

# Maximum Available Desk-to-Eye Distance for Students in Grades One and Two: Regional Norms and Statistical Comparison to Distance Used for Near Point Screening

## Chapter III



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### **Chapter III:** **Methodology**

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#### **Subjects**

##### **Solicitation of Participants**

##### **School Districts**

Texas Education Service Center Region X was contacted to obtain the list of all districts within its region and the names of their superintendents. Each district's administrative officer was contacted by letter to request the district's participation (see [Appendix D](#) for a sample letter). All districts which agreed to participate were included. The local participating districts made the decision regarding how many and which of the elementary schools would participate. The names of the principals were obtained from the districts, and each principal was contacted by both telephone and letter (see [Appendix D](#) for a sample letter). The participation of a parochial school in Dallas, Texas, was solicited through contact with its principal. (Hereinafter, the terms districts and schools refer to both public and nonpublic school jurisdictions and individual schools.)

##### **Students**

Materials soliciting voluntary participation in the study were sent to the parents and guardians (hereinafter referred to as parents) of all students enrolled in Grades 1 and 2 in the participating schools. Included were a letter from each principal which stated the district's participation in the study and a letter from the investigator which requested parental consent for the child to participate (see [Appendix D](#) for a sample letter), a brief description of the study (see [Appendix E](#)), and two copies of a parental permission form (see [Appendix F](#)) appropriate for use with studies involving human subjects. One copy of the permission form was to be returned; the other was to be kept by the parent. A student qualified as a subject when a properly executed consent form was returned.

#### **Participants**

##### **School Districts and Schools**

All public school districts within the geographic area served by Texas Educational Service Center Region X were invited to participate in the study. Subsequently, 9 public school districts in 6 counties participated in the study. A parochial school invited to participate in the study was also within the geographic area of Region X and became a participant in the study.

The participating public school districts represented 5 of the school district categories established by the Texas Education Agency (see [Table 18](#), Appendix Q for a list of TEA categories). The categories are based on Standard Metropolitan Statistical Areas as defined by the U.S. Bureau of the Census. The TEA does not have a comparable category system for parochial schools.

Both of the Coppell ISD (Independent School District)(Dallas County) elementary schools, Pinkerton Elementary and Lee Elementary, took part in the study. The Coppell ISD is in TEA Category 3, Suburban--Fast Growing. Three of the Carrollton-Farmers Branch ISD (C-FBISD) (Dallas County) elementary schools, Blanton Elementary, Central Elementary, and Country Place Elementary, took part in the study. The C-FBISD is in TEA Category 4, Suburban--Stable. Hartmann Elementary of the Wylie ISD (Collin County) took part in the study. The Wylie ISD is in TEA Category 5, Non-Metro (1,000+ Average Daily Attendance [ADA]). Ferris Elementary of Ferris ISD (Ellis County) also took part in the study. The Ferris ISD is in TEA Category 6, Non-Metro (town). Five participating districts are in TEA Category 7, Rural. These districts are Community ISD (Collin County), Savoy ISD (Grayson County), Pottsboro ISD (Grayson County), S and S (Southmayd and Sadler) Consolidated District (Grayson County), and Celeste ISD (Hunt County). Each district has one elementary school which bears the name of the district. Community Elementary is located near Nevada, Texas. Celeste, Pottsboro, and Savoy elementary schools are located in the communities from which they take their names. The consolidated district, S and S, serves the two communities as well as the surrounding rural area, and has its elementary school located in Southmayd. The parochial school, St. Phillip's School, is located in an inner-city minority neighborhood in Dallas, Texas. Classes range from preschool through Grade 3. The TEA did not provide category information on parochial schools. (See [Table 19](#), Appendix Q for additional information about the public school districts, and [Table 20](#), Appendix Q for additional information about the parochial school.)

### **Students**

The measured sample included all students enrolled in Grades 1 and 2 whose parents had returned correctly completed forms granting permission for the child's participation, whose forms were returned within the stipulated number of school days, who were present at the time of measurement, and who were within the upper age limit established for the design (less than 10 years old). There was no lower age limit set for the study. There was no exclusion of subjects from any category of educational placement. The distribution of boys and girls was a result of the number of boys and girls who became participants in the study and were present at the time of measurement at their schools. The data form provided for identification of five ethnic groups: Aleut/Native American, Anglo, Asian/Oriental, Black, and Hispanic. The ethnic categories were taken from the registration forms used in the C-FBISD. All school districts require ethnic identification.

The birth months of the subjects in both the measure and remeasure groups were dispersed among the 12 months of the year. The dispersion of birth months across the 12 months indicates little to no bias in age from unequal numbers of subjects measured at different times within the school year or from an unequal number of subjects in the first and second semesters of each grade. The dispersion of birth months, however, is a result of the birth month of the students enrolled in the school who became participants. The number of measured subjects with birthdays in a single month range from 72 through 115.

### **Helpers and Technician**

Each principal was asked to nominate local personnel to serve as helpers in the study. These individuals were

contacted, employed and scheduled, and instructed in their role of gathering and entering data from registration records, distributing and gathering parental permission letters, recording permission data, escorting children from the classrooms to the place of measurement, and recording the dictated data as the MA-DEDs were taken (see [Appendix G](#) for instructions to helpers). All local helpers were paid an hourly wage for their services.

The investigator instructed the lead local helper regarding the responsibilities of the helpers and provided printed instructions. The helpers were monitored by the investigator and the technician in order to ensure compliance with the research design.

A mature male technician was trained in the procedures to present the task to the subjects, take the MA-DED measurements, and supervise the local helpers. The technician had the authority to adjust the testing schedules in order to comply with the immediate needs of the individual schools.

### **Equipment and Instrumentation**

Chairs of three sizes (11 1/2, 13 1/2, and 15 1/2 inches) and two styles of desks (side storage and across storage) in each of the two sizes recommended by the manufacturers for use in Grades 1 and 2 were used to seat the students for testing (see [Table 21](#), Appendix Q for description of furniture). These were available without cost to the study through the participation of the American Desk Company of Temple, Texas, and Carter Craft of Plano, Texas.

An illustration which appeared in handwriting texts for both Grades 1 and 2 ( [Figure 2](#), Appendix H) was used to demonstrate correct posture and pencil grasp. A photocopy of the illustration was placed on the back of the technician's clipboard, to be shown to each student. A Number 2, sharpened pencil with a length of at least 6 inches was used by the students to point to the target.

The target ([Figure 3](#), Appendix I) for placing the point of the pencil was the intersection of the 3/4-inch arms of a cross (+) printed in black ink on an 8 1/2 x 11 inch sheet of white, unlined paper. Multiple copies were printed so that replacement targets were identical. A sheet was affixed to each desk within marked borders which kept the bottom of the sheet at the edge of the desk and the intersection of the cross at the center of the desk top area above the leg space. The marked borders ensured that replacement sheets were in the same position on the desks as were the originals.

The maximum available desk-to-eye distance (MA-DED) was measured by the technician. The end of a tape measure was placed at the center of the bridge of the nose between the student's eyes and stretched tautly to the placement of the pencil point. The distance was then rounded to the nearest 1/8 inch (0.32 cm). (See [Appendix J](#) for a more detailed description of the methods and procedures for taking the MA-DED measurement.) The data were recorded on a form created for the study (see [Appendix K](#) ).

Data on birth date, grade level, and ethnicity were obtained from enrollment cards or other office records. Ages were calculated by the examiner and were rounded to the nearest full month.

### **Procedure**

#### **Organization of Testing**

Schedules and building locations for the MA-DED measurements were established by consultation with each

school principal (see [Appendix L](#) for criteria and subsequent locations). More schedule choices were available to the earlier responding districts and schools.

### **Administration of MA-DED Testing**

The subjects were brought to the measurement location in groups of three. The technician instructed the group of subjects as to their role, showed the illustration as a model, and demonstrated taking the MA-DED measurement on himself. After the group procedure, one subject sat in each of the chairs for the technician to judge the best fit. The best-fit chair was taken to each desk in turn where the subject sat in the best-fit chair for the technician to judge the best-fit desk. The subject was then seated in the best-fit chair at the best-fit side and across desks in turn while the individual protocol was followed. The technician reviewed the procedure with each individual while the child was seated at each desk for measurement. The technician took both the trial and final MA-DED measurements on each subject. For subjects who had difficulty in following the instructions or in maintaining posture while the final measurement was taken, the individual portion of the protocol (showing the picture, demonstrating, taking trial and final measurements) was repeated up to two times. If difficulty persisted, the results of the third time were recorded as the MA-DED. (See [Appendix J](#) for comprehensive procedure.)

The MA-DED task for each subject was to sit at the desk and chair which were judged by the technician to be the best fit for the student's physical proportions (see [Appendix M](#) for fit criteria), assume the writing posture demonstrated by the child in the provided illustration, grasp the pencil in a writing grasp, and place the point of the pencil at the intersection of the target cross ([Appendix I](#)) which was affixed to the desk. The subject was told to hold that position while the MA-DED was measured.

### **MA-DED Norms**

The MA-DED norms presented in this study were derived from the groups which participated. The  $\bar{n}$  means and standard deviations for described cells are found in [Table 12](#), Chapter IV and [Table 22](#), [Table 23](#), [Table 24](#), and [Table 25](#), Appendix Q. (For a complete description of the norming procedures and process, see [Appendix N](#)). Norm tables are established for each style desk for age, grade, sex by grade, age by grade, and age by sex.

### **Statistical Analysis**

The data obtained from this study were subjected to the following statistical procedures ([Noru&is 1985](#)):

1. A student's  $t$ -Test (two-tailed, independent samples) was used to test for significant differences ( $p < .05$ ) between the Side or Across MA-DEDs for age, grade, and sex cells and for each member of the set of target distances used for nearpoint vision screening as reported by the states and the District of Columbia.
2. A student's  $t$ -Test (two-tailed, independent samples) was used to test for significant differences ( $p < .05$ ) between the diopter equivalent of each Side and Across MA-DED mean ( $D_S$  or  $D_A$ ) for age, grade, and sex cells and for the sum of each member of the set of +D fogging lens used to screen for hyperopia ( $D_{SFL}$  or  $D_{AFL}$ )
3. A student's  $t$ -Test (two-tailed, paired samples) was used to test for significant differences ( $p < .05$ ) between the means of remeasured/measured Side and Across MA-DED.
4. The multiple analysis of variance (MANOVA) was used to test for significant interaction among the

variables of age, sex, grade, and desk style.



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