2) a 1.75 plus sphere lens with the Snellen E test to locate the hyperopic student, (3) an eye muscle balance test at both far and near points, and (4) a color discrimination test.

II. STUDENT'S VISUAL DEFECTS

Of the 726 students screened for visual defects 254, or 35 per cent, had in the fall of 1963 known visual defects. As is shown in Table I, the eighth grade had the highest percentage of reported visual defects. There seems to be little relationship between visual defects of the students and grade.
TABLE I
GRADE AND NUMBER OF MEREDITH JUNIOR HIGH STUDENTS IN VISION SURVEY,
DES MOINES, IOWA, 1964

<table>
<thead>
<tr>
<th>Grade</th>
<th>Number of Students</th>
<th>Reported Visual Defects Fall of 1963</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number</td>
</tr>
<tr>
<td>7</td>
<td>288</td>
<td>100</td>
</tr>
<tr>
<td>8</td>
<td>250</td>
<td>103</td>
</tr>
<tr>
<td>9</td>
<td>188</td>
<td>51</td>
</tr>
<tr>
<td>Totals</td>
<td>726</td>
<td>254</td>
</tr>
</tbody>
</table>

Table II, shows that the highest percentage of reported visual defects were myopia, myopic astigmatism, or both. Five students had conditions that were classed in the table as miscellaneous: one of these had amblyopia; one student had tropia or wall eyes, and was to have surgery; one student had a color discrimination deficiency; two students had no vision in their right eyes (one student had an inoperable cataract and the other was due to a congenital defect).

A review of the vision screening findings from the survey made at Meredith Junior High School using the Titmus School Vision Tester showed that of the 726 students tested, 400, or 55 per cent, failed part of the test. Of these 400 students, 274 failed the Snellen test for myopia, ten failed
TABLE II

NUMBER AND PERCENTAGE OF MEREDITH JUNIOR HIGH STUDENTS WITH PREVIOUSLY IDENTIFIED VISION DEFECTS, DES MOINES, IOWA, 1964

<table>
<thead>
<tr>
<th>Vision Defect</th>
<th>Number with Defect</th>
<th>Per Cent with Defect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperopia</td>
<td>8</td>
<td>1.1</td>
</tr>
<tr>
<td>Myopia, myopic astigmatism, or both</td>
<td>197</td>
<td>27.1</td>
</tr>
<tr>
<td>Strabismus</td>
<td>44</td>
<td>6.0</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>5</td>
<td>.7</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>254</strong></td>
<td><strong>34.9</strong></td>
</tr>
</tbody>
</table>

The far vision test, eight failed the far muscle balance test, fifty-six failed the near muscle balance test, thirteen failed both the near and far muscle balance test, and thirty-nine failed the color discrimination test. The data on each part of the screening test are shown in Table III. Of the number failing the muscle balance tests, forty-four were students with previously reported known visual defects as shown in Table II; these were the forty-four cases of strabismus, one amblyopia, two students without vision in their right eyes, and one tropia. Of the 274 students who failed the Snellen part of the Titmus Test, nine had previously passed the Snellen wall chart test. As shown in Table III, thirty-nine students failed the color
<table>
<thead>
<tr>
<th>Parts of the Vision Screening Test</th>
<th>Number of Students Who Failed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Far Vision Test</td>
<td>10</td>
</tr>
<tr>
<td>Muscle Balance Test</td>
<td></td>
</tr>
<tr>
<td>Far Point</td>
<td>8</td>
</tr>
<tr>
<td>Near Point</td>
<td>56</td>
</tr>
<tr>
<td>Both Near and Far Point</td>
<td>13</td>
</tr>
<tr>
<td>Color Discrimination</td>
<td>39</td>
</tr>
<tr>
<td>Near Vision Test (Snellen)</td>
<td>274</td>
</tr>
<tr>
<td>Total</td>
<td>400</td>
</tr>
</tbody>
</table>

discrimination test; one student previously knew he had a color deficiency and was listed as miscellaneous in Table II.

Data obtained in the vision screening of the junior high students have been tabulated and presented by sex and grade.

Vision defects of the seventh-grade boys of Meredith Junior High. The highest percentage (26.6% per cent) of the vision defects were found to be myopia, myopic astigmatism, or both; as shown in Table IV, page 15. There is an increase of 4.9 per cent since sixth grade. The near muscle balance
## TABLE IV

**VISION DEFECTS OF 143 SEVENTH-GRADE BOYS OF MEREDITH JUNIOR HIGH, DES MOINES, IOWA, 1962-64**

<table>
<thead>
<tr>
<th>Vision Defect</th>
<th>Vision Defects in 1962-63</th>
<th>Vision Defects in 1963-64</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
</tr>
<tr>
<td>Myopia, myopic astigmatism, or both</td>
<td>31</td>
<td>21.7</td>
</tr>
<tr>
<td>Hyperopia</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Muscle Balance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Far</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Near</td>
<td>9</td>
<td>6.3</td>
</tr>
<tr>
<td>Far and Near</td>
<td>3</td>
<td>2.1</td>
</tr>
<tr>
<td>Color Discrimination</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>43</td>
<td>30.1</td>
</tr>
</tbody>
</table>

Defect of 15.4 per cent exceeds the far muscle balance defect of 1.4 per cent. The color discrimination test was failed by 7.7 per cent or 11 boys. Fox reported approximately one in twenty males have some degree of color deficiency.¹

**Vision defects of the seventh-grade girls in Meredith Junior High.** Table V, shows 39.3 per cent of the girls had myopia, myopic astigmatism, or both. This is an increase of 4.1 per cent since sixth grade. There were 12.7 per cent

---

<table>
<thead>
<tr>
<th>Vision Defect</th>
<th>Vision Defects in 1962-63</th>
<th>Vision Defects in 1963-64</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
</tr>
<tr>
<td>Myopia, myopic astigmatism, or both</td>
<td>51</td>
<td>35.2</td>
</tr>
<tr>
<td>Hyperopia</td>
<td>3</td>
<td>2.0</td>
</tr>
<tr>
<td>Muscle Balance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Far</td>
<td>2</td>
<td>1.4</td>
</tr>
<tr>
<td>Near</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Far and Near</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Color Discrimination</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Totals</td>
<td>57</td>
<td>39.3</td>
</tr>
</tbody>
</table>

More seventh-grade girls with myopia, myopic astigmatism, or both than the seventh-grade boys. The seventh-grade girls had 2.0 per cent with hyperopia and the seventh-grade boys had .7 per cent. The near muscle balance defect of 2 per cent is about the same as for the far muscle balance defect of 1.4 per cent. The color discrimination deficiency of the seventh-grade girls was 1.4 per cent compared to 7.7 per cent of the seventh-grade boys. According to Fox only one-fortieth as many females have color discrimination deficiency as males.  

\[1\text{Ibid.}\]
Vision defects of eighth-grade boys in Meredith Junior High. Of the eighth-grade boys vision screened, 44.1 per cent had myopia, myopic astigmatism, or both. As shown in Table VI, there was an increase of 20.3 per cent since sixth grade. None of the boys had hyperopia or far muscle balance defects. Then per cent had near muscle balance defect. Of the ten with color discrimination deficiency only one was aware of the defect.

**TABLE VI**

VISION DEFECTS OF 120 EIGHTH-GRADE BOYS OF MEREDITH JUNIOR HIGH, DES MOINES, IOWA, 1961-64

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
</tr>
<tr>
<td>Myopia, myopic astigmatism, or both</td>
<td>37</td>
<td>23.3</td>
</tr>
<tr>
<td>Hyperopia</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Muscle Balance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Far</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Near</td>
<td>8</td>
<td>6.7</td>
</tr>
<tr>
<td>Far and Near</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Color Discrimination</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Totals</td>
<td>46</td>
<td>30.9</td>
</tr>
</tbody>
</table>
TABLE VII
VISION DEFECTS OF 130 EIGHT-GRADE GIRLS
OF MEREDITH JUNIOR HIGH,
DES MOINES, IOWA, 1961-64

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
</tr>
<tr>
<td>Myopia, Myopic astigmatism, or both</td>
<td>45</td>
<td>34.6</td>
</tr>
<tr>
<td>Hyperopia</td>
<td>5</td>
<td>3.9</td>
</tr>
<tr>
<td>Muscle Balance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Far</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Near</td>
<td>4</td>
<td>3.0</td>
</tr>
<tr>
<td>Far and Near</td>
<td>3</td>
<td>2.3</td>
</tr>
<tr>
<td>Color Discrimination</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Totals</td>
<td>57</td>
<td>43.8</td>
</tr>
</tbody>
</table>

(3.9 per cent) with hyperopia was found in this group. Table VII, shows this defect was present in sixth grade. There was an increase in far muscle balance defect of 1.6 per cent and 5.4 per cent with near muscle balance defect.

Vision defects of the ninth-grade boys in Meredith Junior High. Of the ninth-grade boys, 31.4 per cent had myopia, myopic astigmatism, or both. This was 12.7 per cent less than the eighth-grade boys. As shown in Table VIII, there was an increase of 20.6 per cent myopia, myopic astigmatism, or both since sixth grade. No hyperopia was found in sixth or ninth grade of the


## TABLE VIII

VISION DEFECTS OF 102 NINTH-GRADE BOYS
OF MEREDITH JUNIOR HIGH,
DES MOINES, IOWA, 1960-64

<table>
<thead>
<tr>
<th>Vision Defect</th>
<th>Vision Defects in 1960-61</th>
<th>Vision Defects in 1963-64</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
</tr>
<tr>
<td>Myopia, myopic astigmatism, or both</td>
<td>11</td>
<td>10.8</td>
</tr>
<tr>
<td>Hyperopia</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Muscle Balance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Far</td>
<td>1</td>
<td>1.0</td>
</tr>
<tr>
<td>Near</td>
<td>4</td>
<td>3.8</td>
</tr>
<tr>
<td>Far and Near</td>
<td>3</td>
<td>2.9</td>
</tr>
<tr>
<td>Color Discrimination</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Totals</td>
<td>19</td>
<td>18.5</td>
</tr>
</tbody>
</table>

ninth-grade boys. The 13 ninth-grade boys with color discrimination deficiency had never been tested for color discrimination until 1964.

**Vision defects of the ninth-grade girls in Meredith Junior High.** The ninth-grade girls has the highest percentage (45.4 per cent) with myopia, myopic astigmatism, or both. There was an increase of myopia, myopic astigmatism, or both in the seventh, eighth, and ninth grade girls. The seventh-grade girls had 39.3 per cent with myopia, myopic astigmatism, or both; while the eighth-grade girls had 42.3 per cent. As presented in Table IX, the ninth-grade girls had 39 with myopia, myopic
TABLE IX

VISION DEFECTS OF 86 NINTH-GRADE GIRLS
OF MEREDITH JUNIOR HIGH,
DES MOINES, IOWA, 1960-64

<table>
<thead>
<tr>
<th>Vision Defect</th>
<th>Vision Defects in 1960-61</th>
<th>Vision Defects in 1963-64</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
</tr>
<tr>
<td>Myopia, myopic astigmatism, or both</td>
<td>22</td>
<td>25.6</td>
</tr>
<tr>
<td>Hyperopia</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Muscle Balance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Far</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Near</td>
<td>6</td>
<td>7.0</td>
</tr>
<tr>
<td>Far and Near</td>
<td>4</td>
<td>4.6</td>
</tr>
<tr>
<td>Color Discrimination</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Totals</td>
<td>32</td>
<td>37.2</td>
</tr>
</tbody>
</table>

Myopia, myopic astigmatism, or both. There was one student with hyperopia and twelve with defects in muscle balance. None of the ninth-grade girls had a color discrimination deficiency.

III. A COMPARISON OF VISION SCREENING METHODS AT
MEREDITH JUNIOR HIGH SCHOOL

A comparison was made of the number vision defects recognized by the Snellen vision screening method used at Meredith Junior High School with those of the Titmus method and presented in Table X. The findings of this study show the Snellen Test recognized only 274 of the 400 students with vision defects as
TABLE X

COMPARISON OF NUMBER OF VISION DEFECTS RECOGNIZED BY SNELLEN TEST AND TITMUS TEST, BY GRADE, 1964

<table>
<thead>
<tr>
<th>Grade</th>
<th>Number Vision Defects Recognized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Snellen Test</td>
</tr>
<tr>
<td>Seventh Grade</td>
<td>95</td>
</tr>
<tr>
<td>Eighth Grade</td>
<td>108</td>
</tr>
<tr>
<td>Ninth Grade</td>
<td>71</td>
</tr>
<tr>
<td>Totals</td>
<td>274</td>
</tr>
</tbody>
</table>

indicated by the Titmus test. The Snellen Test alone did not detect 126 students who had vision defects. Of the seventh-grade students, the Snellen Test recognized 95 of the 144 students with vision defects; 49 students with vision defects were missed by the Snellen Test but were recognized by the Titmus Test. The eighth-grade students that were vision screened, 108 vision defects were recognized by the Snellen Test; the Titmus Test found 149 with vision defects. The Snellen Test missed the least number of vision defects (36) in the ninth-grade students. As shown in Table X, the Titmus Test recognized 107 vision defects and the Snellen Test 71.

These data show clearly that the vision defects were
found in a greater number of students by the Titmus Test vision screening method than by the Snellen vision screening method.

This chapter has presented the data of the survey made at Meredith Junior High School, Des Moines, Iowa. The following chapter presents the summary, conclusions, and recommendations.
CHAPTER III

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

I. SUMMARY

The purpose of this study was (1) to review a survey of the vision defects of students attending Meredith Junior High School in Des Moines, Iowa; (2) to review research findings concerning vision screening methods; and (3) to compare the method used at Meredith Junior High School with approved methods as shown by research findings.

Vision is the primary avenue to education. The degree of skill and efficiency any individual attains in the use of his eyes determines in large measure how fully he is able to develop and utilize his intellectual potential. The ultimate success of the learning process in our culture is to a large extent dependent upon efficient visual functionings. Today education relies more and more on pictorial expressions and perceptual activities.

The procedure of the study was as follows:

1. The literature relevant to this study was review for background material in determining recommended school vision screening methods. From recommendations in the literature the Titmus vision screening method was selected for this study.
2. A study of the vision screening method for Meredith Junior High School students was made and the vision defects found were analyzed.

3. Conclusions indicated by the data were made and recommendations for improvement of the vision screening method at Meredith Junior High School were made.

This study was made of the 726 students in the Meredith Junior High School, Des Moines, Iowa, during April and May of 1964. All vision screening was done by the author of this report, who was a school nurse. Permission was granted by the Des Moines Independent Community School District to use the Titmus Optical School Vision Tester, a stereoscopic instrument, which was used in this vision screening survey. The students having glasses were tested without their glasses. The battery of tests used in this survey consisted of: (1) the Snellen E test for visual acuity to locate the myopic student, (2) a 1.75 plus lens with the Snellen E test to locate the hyperopic student, (3) an eye muscle balance test given at both far and near points, and (4) a color discrimination test.

II. CONCLUSIONS

There appears to be agreement among authorities on the approved vision screening methods. This was shown by research on the use of the Snellen test for central distance visual
acuity and the use of the Massachusetts Vision Test.

The National Society for the Prevention of Blindness recommended annual vision screening of all students for central distance visual acuity using the Snellen chart combined with careful teacher observation for eye symptoms. It also recommended that a color discrimination test, be given at least once during the student's school experience because of the value to the student in his vocational counseling.¹

The National Education Association and the American Medical Association recommended both the Snellen test and the Massachusetts Vision Test, which consists of a battery of tests.²

The data presented in this study of the school vision screening methods indicate that the Snellen test used alone was an inadequate means of recognizing the vision defects.

The vision screening method at Meredith Junior High School as compared to the recommendations given for effective vision screening methods by authorities, does not include: (1) an annual vision screening test for all students using the Snellen test for central distance visual acuity, (2) the

²Dukelow and Hein, op. cit. p. 63.
Massachusetts Vision Test, and (3) a color discrimination test once during the student's school experience.

III. RECOMMENDATIONS

From the analysis of the data presented in the study the following recommendations for Meredith Junior High School appear pertinent:

1. An annual vision screening for all students alternating the use of the Snellen test for central distance visual acuity with the Massachusetts Vision Test.

2. A color discrimination test be administered at least once during the student's school experience.

It is hoped that the findings of this study will not only be of use to the school in the selection of the vision screening method in their program, but will also help toward further investigations of similar studies.
BIBLIOGRAPHY
BIBLIOGRAPHY

A. BOOK


Fox, Sidney A. **Your Eyes.** New York: Knopf, 1944.


Swanson, Marie. **School Nursing in the Community Program.** New York: The Macmillan Company, 1953.

B. PUBLICATION OF THE GOVERNMENT AND LEARNED SOCIETIES


C. PERIODICAL


Friedman, Leonard Z. "Optometric Investigation of Reading Problems," *Education*, XXC (September, 1959), 181-84.


