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

Appendices

Main Thesis Page

Appendix A:

State Publications: Vision Screening Guidelines (Recommended or Mandated)

State	Guideline(s)
Alabama	Code of Alabama, Statute 16-19-1, et seq., 1975, no guidelines, Alabama Department of Public Health
Alaska	Statute Article 2, Sec. 14.30.127, 1982, to be implemented (only excerpt received), Department of Health and Social Services
Arizona	Guidelines for Vision Screening for Handicapped Children, (1983), Arizona Department of Health Services, and Guidelines for Recommended School Vision Screening Program, 1969, Revised 1980, Arizona Department of Health Services
Arkansas	Vision and hearing screening guidelines and regulations, Arkansas Department of Health (no year)
California	A Guide for Vision Screening in California Public Schools , 1984, California State Department of Education
Colorado	Colorado School Health Guidelines, 2nd ed., 1986, Colorado Department of Health
Connecticut	Connecticut Legislation and Regulations, Sec. 10-214-5, Department of Education (only excerpt received)
District of Columbia	Vision Screening Policy and Procedures, Revised 1984, 1985-86, Department of Human Services
Florida	School Health Services, 1983, Department of Health and Rehabilitative Services
Georgia	Training Manual for Vision Screening of Children, Revised 1976, no date, but after 1972 legislation, Georgia Department of Human Resources; Rules and Regulations for Eye, Ear, and Dental Examinations of Children Entering Public Schools, Chapter 290-531, July 31, 1974
Hawaii	Vision and Hearing Screening Program, School Health Services Branch, Department of Health; Part IX, Vision Screening and Education, Hawaii revised Statutes (HRS), no date given
Idaho	A School Health Manual for Idaho, 1970 (under revision), Department of Health and Welfare
Illinois	Vision Screening Guide. (1984). Springfield, IL: Illinois Department of Public Health and Illinois Society for the Prevention of Blindness
Indiana	Senate Enrolled Act 201 (1986), to be implemented, State Board of Health
Iowa	Letter: Department of Health and Department of Public Instruction
Kansas	Vision Screening Guidelines, 1983, Bureau of Maternal and Child Health, Kansas Department of Health and Environment
Kentucky	Administrative Regulations 704 KAR 4:020, Section 2, 1983, Kentucky Department of Education
Louisiana	Guidelines for Vision Screening, 1985, School Nurse Program, Department of Education

Maine	State School Code 693, Section 5,8, 1983; Recommendations of the School Health Advisory Committee, no date, Department of Educational and Cultural Services
Maryland	Vision Screening Manual, 1982, Maryland Department of Health and Mental Hygiene, and Public School Law, Section 7-403
Massachusetts	Instructions for the Massachusetts Vision Test, Grades K-3; Instructions for the Massachusetts Vision Test, Grades 4-12, Titmus Optical versions, 1986, Massachusetts Department of Public Health, Division of Family Health Services, Vision and Hearing Section; Massachusetts General Law Chapter 7, Section 57
Michigan	Vision Technician's Manual, 1982, Michigan Department of Public Health
Minnesota	Pre-School and School Vision Screening Manual, 1980, Minnesota Department of Public Health
Mississippi	Referral to Placement Process, Module H: Vision Screening Training, Mississippi Department of Education, For 1986
Missouri	Handbook for the School Health Nursing Program, 1985, Missouri Department of Elementary and Secondary Education
Montana	Administrative Rules of Montana: 16.10.1117 Health Supervision and Maintenance (7), 1986, Department of Health and Environmental Services
Nebraska	Health Services in Nebraska Schools--Policies and Procedures, 1985, Department of Education; Nebraska School Laws, 1967, Sec. 79-4, 133
Nevada	Revised Statutes 392.420, 1981, Department of Human Resources
New Hampshire	School Health Services Manual, New Hampshire State Department of Education, 1980, Division of Instruction
New Jersey	Guidelines for School Health Services, 1986, Department of Education
New Mexico	New Mexico Health Manual (1986), Department of Education, and letter: State General Consul
New York	Vision Screening Tests, 1981, The State Education Department; New York State Education Law, Article 19, Section 105 (year not given)
North Carolina	Child Health Manual, 1985, Division of Health Services, North Carolina Department of Human Resources
North Dakota	School Health Nursing Manual, 1985, Division of Community Health Nursing, North Dakota State Department of Health
Ohio	Policies Recommended for Vision Conservation Programs for Children and Vision Screening Guide, 1982, Ohio Department of Health
Oklahoma	Letter: State Department of Education
Oregon	Excerpts sent from Oregon Administrative Rules and Guidelines 851-22-705, 1983, Oregon Department of Health
Pennsylvania	Pennsylvania Code, Section 23.4; Public School Code of 1940, Section 1402(a)(11), Revised 1981, Department of Education, or Pennsylvania School Nurses Guide, no date given, Division of School Health, Department of Health
Rhode Island	Rules and Regulations for School Health Programs , amended 1980, Department of Health/Department of Education; Outline of Procedures for Visual Appraisal School, 1978, being revised
South Carolina	Outline of Procedures for Visual Appraisal - School: State Department of Education, Department of Health and Environmental Control
South Dakota	Letters: State Department of Health and Department of Education and Cultural Affairs
Tennessee	Tennessee Rules, Regulations, and Human Standards, 1985, Tennessee Department of Education; Letter: Department of Education, 1985
Texas	Basic Vision Screening, 1981, Texas Department of Health, Bureau of Maternal and Child Health; Children Vision Screening Act, 1979; Special Senses and Communication Disorders, adopted rules, 1984

Utah	Standards for Visual Acuity Screening Programs of Utah School Children, 1984, Utah Department of Health; Utah Code, Title 53, Chapter 22, 1983-84
Vermont	Excerpt from Vision Screening; Vermont School Health Services, (1986). Montpelier, VT: Department of Education
Virginia	State Code 22.1-273, 1981, Commonwealth of Virginia, Department of Education
Washington	Washington State Administrative Code, Chapter 248, 148-140, (1983 ed.), Olympia: Superintendent of Public Instruction
West Virginia	Handbook for School Health Services, 1985, Office of Education Program Development, Department of Education; School Laws of West Virginia, Section 18-5-17
Wisconsin	Children's Eye Health Guide, National Society to Prevent Blindness, Wisconsin Department of Public Instruction
Wyoming	Letter: Department of Education

Appendix B:

Sample Teacher Observations[1]

1. Items 1-47 are from the Student Evaluation Manual-- -Revised (pp. 14.10, 14.11) by the Tennessee State Department of Education, 1985, Nashville: Tennessee State Department of Education, Psychological Services. Adapted by permission.
2. Items 48-70 are from the Oregon Vision Screening Administrative Rule by the Oregon Department of Education, Salem: Oregon Department of Education Student Services and Special Education, 700 Pringle Parkway SE, Salem, OR. Adapted by permission.
3. Items 71-94 are from the Preschool and School Vision Screening Manual, 1980, Minneapolis: Minnesota Department of Health, P.O. Box 8441, Minneapolis, MN 55440. Adapted by permission.
4. Items 95-104 are from the South Carolina Outline of Procedures for Visual Appraisal--School (under revision), 1986. Columbus, SC: South Carolina Department of Health and Environmental Control, 2600 Bull Streett Columbus, SC 29201. Adapted by permission.

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                Sample Teacher Observations

Name _____________________________________    DOB _________________

School ____________________ Grade ________ Teacher _________________

To Teachers: Please complete the following checklist.  Your
observations will be an important part of the functional
vision assessment.  Place a check ( ) in the space beside
each behavior you have observed.

            CHARACTERISTICS OF VISION DIFFICULTIES

A.   Appearance of the Eyes

_____  1.  Eyes crossed--turning in or out--at any time
_____  2.  Reddened eyes
_____  3.  Watering eyes
_____  4.  Encrusted eyelids
_____  5.  Frequent sties
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B. Behavior Indications of Possible Vision Difficulty

Near

_____ 6. Frowning or scowling while reading or writing
_____ 7. Thrusting head forward or tilting to one side
_____ 8. Covering or closing one eye habitually
_____ 9. Unusual fatigue after completing a visual task
_____ 10. Holds reading materials at an unusual angle
_____ 11. Turning head so as to use one eye only
_____ 12. Bending over to see material
_____ 13. Constantly shif
p;
Parents and teachers have the advantage of observing a child several hours a day and, therefore, are in a position to detect vision difficulties. The following signs and symptoms of vision problems should be reported to the person responsible for referral and follow-up and considered in the assessment of the child's vision status. Any child manifesting one or more of these behaviors consistently should go through the screening process. Refer if the problem persists after discussing the problem with the parent and/or teacher, even though the child may pass the screening.

G. External Abnormalities

_____ 71. Any observed problem or change in the whites, lids, lashes, pupils, or area around the eye

H. Complaints of Visual Distress

_____ 72. Sensitivity to light
_____ 73. Burning or itching of eyes or lids
_____ 74. Blurring or seeing double
_____ 75. Words or lines running together
_____ 76. Words jumping
_____ 77. Headache
_____ 78. Nausea or dizziness Behaviors

I. Behaviors

_____ 79. Rubbing eyes frequently
_____ 80. Blinking frequently when reading or watching movies
_____ 81. Frowning or scowling when reading
_____ 82. Closing or covering an eye when reading or watching movies
&n
style='margin-left:.25in'>
_____ 99. Facial distortions, constant rubbing of the eyes, tilting of the head when seeing
_____100. Frequently changes the distance of reading material from near to far
_____101. Inattentiveness during reading; cannot read for long periods without tiring; reads more poorly as

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          time span increases
_____102. Tendencies towards reversals of letters and words
          of confusion of letters and numbers with similar
          shapes
_____103. Constant loss of place in a sentence or on a page
_____104. Poor spacing in writing
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Appendix C:
Inquiry Respondents

NOTE: Open images in separate windows to see full-size

Inquiry Respondents

State	Response Date	Respondent
Alabama (AL)	05/19/86	W. Holcomb Kerns Assistant Legal Counsel Department of Public Health
Alaska (AK)	05/03/86	Rita Schmidt Chief Division of Public Health Section of Family Health Department of Health and Social Services
Arizona (AZ)	12/06/85	Elizabeth J. Field, M.P.H. Vision Program Manager Office of Maternal and Child Health Division of Family Health Services Arizona Department of Health Services
Arkansas (AR)	05/13/86	Fred R. Beggs Director Hearing, Speech, and Vision Services Arkansas Department of Health
California (CA)	11/20/85	James R. Smith Deputy Superintendent Curriculum and Instructional Leadership California State Department of Education
Colorado (CO)	05/22/86	Victoria Hertel, R.N., M.S., S.N.P. School Health Nursing Consultant Colorado Department of Health
Connecticut (CT)	10/31/85	Elaine F. Brainerd Consultant School Health Services Department of Education
Delaware (DE)	11/07/85	Edith P. Vincent State Supervisor Health Education/Services Department of Public Instruction
District of Columbia (DC)	11/20/85	Floretta Dukes McKenzie Superintendent of Schools Chief State School Officer District of Columbia Public Schools
Florida (FL)	11/20/85	Ralph D. Turlington Commissioner State of Florida Department of Education
Georgia (GA)	05/21/86	Adam Roche, Jr. Acting Program Manager Child and Adolescent Health Program Georgia Department of Human Resources

State	Response Date	Respondent
Hawaii (HI)	10/14/86	Francis M. Hatanaka Superintendent Department of Education
	04/04/86	Dorothy Colby Supervisor School Health Support Services Section Department of Health Family health Services Division School Health Services Branch
Idaho (IH)	05/13/86	Carole A. Hesse, M.P.H. Supervisor Crippled Children's Service Department of Health and Welfare
Illinois (IL)	05/20/86	Michael R. Larson, M.S. Coordinator Vision and Hearing Program Division of Health Promotion and Screening Department of Public Health
Indiana (IN)	01/28/86 05/20/86	Raymond Handley Consultant for the Visually Impaired Division for the Handicapped State Board of Health
Iowa (IA)	11/12/85	Robert D. Benton, Ed.D. Commission of Public Instruction Department of Public Instruction
	05/16/86	Paul F. Carlson Acting Commissioner of Public Health Iowa Health Department
Kansas (KS)	11/05/85	Gorin Rutherford Hearing Conservation Specialist Bureau of Community Health Department of Health and Environment
Kentucky (KY)	10/23/85	Dianne H. Caines Director Unit for Health and Psychological Services Kentucky Department of Education
	12/04/85	Kathleen Stevenson, R.N. President Kentucky School Nurses Association
Louisiana (LA)	11/06/85 05/08/86	Edis Harris Section Chief School Nurse Program Bureau of Student Services Department of Education
Maine (ME)	10/25/85	Mary E. Spencer, R. N., M.S. School Nurse Consultant Department of Educational and Cultural Serv

Maryland (MD)	11/12/85	Mary K. Albrittain Chief Pupil Services Branch Maryland State Department of Education
	12/13/85	Bella Caplan, R.N., M.S. Nurse Consultant in Pediatrics Preventive Medicine Administration Department of Health and Mental Hygiene
Massachusetts	12/03/85	Cheryl Baug-Simons Project Director Health and Human Development Bureau of Student, Community, and Adult Services Department of Education
Michigan (MI)	05/20/86	Karen Schrock Chief Eastern Regional Division Bureau of Community Services Department of Public Health
Minnesota (MN)	06/13/86	Don Newman Supervisor Hearing and Vision Conservation Program Minnesota Department of Health
Mississippi (MI)	10/31/86	Charles E. Saul, Ed.D. Educational Technologist State Department of Education
Missouri (MO)	11/14/85	Marla J. Baigi Supervisor State and Federal Programs Department of Elementary and Secondary Education
	10/21/86	Arthur L. Mallory Commissioner of Education
Montana (MT)	05/19/86	Eleanor A. Parker DHES Counsel Legal Division Department of Health and Environmental Sciences
Nebraska (NB)	10/29/85	Stan Carlson Administrator School Assistance and Support Nebraska Department of Education
Nevada (NV)	06/11/86	Lisa Singer Acting Manager Special Children's Clinic Health Division Department of Human Resources
	10/14/86	Eugene T. Paslov Superintendent of Public Instruction Department of Education
	01/25/89	Dr. Kevin Crowe Director of Planning, Research, and Evaluation Nevada Department of Education

State	Response Date	Respondent
Nevada (NV) (continued)	01/25/89	Sandra Fairburn, R.N. Supervisor of Rural Nurses Health Division Nevada Department of Human Resources
New Hampshire (NE)	12/09/85	Muriel C. Desrosiers, R.N., Ed.D. FASHA School Health Consultant Special Education Bureau Department of Education
New Jersey (NJ)	11/04/85	Joel Bloom Assistant Commissioner Division of General Academic Education Department of Education
	12/04/85	Jane DeMaio, R.N.
	12/14/85	Education Program Specialist Bureau of Student Behavior and Development Division of General Academic Education Department of Education
New Mexico (NM)	05/22/86	Florenceruth J. Brown Deputy General Counsel Office of General Counsel New Mexico Health and Environment Department
	01/25/89	Walt Youngblood Deputy Division Director of Public Health State of New Mexico
New York (NY)	11/13/85	Arlene Sheffield Director School Health Demonstration Program Bureau of Health and Drug Education and Services The State Education Department
North Carolina (NC)	11/05/85	Tina Fisher, R.N., M.P.H. Nursing Consultant School Unit Maternal and Child Care Section Division of Health Services North Carolina Department of Human Resources
North Dakota (ND)	05/19/86	Stephen L. McDonough Director Division of Maternal and Child Health Preventive Health Section North Dakota State Department of Health
Ohio (OH)	05/28/86	James F. Quilty, Jr., M.D. Chief Division of Maternal and Child Health Department of Health
Oklahoma (OK)	10/29/85	Dean Niles Director RESC Section Oklahoma State Department of Education

State	Response Date	Respondent
Oregon (OR)	10/14/86	Les Adkins Director Student Services and Special Education Oregon Department of Education
Pennsylvania (PA)	11/05/86	Paula Hower Clausen Legislative Analyst Office of Legislative Programs Department of Health
Rhode Island (RI)	05/13/86	Estelle A. Tetreault, M.S. Specialist Health Regulations Department of Health
South Carolina (SC)	05/21/86	Maryellen Hatfield, R.N., M.N. Associate State Director Public Health Nursing Nurse-Consultant-School Health Division of Children's Health South Carolina Department of Health and Environmental Control
South Dakota	05/21/86	Carol Job Health Services Assistant Administrator Community Health Nursing Program South Dakota Department of Health
Tennessee (TN)	11/12/86	Gloria Matta Consultant Psychological Services Division of Special Programs Tennessee State Department of Education
Texas (TX)	11/12/85 04/25/86 05/20/86	Douglas K. Ozias, Ph.D. Director Vision, Hearing, and Speech Services Bureau of Maternal and Child Health Texas Department of Health
Utah (UT)	05/15/86	Jan Robinson, R.N., M.S., C.P.N.P. Child Nursing Consultant Family health Services Division Utah Department of Health
Vermont (VT)	03/18/86	Shirley M. Reid Consultant Guidance and Health Services Department of Education
Virginia (VA)	10/31/85	Jeane L. Bentley Associate Director Health, Physical Education, and Driver Education Department of Education
Washington (WA)	11/12/85	Judith A. Maire, M.N., C.R.N. Health Services Supervisor Division of Special Services and Professional Programs Office of Superintendent of Public Instruction

State	Response Date	Respondent
West Virginia (WV)	10/29/85	Lenore Zadosky Coordinator School Health Services and Health Education Office of Educational Program Development Department of Education
Wisconsin (WI)	11/04/86	C. Ernest Cooney Children's Vision Screening Specialist Division for Handicapped Children and Pupil Services Bureau for Children with Physical Needs Department of Public Instruction
Wyoming (WY)	10/28/85	Audrey Cotherman Deputy State Superintendent of Public Instruction Department of Education

Appendix D:
Letters

[Sample Letter of Inquiry to States]

(DATE)

(INSIDE ADDRESS)

Dear (NAME OF ADMINISTRATOR):

Currently, I am engaged in a doctoral study at Texas Woman's University (Denton, Texas) which includes utilizing information from each state. The study incorporates references to mandatory or suggested vision screening that is provided to students in Grades 1 and 2 who are enrolled in public, private, parochial# or proprietary schools.

I will appreciate receiving information that states the conditions under which the screening is done, the instrument used, the distances used for each type of screening, power of +D lens to screen for hyperopia, and other specific information which is included in the guidelines for vision screening in your state.

If this information is more properly obtained from a different governmental agency, I would appreciate your referring this request to that agency.

In case there is a charge for receiving a copy of the material, I will immediately forward payment upon receipt of the statement.

A copy of the results of this survey may be obtained by including a request for a copy in your response. A copy will then be sent when the study is complete.

Thank you for your help.

Sincerely,

Betty Ward
706 Ridgedale
Richardson, Texas 75080
Phone: 214/783-1413 (recorder)

[Sample Letter to Superintendents]

(DATE)

(INSIDE ADDRESS)

Dear (SUPERINTENDENT'S NAME):

I am involved in research that relates to the screening

of nearpoint vision. The study requires public school children in Grades 1 and 2 as subjects. In order to have the children available, the participation of school districts in ESC Region X. such as yours, is needed.

Enclosed is a resume of the study, and the complete description of it in order that you, and the members of the research committee and of the school board, can determine what is involved. Although there is no immediate benefit to the subjects, the outcome of the study has the potential of benefitting all children in the future who receive nearpoint vision screening.

Texas' present time constraints within the classroom have been taken into consideration. The research design has been constructed so as to impinge as little as possible upon instructional time and classroom procedures.

If more information is needed, or wanted, please contact me at the address/phone below, or check the statement on the form.

I greatly appreciate my request being thoughtfully considered, and look forward to working with your school district in establishing the Maximum Available Desk-to-Eye Distance norms (MA-DED) for students in Grades I and 2.

Sincerely,

Betty Ward
Texas Woman's University
Vis

[Sample Letter to Principals]

(DATE)

(INSIDE ADDRESS)

Dear (PRINCIPAL'S NAME):

Thank you for cooperating in my doctoral study being done at Texas Woman's University, which allows the first and second grade grade students in your building to be participants in the research.

Enclosed is a sample letter that the principals have been having us enclose with the letter and form sent to the parents. If you, too, would like for this, or a similar letter, to be enclosed, please return the signed letter to me, as well as the school letterhead. I will then add the proper title etc.,

below your name, insert the contact phone numbery, format it with your letterhead, and have it printed.

We will also have prepared the number of envelopes for your enrolled students in grades 1 and 2 (plus a few extra). The material to the parents will already be inserted when the envelopes are delivered to your building. This will be done about 2 weeks before the date of measurement. This allows for any follow-up that is needed for parents who do not respond within the designated number of days.

In order to make as little time demand on the school staff as possible, we like to use a local person--perhaps from the PTA or similar organization--to help us. We offer $3.50 per hour. This can be done either as a fund-raising activity for the parent organization or by an individual. The individual will need to deliver the envelopes to the rooms and

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[Sample Follow-Up Letter to Principal]

(DATE)

(INSIDE ADDRESS)

Dear (PRINCIPAL'S NAME):

Please share my thanks with the staff and faculty members who made it possible for the students in grades 1 and 2 at Blanton to be included in the Vision Screening Research Project study.

While I also appreciate the cooperation of the parents who made it possible, I cannot contact each of them. But if the opportunity arises, please pass on my thanks to them, too.

As an expression of my appreciation, please place the fruit bowl in the lounge (lounges?) for the staff and faculty -- to include all, although all did not have students who took part in the study.

My special thanks to you for making Mr. Ward feel so welcome, and being so helpful while he was there.

Sincerely,

Betty Ward
706 Ridgedale
Richardson, Texas 75080
Vision Screening Research Project
Texas Woman's University (Denton)

Sample Letter to Teachers and Staff: Measure

Dear Teachers and Staff:

Thank you for cooperating in my doctoral study. We are trying to have the procedure done in a way that will interrupt the least with your daily routine and activities.

The children will take home a letter and 2 copies of the parent consent form: 1 is to be completed and returned, and the other is to be kept by the parent. It is very important that ALL returned forms be kept. My field assistant, Ottis Ward, will retain all of the returned forms to be filed in our records, as is required by the University.

Your principal will be working with us to determine in which order the children will be gotten from the classrooms. A helper will come for a group of 3. We can return them in a group, or let each one return alone as his or her measurement is completed. Please let us know your preference.

A helper will have filled out the data sheets from the AGR cards. She will also keep track of which children return a form giving or denying consent for the child to be included in the study. Only those whose parents have returned a "yes" consent will be among those measured.

It will take about 15 minutes to get the children, do the measuring, and have them start to return to the classroom.

The helper will also determine who did not return any form, and will have a letter, addressed to the parents of the child, that the child is to carry home. This will be brought to your room the first day th

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Sample Letter to Teachers and Staff: Remeasure

Nov. 15, 1987

Dear Teachers:

Those of you who were teachers in grades 1 and 2 last year in Elementary will remember that the District took part last spring in the Vision Screening Research Project, which involves my doctoral study. We appreciated so much the cooperation of the District, the parents, and you, the teachers.

At this time, we are doing phase 2 of the study. This involves the repeat measurements of the children now in

grades 1 and 2 who were among those measured last spring.

Since it does not involve all the children in your classes, the local helper will bring to your room on Wednesday, Nov. 18, letters already addressed to the parents of the children involved in the repeat measurement. It will also have the child's name on the envelope. These will need to be sent home on that day.

The children are asked to return the signed forms within 3 school days--by Monday, Nov. 23. The helper will be coming by to pick them up each day. It IS necessary that all forms returned be gotten to us: The research requires that all the forms be kept on file by us.

Because of the Thanksgiving holiday, the measurements will be done on Monday and Tuesday, Nov. 30 and Dec. 1. The procedure will be as it was last spring. The helper will come by for the next 3 students on her list, take them with her to be measured, then they will return to your room. The timing

Sample Suggested Principal's Letter to Parents

Dear Parents:

Our school district is cooperating in a doctoral study which is being conducted at Texas Woman's University by Betty Ward. We feel that the result of the study can be of benefit to children in the future. In order for your child to participate, we must have on file the completed form which gives your approval.

The study will require very little time during one school day, and should not cause much disruption.

If you have any questions about the study or about your child being a participant in the study, please call me at _____.

We encourage you to have your child take part in the study.

Sincerely,

Sample Letter to Parent or Guardian

(Date)

Dear Parent or Guardian:

We are asking your permission to have your child, _____, participate in our research study. The purpose of the study is to collect data to create norms.

The created norms will allow the distances used for vision screening to be compared to the distances children have from their eyes to the desk. These comparisons will result in a determination of whether a Pass or Fail on different vision screening tests can be appropriately generalized to the classroom situation for children in Grades 1 and 2.

Taking the measurement of the distance from the bridge of the nose to the desk top has no basic risk to your child. Although there is no direct benefit to your child at the time of measuring, there is the likelihood that the study results can benefit all children who will have their vision screened in the future.

Please complete and return the attached form within the next three (3) school days.

Sincerely,

Betty Ward
Doctoral Candidate
Texas Woman's University
Denton, Texas

If there are any questions, please call (214) 783-1413, or write:

Betty Ward
Vision Screening Research Project
706 Ridgedale
Richardson, Texas 75080

Sample Follow-up Letter to Parent or Guardian

Dear Parents:

Earlier this month, a letter and permission form were sent home with the students in Grades 1 and 2. They were asking you to give permission for your child to be included in a doctoral study being done at Texas Woman's Univerity by Betty Ward.

The research assistant will be at your building this week to take the measurements. I know that forms can become misplaced and not get returned to the school. So, enclosed is a copy of the material sent. Please sign the form indicating whether or not you want your child included in the group being measured. A "yes" reply must be on file in order for your child to be among those who will help create a nearpoint vision screening distance which will be applicable to classroom vision tasks.

The measurement will be of the space from their eyes to the surface of the desk. It is of no hazard to the child. Taking the measurement should take only about 5 minutes. This should be of very little disruption of the instructional time during the school day.

If there are any questions, please call me in the evening and I will be happy to discuss it with you and to answer your questions (783-1413, with recorder).

I appreciate so much your signing the form and returning it to the school tomorrow.

Sincerely,

Betty Ward
Vision Screening Research Project
Texas Woman's University

Appendix E:
Brief Description of the Study

Maximum Available Desk-to-Eye Distance
for Students in Grades 1 and 2

Regional Norms and Statistical Comparison to Distances
Used for Nearpoint Vision Screening

By Betty Ward

The distance used to screen nearpoint vision is based on the accommodation convergence/accommodation ratio (AC/A). The AC/A is the nearest point at which accommodation has been established for clear nearpoint vision. Because no norms have been established for the distance which children have available during the usual nearpoint school tasks which involve both reading and writingr there have been no studies which relate the distance of nearpoint visual screening to the distance of nearpoint school tasks.

Establishing the maximum available desk to eye distance (MA-DED) norms will provide the criteria which are needed, but at present do not exist.

The tradition of using the AC/A distance for nearpoint vision evaluation and screening has developed since the early studies around 1850 first established the distances found for the AC/A ratio. The range for the AC/A extends well past 30 inches out from the eye. From the mean of the AC/A the standard 13-16 inches used for nearpoint vision screening has been established. The "Pass" of the nearpoint vision screening done at 13-16 inches has been generalized to mean that the child who passes the screening can handle the nearpoint visual tasks of the school environment.

According to present day research standards such a generalization would not be accepted. Studies have not been done which demonstrate the similarities of the AC/A distance and the nearpoint distance available to a student during a nearpoint academic task in the school environment. Therefore, no statistical comparisons have been made.

A review of the literature in the fields of eye care, vision screening, investigations of eye movements and other related eye-reading variables during the act of reading, and research in the field of reading has shown that there is a need to have available the norms for the MA-DED. Distance, whether controlled or not, has not been considered a variable in the studies. Often the controlled distance (even up to 47 inches) was greater

than that used for nearpoint vision screening. This means that the findings cannot properly be generalized to children. Until the MA- DED norms are available for comparisons, no generalizations can properly be made to children in the lower grades.

The subjects are to be drawn from among the students enrolled in districts within the geographic boundaries of Education Service Center (ESC) Region X.

Desks and chairs will be supplied by the manufacturers of school furniture who have plants in Texas. The styles of desks shall include those with storage facilities under the desk top and above the thighs, and those without storage area above the thighs. Having storage facilities above the thighs shortens the MA-DED. Most schools use this type of desk. The desks and chairs will be of the sizes purchased for use in Grades 1 and 2, as indicated by the furniture manufacturers. Subjects are to be seated at a chair whose seat is no higher than the bend in the back of knee, and at a desk adjusted at its lowest setting. Attached to the desk will be a paper positioned as shown in the manuscript handwriting texts. The paper will be marked with a cross as the visual target.

While seated at the proper chair and desk, and holding a pencil, the subject will be shown a picture of the correct writing posture taken from the handwriting text. The subject will be told, "Sit like this, and put the pencil on the middle of the cross as if you are going to write your name." Once positioned, the subject will be shown the picture again, and asked, "Are you sitting like this?" With the subsequent posture held, the technician will place non-stretchable tape at the center of the bridge of the nose of the subject, and at the point on the paper. Retaining his hold on the tape, the technician will read the MA-DED distance in both inches and centimeters. This distance is the MA-DED distance for this subject at this desk.

Statistical comparisons will be made. Findings of no significance will allow the generalizations of the past to stand. Findings of significant differences will indicate the need for future studies, which may include the determination of new distances for nearpoint vision screening. The new distances may be based on the MA-DED findings.

A survey is being made of all the states to determine the vision screening mandated, or the guidelines for vision screening, with the distance for nearpoint screening included. Communication with the education and health departments has revealed that there is an interest in having the MA-DED information available to them. Several of the states at present have an advisory committee studying possible changes in vision screening.

The need for the MA-DED norms is readily apparent and urgent.

Appendix F:
Summary Consent Form Reply: Measure/Remeasure

```
        Summary Consent Form Reply: Measure/Remeasure

Study Title: Maximum Available Desk-to-Eye Distance for
             Students in Grades One and Two: Regional
             Norms and Statistical Comparison to Distance
             Used for Nearpoint Screening

Investigator: Betty Ward, Texas Woman's University, Denton
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```
Date Sent: _____ Please return within 3 school days.

The study involves measuring the distance between the bridge
of the child's nose and the pre-positioned target on the
desk.  There is considered to be no risk involved to the
child.  However, should there be an injury to the child,
Texas Woman's University is not responsible for any
compensation for such injury.

I understand that all information that is obtained which can
be identified with the child is to remain confidential by
the name being removed from the records at the completion of
the study.  The result of the study may be published without
identifying the child by name, but by a number only.

Participation in this research study is completely
voluntary.  Refusal to have my child participate will
involve no penalty.  When I give my consent for my child to
participate in the study, I understand that I can withdraw
my consent and discontinue my child's participation at any
time.

I understand that I am to keep the attached copy of this
form as my copy of this document.
```

Appendix G:
Instructions to Local Helpers

Data Sheets and Letters Home

1. Data sheets will be delivered on Monday.

2. Before the forms are returned, do the following:

    - List the students for each teacher's class on a separate data sheet. Write the teacher's name and class designation (i.e. 2C) on each. If a class requires two sheets, write the same information on each sheet, with the word "continued" also on the second sheet. Clip the two sheets together.

    - Put the following information (gathered from the AGR or similar office file card): name, sex, birth date, grade, and ethnic group.

      In filling out the Ethnic column on the data sheets, use the prefix "L" when the student is enrolled in an ILD (or ESL) class.

        - LA = ILD Anglo (includes European)
        - LO = ILD Asian or Oriental
        - LH = ILD Hispanic
        - LB = ILD Black

        - LL = ILD other--such as Arabic, etc.
    - At the top fill in the date(s) the information was gathered. Sign your name in the "By" space.

3. On Monday deliver the envelopes containing the forms for the students to take home. (These will arrive bound in groups of 20.)
   You are to prepare groups of these envelopes according to the number of students in each teacher's class (Grades 1 and 2). Place a paper on the front of each group with the teacher's name written on it. Deliver the packet to the teacher. Each child is to take one home.
4. There will be a small reward furnished for each child who returns a form--whether it is blank, completed correctly or incorrectly. Count out the number of awards for each teacher's class and deliver them along with the envelopes.
5. Each of the 3 school days following the forms being taken home, go by each class to collect the returned forms. ALL RETURNED FORMS, letters, etc., must be saved and turned in to Mr. Ward. Mark each returned form with the teacher's name and the class designation (i.e. 2C).
   Keep the forms grouped according to the teacher and class.
6. Mark the data sheet in the Parent Permission space Y or N according to the correctly filled out form. LEAVE BLANK the parent permission space when the returned form is marked incorrectly or is blank. ALL RETURNED FORMS, even those that are blank, must be saved and returned to Mr. Ward.
7. On Friday afternoon, prepare a list by student name and teacher of those students who have not returned a form. Give this information to Betty Ward by telephone (214-783-1413,1 recorder). Follow-up packets will be prepared for those students.
8. Follow-up packets are to be delivered to the students' teachers on the first day of measuring.
   Each envelope is to have written on it, "To the Parents of " (and write the student's name). The student is to take this envelope home the first day of measuring.
9. Each day of measuring, check with the teachers for additional returned forms. Mark the data sheets Y or N in the parent permission space according to number 5 above.

Appendix H:

Figure 2: Demonstration of Correct Posture

POSITION AT DESK

Figure 2. Demonstration of Correct Posture.

SOURCE: From Writing On, Imaginary Line Handwriting Series by R. M. Townsend, 1978, Austin, TX: Steck-Vaughn Company. Copyright 1978 by Steck-Vaughn Company. Reprinted by permission of the publisher.

Appendix I:

Figure 3: Sample of Target Cross

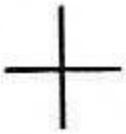


Figure 3. The Target Cross.

The page containing the target cross was affixed to each desk so that the intersection of the arms of the cross was in the measured center of the portion of the desktop above the leg space. For the side desk, this was off the center of the desktop because not all of the space under the desk was available as leg space: the storage space is located under one side of the desk top. For the across desk, the target was in the center of the desktop because all of the space was available as leg space. The desk was marked so that a replacement page, if needed, could be affixed very quickly in the same position.

Appendix J

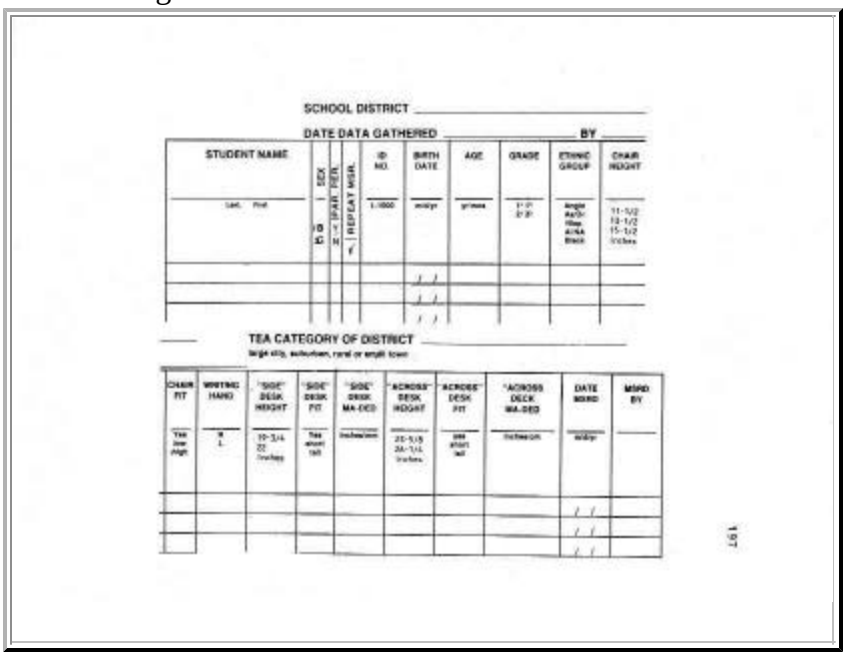
Procedure for Taking the MA-DED Measurement

1. The helper brings a group of three (3) subjects to the measurement location, where they are seated in the waiting area.

2. The technician introduces himself and explains the study. The explanation includes a demonstration of taking the
   MA- DED on himself. This is done by placing the end of the tape on the bridge of his nose and holding the tape tautly stretched downward.
3. One subject is led to the chairs and sits by turn in each while the technician judges the best-fit chair and dictates its size and fit to the helper.
4. The best-fit chair is brought to each Side desk in turn. The subject is seated with the chair positioned by the technician so that the edge of the desk is approximately half-way between the subject's knees and trunk. The technician judges the best-fit Side desk and dictates the size and fit to the helper.
5. With the subject seated at the best-fit desk, the model picture is displayed, a short explanation is given, and a demonstration is made again. The subject is asked which is his or her writing hand and is given the pencil. The writing hand information is dictated to the helper. A trial MA-DED is taken on the subject.
6. The subject is told that the real MA-DED will now be taken. All the steps are repeated. For the subject who correctly follows the instructions of holding the pencil as if to write, seems to be sitting in a writing posture, and who remains still while the end of the tape is placed on the nose and pulled tautly to the point of the pencil placed on the target, this is the recorded MA-DED. The measurement is dictated to the helper, using the nearest 1/8 inch. This procedure is completed for the Side desk before determining the best-fit Across desk. The procedure is then repeated using the best-fit Across desk.
7. For the subject who has difficulty holding the pencil as if to write, a blank sheet may be placed over the target, with the subject then asked to write the first letter of his or her name. The subject is then told to hold the pencil in the same manner when the pencil is placed on the target. The blank paper is removed, and the MA-DED procedure is repeated.
8. For a subject who has difficulty in either following the instructions or remaining still while the measurement is taken, the following may be repeated a maximum of two (2) more times: display the picture, carry out the demonstration, give the instructions, and take the measurement. If there is not complete compliance on the first repeat, the MA-DED measurement taken on the second repeat becomes the recorded MA-DED for that subject.
9. The explanation to the subject must include the following: "Hold the pencil like you do when you write", "Here is a picture of a girl in her very best writing position. Sit like the girl in the picture", and "Sit as still as a statue while I measure the distance from the bridge of your nose to where the point of the pencil is touching the paper".
10. Each child and each group is thanked, and is either sent back to join their classmates or taken back according to the plan determined for the school.

Appendix K:

Figure 3: Form for Collection of MA-DED Data



NOTE: Open the image in a separate window to see it full-size.

Appendix L:
Criteria for Measurement Locations and Resulting Locations
Criteria for Measurement Locations

1. Easily accessible to students in Grades 1 and 2.
2. Out of any line of traffic.
3. Quiet.
4. Adequate lighting.
5. Equipment can be left set up overnight or for the duration of measurements.
6. Allows ease of setting up the equipment.
7. Has available additional chairs and desks for the group of children to wait and receive instruction and for the helper to sit and write.
8. Does not disrupt the routine within the school.

Resulting Locations

1. Hallway
2. Storage room (with old equipment present)
3. Book room
4. Stage in the cafetorium

5. Unused classroom
6. Different classrooms during different periods in a day
7. School clinic

Appendix M:
Criteria for Fit of Chair and Desk

Chair

The best fit chair is an appropriate fit when the chair height allows the child's thighs to rest on the chair with feet flat on the floor when seated well back in the chair. The chair fit is low when the chair height does not allow the thigh to rest on the chair when the child is seated well back in the chair with feet flat on the floor. The chair fit is high when the chair height does not allow the child's feet to be flat on the floor when seated well back in the chair.

Desk

The best fit desk is determined while the subject is seated in the best fit chair at each desk in turn, with the edge of the desk approximately half-way between the subject's knees and the trunk of the body. In an appropriate fit, the under surface of the desk is approximately 2 inches from the surface of the thighs. In a short fit, the distance between the undersurface of the desk and the surface of the thighs is less than approximately 2 inches. In a tall fit the distance between the undersurface of the desk and the surface of the thigh is approximately 3 or more inches.

Appendix N:
Norming of the MA-DED

The MA-DED norms presented in this study were derived from the groups that participated. The sample pool was drawn from students enrolled in Grades 1 and 2 in schools within the geographic boundaries of Educational Service Center Region X in the State of Texas.

Region X serves eight counties: Collin, Dallas, Ellis, Fannin, Grayson, Hunt, Kaufman, and Rockwall. All public school districts and one parochial school within the region were invited to participate in the study. Nine public school districts and one parochial school became participants, with a total of 13 schools participating.

The Texas Education Agency (TEA) places public school districts in categories based on the Standard Metropolitan Statistical Areas (SMSA) as defined by the U.S. Bureau of the Census: Urban, Other Central, Suburban (stable in growth or fast-growing student enrollment), Non-Metro (with a town of 1,000+ population), Non-Metro (with a town of equal to or less than 1,OOO population), and Rural (see Table 18, Appendix Q) The TEA does not classify or categorize the school districts according to size of enrollment, but according to the economic base of the taxing district. All seven categories of schools are found in Region X: This is not true for all Education Service Centers in Texas. The categories used in this study are described more fully in the TEA Statistical brief SB81SAR (see Table 19, Appendix Q) October 8, 1961, which was still in use in 1986. This brief provides, among other information, data on the refined Average Daily Attendance (ADA) and the minority percentage of the ADA. The report also provides information on the tax

base.

Category 3, Suburban-Fast Growing, is represented by Coppell ISD (Independent School District). Both of its elementary schools took part in the study. Category 4, Suburban-Stable, is represented by the Carrollton-Farmers Branch ISD (C-FBISD), which chose to have three of its elementary schools take part in the study. Category 5, Non-Metro (1,000+), is represented by the Wylie ISD. Category 6, Non-Metro (Town) is represented by the Ferris ISD. Category 7, Rural, is represented by 5 districts which took part in the study.

There was no determination of the comparison of the parochial school, St. Phillip's to other schools whether public, private, or parochial. The TEA does not provide category information for parochial schools. St. Phillip's enrollment for kindergarten through Grade 3 is 100% minorities, with Black as the predominant ethnic group. St. Phillip's School, located in a Dallas inner-city minority neighborhood, draws students from within and outside the immediate vicinity.

The size of the ADA for districts may vary widely, especially in the suburbs. In Category 3. Suburban-Fast Growing, there are 10 school districts, but nearly 50% of that category's ADA is found within one of them. In Category 4, Suburban-Stable, there are 11 districts, with nearly 50% of that category's ADA found within 2 of them.

The TEA does categorize the schools as to urban or suburban districts. Of the nine participating districts and the parochial school, only the parochial school is in a large urban center (Dallas). The largest of the participating districts (C-FBISD) is composed of two industrialized suburbs which have a combined population of over 60,000 people. Two of the districts (Coppell ISD and Wylie ISD) lie in the second outlying ring of Dallas suburbs, and are contiguous with suburbs that touch Dallas. These two districts are in towns that have populations of less than 15,000 people, have smaller industrial/business bases than does Dallas, and are located 20 or more miles from the center of Dallas. A fourth district (Ferris ISD) is in a town which is over 35 miles from the center of Dallas and is on a major interstate highway. The remaining districts which participated in the study are in small towns, may serve one or more municipalities, and are surrounded by rural areas from which their enrollments are drawn.

In this study, 21.98% of the 1,135 subjects measured were minorities, or non-anglos. Of the 13 schools participating in the study 3 had no minorities among the measured subjects, 1 had 100% non-anglo pupils, and 2 had over 50% non-anglo students. The other 6 schools ranged from 2.74% to 20.80% non-anglo measured students.

Subjects were remeasured at two schools. Of the remeasured subjects, 30.46% were non-anglo. For Time 1, there was 15.69% non-anglos, and for Time 2 there was 61.24% non-anglos remeasured.

The minority labels used in this study were those found on the enrollment cards of the Carrollton-Farmers Branch ISD. The percentages of minorities in this study are as follow: Anglo, 78.02%; Hispanic, 10.86%; Black, 7.06%; Asian/Oriental, 3.71%; and Aleut/Native American, 0.35%.

The 1,135 subjects included 510 boys and 625 girls. There were 197 students from first grade, first semester (Grade 1^1); 381 from first grade, second semester (Grade 1^2); 194 from second grade, first semester (Grade 2^1), and 363 from second grade, second semester (Grade 2^2).

The bias toward the second semester of each grade is an outcome of the election by schools with larger enrollments to schedule the measurements later in the school year. Most schools wanted to avoid scheduling measurements at the start of the year and during the weeks preceding the administration of the statewide achievement tests. Data for the study were gathered in the months of September, October, November, January, February, and March in two different years; the fall of 1987 and in the spring and fall of 1988.

Remeasurement was made of groups at two schools. Time 1, fall to spring, was a 4-month interval (October 1987 to February 1988). Grades 1^1 and 2^1 were remeasured in Time 1. Time 2, spring to fall, was an 8-month interval (March 1987 to November 1987). Grade 1^2 was remeasured during Time 2.

The age span established for the study had no lower limit set in order to allow for the possibility of young ages if there were a difference of policy among the districts regarding the earliest age at which a student is allowed to enroll in Grade 1. An upper age limit was set at < 10 years old. No subjects younger than 6 years, zero months were found in the study. The resulting age span is from age 6 through age 9.

No formal determinations were made of either family socioeconomic status or occupation of head of household. In the 9 participating public school districts, 6 had only one elementary school, thus ensuring that 100% of the districts's enrollments in Grades 1 and 2 was available to the study. A 7th district had two elementary schools: Both participated in the study, ensuring that inclusion of 100% of that district's first- and second-grade enrollment was available to the study. An eighth district had two elementary schools. One of them participated in the study. The largest district in the study had 3 of its 15 elementary schools take part in the study. In this last district, the administrator responsible for determining the schools to be included stated that he, on his own initiative, selected the 3 schools from that district which, in his opinion, would best represent the high, middle, and low socioeconomic and head of household levels and include regular students, students enrolled in special education, ESL (English as a Second Language), and LEAP (IQ > 140 and other qualifying criteria for Gifted and Talented class enrollment) classes as well as mainstreamed special education and low-achieving students who received only supportive help on demand. The parochial school is located in a low-income, inner-city, minority neighborhood, and draws its students from the surrounding vicinity as well as from other areas.

The Maximum Available Desk-to-Eye Distance (MA-DED)

The MA-DED distances are indicators of the distances within which children in Grades 1 and 2 must work during their nearpoint tasks. The students need to have a reserve of accommodation and convergence while working at these distances. The MA-DED mean distances, based on linear measurement, are for each age group, each grade span, and each age group within a grade span, as well as by sex. The maximum desk-to-eye distance was selected as an indication that a child's working distance while writing is at or within this distance, and cannot be greater than the maximum distance available. The work distance while holding a book and reading at the desk, because the desk limits the placement of the book, is also likely to be at or within this distance. The only study found which sought to determine the actual working distances of children wile reading or writing at their desks found that the writing distance was shorter than the reading distance (Hurst, 1964). The decision to include an element of writing in the MA-DED study is based on the fact that one is required to use nearpoint vision during a task which requires both reading and writing, as do many

academic tasks.

Equipment

The equipment used for the study included chairs, desks, a pencil, the prepared target, a nonstretchable measuring tape marked in eighths of inches and in centimeters, an illustration of a child writing at a desk, and forms for recording data. The chairs of the three sizes suggested in the manufacturer's catalogues for use in Grades 1 and 2 were 11 1/2, 13 1/2, and 15 1/2 inches tall (height of seat from the floor). The fit of the chairs was recorded as yes (appropriate), low, or high. Of the measured subjects, fit was recorded as "appropriate" for 96.3%, low for 0.53%. and high for 3.08%. There was no allowance made for the need of a footstool for a dwarf child; the chair fit was high for her. (See Appendix M for a description of fit criteria.)

The two styles of desks were one with across (Across desk) and one with side (Side desk) storage. The Side desk had storage at the side of the work area; whereas, the Across desk had storage underneath the full width of the working surface. The Side desks were described in the catalogue as having lowest adjustments of 19 1/2 to 21 1/2 inches tall (height of working surface from the floor), but in actuality, the lowest possible adjustments were 19 3/4 and 22 inches. The Across desks were described as being 21 1/2 and 23 1/2 inches tall, but the actual lowest adjustments were 23 5/8 and 26 1/4 inches. The fit of the desks was recorded as yes (appropriate), short, or tall. Of the measured subjects, the desk fit was recorded as "appropriate" for 21.0%, short for 0.7%, and tall for 77.9%. (See Appendix M for a description of the fit criteria.)

Procedure

To construct the MA-DED table for the maximum available desk-to-eye distance at Side desk and Across desk, measurement of each subject was made at each style of desk using the following steps:

1. Best-fit chair was determined from among the three sizes suggested for use in Grades 1 and 2 by chair manufacturers.
2. One best-fit desk was determined from two side-storage desks (Side desk), and one best-fit desk was determined from two across-storage desks (Across desk) from among the sizes suggested for use in Grades 1 and 2 by desk manufacturers.
3. Each subject was seated in the best-fit chair at the best-fit desk and instructed to "sit like the child in the illustration", to hold the pencil as if to write, and to place the point of the pencil on the intersection of the target cross.
4. The illustration was shown again to the subject, and a demonstration given of taking the MA-DED and a trial MA-DED measurement were made for each subject.
5. Instructions, demonstration, and trial measurement were repeated up to two additional times for subjects who were unable to follow directions or maintain the illustrated posture and pencil grasp.
6. The MA-DED measurement was taken from the bridge of the student's nose to the placement of the pencil point on the intersecting arms of the target. The target (a + with arms ¾ inch long) was attached to the desk so the intersection of the arms was in the middle (front to back and side to side) of the

desk, with the bottom of the unlined page even with the edge of the desk nearest the subject's body. This position is the positioning described and illustrated in the handwriting texts for Grades 1 and 2.

7. The MA-DED was recorded on the measurement in which the subject followed the directions and held the posture and position during the measurement, or on the second repeat of the protocol.

The means and standard deviations of the Side and Across MA-DEDs were computed for each 6-month 1-year, 2-year, 3-year, and 4-year age group. These values are presented in Table 12, Chapter IV. The values for the remeasured Side and Across means and standard deviations for grade or sex are presented in Table 26 and Table 27, Appendix Q. The cells which have an n smaller than the number of variables being studied are excluded from the findings. Smaller age groups in which $n < 5$ are excluded from the findings for age or age/grade spans. The subjects excluded in these findings are included in the cells for larger age spans with $n > 5$, thus not being lost to the study.

Cells for grade levels allowed the inclusion of all subjects (see Table 26, Appendix Q). Separate means and standard deviations for boys and girls for each grade group are given in Table 23, Appendix Q. Separate means and standard deviations for each 1-year age-by-grade group are given in Table 24, Appendix Q. Separate means and standard deviations for age-by-sex are given in Table 25, Appendix Q.

Interpretation of the MA-DEDs

The MA-DED scale has only a quantitative interpretation. it contains means and standard deviations for five age spans: 6-month (young = year plus 0 – 5 months, old = year plus 6 – 11 months); 1-year (ages 6, 7, 8, and 9); 2-year (ages 6 + 7, and 8 + 9); 3-year (ages 6 through 8, and 7 through 9); and 4-year (ages 6 through 9). The age spans include subjects of those ages who are in any one of the four grade levels: Grades 1^1, 1^2, 2^1, and 2^2 (see Table 12, Chapter IV). The scale also contains means and standard deviations for grade (see Table 22, Appendix Q). Each grade span includes all subjects younger than 10 years old who were enrolled in each grade level or span (1^1, 1^2, 2^1, 2^2, 1^{1+2}, 2^{1+2}, and $1^{1+2} – 2^{1+2}$). Additional scales are provided for sex by grade, age by grade, and age by sex (see Table 24, Table 25, and Table 26, Appendix Q).

Statistical Properties of the Scale

Standard Error Measurement

The standard error of measurement (se_m) is a function of the reliability coefficient and the variability of scores for a particular age group. It provides an indication of the confidence in making judgments about the true maximum available desk-to-eye distance for children of ages or in grades shown on the scale. The se_m or standard deviation (SD) indicates the limits of a band of error around a MA-DED measurement. Table 12, Chapter IV, and Table 22, Table 23, Table 24, and Table 25, Appendix Q, present the standard deviations

of the MA-DED measurements. The standard deviation of +/-1.745 inches for the Side MA-DED mean at age Y6 indicates that the chances are about 95 in 100 that this mean is within +/-1.745 inches of the true measurement. The true measurement is the average of measurements that would be obtained for a child if the child were measured many times and if other effects could be ruled out. The smaller the standard deviation, the more reliable the measurement.

The standard deviation of the MA-DED varies across the age groups, across grade levels and spans, and across styles of desks. The range of measured means also varies across age groups, grade levels and spans, and sex for both styles of desks (see Table 12, Chapter IV, and Table 22, Table 23, Table 24, and Table 25, Appendix Q).

Stability

It is difficult to assess the reliability of the MA-DED across time because of the possible effect of physical growth. Therefore, remeasurement was made of two groups from fall to spring (Time 1), a period of 4 months, and spring to fall (Time 2), a period of 8 months, for a total of 151 children (105 anglo; 46 non-anglo) (see Table 26, and Table 27, Appendix Q). Tests were made for significant differences between the means for each Time group. The absolute differences of means (in inches) for the Side MA-DED were 0.0156 (Grade 1^1) and 0.0486 (Grade 2^1) for Time 1 and 0.4618 (Grade 1^2) for Time 2. The absolute differences of means for the Across MA-DED was 0.7474 (Grade 1^1) and 0.2893 (Grade 2^1) for Time l and 0.0892 (Grade 1^2) for Time 2. The variation in the lengths of Time I and Time 2 was brought about by the summer vacation and the end of the school year intervening in Time 2, and the measurement schedule. The schedules were arranged by the principals to be compatible with other activities at each facility.

Differences Between the Side and Across MA-DEDs

The size of the difference between the Side and Across MA-DED means which is required for statistical significance is small. An examination of the absolute difference found to be significant was approximately 1/2 inch or less in length. The dioptric equivalent of this absolute difference varies according to the distance of the target from the eyes. The linear range equivalent of the one-diopter difference between two and three diopters for the emmetrope (individual with optimal vision) is 7 inches (20 to 13 inches) but is only 1/2 inch (5 to 4 1/2 inches) for the one-diopter difference between eight and nine diopters. The dioptric accommodation range required for the 2-inch reading range difference in Borish's (1970) 16- to 14-inch reading range is +0.34 D. but the dioptric accommodation reading range required for the 2-inch difference between 6 and 4 inches is 3.34 D (Hurst, 1964).

Intercorrelation with Other Measurements

There have been no other measurements made of the maximum available desk-to-eye distance for children in Grades 1 and 2. Hurst (1964) determined the working distances of children in Grades K-8 when writing and

when reading a book at their desks. It is not appropriate to assume the maximum available distance desk-to-eye distance is always a student's working distance, but the appropriate mean MA-DED is probably be the best approximation available.

General Measuring Considerations

The MA-DED was developed for use with children aged 6 through 9 years, or in Grades 1 and 2. The scale might also be applied, however, to children in grades other than Grades 1 and 2 or of ages older than 6 through 9 when both the height and weight of the individual falls within the height and weight norms of children in Grades 1 and 2 or the height and weight norms of children aged 6 through 9. This could be considered because the child would likely be of a size or physique similar to that of the target population. The study cited a child's size or physique as affecting the size of best-fit chair and desk, which in turn was considered to affect the maximum available desk-to-eye distance.

Standard Procedure

When a MA-DED is to be determined for children in Grades 1 or 2 or of an age within the 6 to 9 year span, the conditions should be identical in regard to the placement of the target, type of target, and the presentation of an illustration depicting writing posture appropriate for the style of writing being used in the classroom. The intention of the MA-DED scale is to provide a minimum standard against which near viewing distances may be compared when determining the generalizability of a finding made by a researcher, or may be used when designing investigations that employ reading or writing at a desk, screening vision, examining vision, or determining possible optical aids to be used. In the case of examining vision and determination of optical aid, however, it is more appropriate to determine the individual's actual working distance at his or her school desk/work surface and employ that distance in evaluating the need for optical aid for near distance work.

Intended Use of the MA-DED

The MA-DED scale provides a standard that can be used to determine whether the near viewing distances used in the past investigations and norms of visual elements are appropriate for Grades 1 and 2 and ages 6 through 9 years. If the difference between the viewing distance used and the MA-DED for a given age or grade is significant, there is a need to establish norms of the visual element using a distance no greater than the maximum available desk-to-eye distance for the given age or grade. The availability of the MA-DED scale also provides one standard for near viewing distance that can be utilized in designing reading experiments. A MA-DED might be the only viewing distance used, or one of several reading distances used in replication of earlier studies which incorporated greater reading distances. The intention would be to determine if the same findings will result at viewing distance equal to, shorter than, or longer than the appropriate MA-DED.

Validity of the MA-DED

The internal validity of the study was viewed in terms of an individual's desk-to-eye distance being different for Side and Across MA-DEDs and not in terms of the significance between the means. In the raw data, 21 of the 1,135 subjects had no difference between the Side and Across MA-DEDs, and 110 subjects had an Across MA-DED which was longer than the individual's Side MA-DED. This latter finding was unexpected, in that the Side desk with its absence of the storage area between the subject's thigh and the desk top allows the Side desk to be shorter than the Across desk when each has the same clearance above the thighs. Theoretically, this would allow the MA-DED to be greater for the Side desk.

The time lapses for Time 1 and Time 2 were not the same, although each group had the remeasurement made the semester immediately following the semester of measure. Time 1 was fall to spring, a period of 4 months. Time 2 was spring to fall, a period of 8 months across the summer vacation and the end of the school year.

External validity could not be controlled. It is felt, however, that the external validity is good due to the procedure followed:

1. All public school districts within the geographic boundaries of Education Service Center Region X were invited to become participants.
2. All elementary schools within a participating district were eligible to become participants.
3. Parents of all students enrolled in Grades 1 and 2 in the participating schools were asked to grant permission for their children to become participants.
4. A parochial school in an inner-city neighborhood was included in the study.
5. No education placement excluded a student as a subject.
6. No lower age limit was set, and the upper age limit (< 10 years) was set high enough to included retained students.
7. There was representation of each of the given ethnic groups.

Therefore, it is felt that each student enrolled in the public schools within the geographic boundaries of Region X had equal opportunity to become a subject in the study. The inclusion of all students given permission to participate indicates that the finds may be generalized to the larger target population of students who are enrolled in Grades 1 and 2, and are of the ages of the subjects, that is, 6 through 9 years of age.

Appendix O:

Legend of Acronyms

Legend of Acronyms in Tables	
1^1	Grade 1, first semester
1^2	Grade 1, second semester
2^1	Grade 2, first semester
2^2	Grade 2, second semester
@	about, approximately
/	Or (when not used as part of linear measurement)
+D	plus diopters

AA	all ages
AC	all children
ANY	any grade
AR	administrative rule
ARP	all students with reading problems
BC	with behavior change
CB	complete battery
CH	local choice
D_A	diopter equivalent for given Across MA-DED
D_{AFL}	Sum of D_A and D_{FL} lens powers
DE	driver's education
D_{FL}	Fogging lens power used to screen for hyperopia
DGG	failed screening, but didn't get glasses
D_S	diopter equivalent for given Side MA-DED
D_{SFL}	sum of D_S and D_{FL} lens powers
EG	even grades
FL	fogging lens: used to screen for hyperopia
FPS	failed past screening
FSLY	failed screening last year
G	Guidelines
GNS	grade not specified
HR	high risk cases
HRM	high risk: mental retardation, Down's Syndrome, cerebral palsy, hearing impaired/deaf, diabetes
K	Kindergarten
L	Legislated
LD	learning disability
LP	learning problems, including dyslexia or reading difficulties
M	Mandatory
MA-DED	Maximum available desk-to-eye distance
MCT	modified clinical technique
MEM	monocular estimate method of retinoscopy
MVT	Massachusetts Vision Test
N	No
NE	new enrollees
NI	not implemented

NPSE	Nonpublic, certified regular, or special education facility
NPVS	nearpoint vision screening
NS	not specified
NSHI	no screening of hyperopia indicated
OG	Odd grades
P	by policy
PNS	power not specified
R	recommended
RG	by regulations
RPG	repeating a grade
RT	referred by teacher
SC	special conditions
SE	special education
SF	scholastic failure
SN	Snellen, far only
SP	special populations
SR	self-referred
T1	Time 1 (4 months) remeasured Grade 1^1 and 2^1
T2	Time 2 (8 months) remeasured Grade 1^2
TDNPVS	target distance used for nearpoint vision screening
TWR	if trouble with reading
UG	ungraded classes
VSM	vision screening machine
WG	wear corrective lenses (glasses)
Y	yes
YR	years of age

Appendix P:

Reply and Response Forms

[Principal's Reply Form]:

```
Maximum Available Desk to Eye Distance (MA-DED) Research:
School _____________________  Principal _________________
School District _______________ School Phone _____________
Scheduled measurement date _____________________________
Number of 1st graders ______ No. of Classrooms (1st) ______
Number of 2nd graders ______ No. of Classrooms (2nd) ______
Name of persons to contact concerning employment as helper:
```

_____ Phone _____
_____ Phone _____
Location for the 4 desks and 3 chairs to be used for the
_____
_____
_____
We would like to borrow 4-5 chairs or desks to use for the helper, the Field Assistant, and the children to sit in while they are waiting.
Address of the building, and directions for getting there:
_____
_____
_____
_____
Thank you for your help and cooperation.
Betty Ward School: 323-6600 or 6601
Doctoral Candidate call can be
Texas Woman's University &

[Principal's Response Form]:

Date_____
The _____ School District
(please check the ones which apply)
_____"will" be a participant in the MA-DED study.
_____wants more information on the MA-DED study.
Please contact by _____ mail _____ phone
Name_____
Address_____
_____
Phone _____-_____
_____contact the following persons to schedule the MA-DED study in the buildings: Grades 1 and 2
Name_____Title_____
School_____
Address_____
_____
Phone _____-_____
Name_____Title_____
School_____
Address_____
_____
Phone _____-_____
Name_____Title_____
School_____
Address_____
_____

Appendix Q:

Tables

Table 16:
Inquiry Responses, 1985-86: Near Tests and Target Distances

Test	Distance (in inches)	State	N
Corneal Light Reflection	DNS	GA, MO[a], NC	3
"	12-13	TX[a]	1
"	12-18	CO	1
"	@13	MD	1
"	13	MI	1
"	13-14	FL[a]	1
"	13-16	LA	1
"	at arm's length	KS, MN	2
Cover/Uncover	DNS	GA, MO[a], NH[a], TX[a]	4
Cover	reading position[d]	CA	1
Alternating	12	NC	1
Cover	12-18	CO	1
"	13	LA	1
"	13-14	FL[a]	1
"	14	DE, NJ[a], NM	3
"	@14	MD	1
"	14-16	MI	1
"	at arm's length (14-16)	MN	1
"	14-20	KS	1
"	15	OH	1
"	15-18	DC	1
"	16	TN	1
"	at reading distance	SC	1
Muscle Balance	DNS	AR, DE, IL, NH, NJ[a], NC, PA, TX[a], VT, WV	10
"	14	NM	1
"	16	OH	1
Near Acuity	DNS	AZ[a], CO, MI, VT, WV	5
"	12-14	OH	1
"	13-16	KS	1
Near Phoria	DNS	IL, TX[a], VT	3
"	16	OH	1

"	at reading distance	MI	1
Nearpoint Accomodation	14[a]	CA	1
Nearpoint Convergence	5-8[a]	NH	1
"	10[c]	CA[a]	1
"	12-16[c]	KS	1
"	13-16[c]	LA	1
Plus Diopter Fogging Lens	far distance	AZ, AR, CA[ah], CO, DE, FL, IL, IN, KS[h], LA, MD[h], MA[h], MI, MN[ah], MS, NE[a], NH, NH[ah], NM[a], NY[i], OH[h], PS[h], SC[h], TN, TX[a], VT, WY	27
Strabismus	average reading distance	AZ	1
Titmus Fly	DNS	AZ, CO, NM, TN	4
"	16	DE, KS	2
"	@16	MD	1
Worth Dot Test	DNS	KS, NJ[a]	2
"	13-16	TN	1
"	@14	DE	1
"	14-16	MD	1
"	60[a]	MN	1
"	intermediate distance[e]	TN	1
Vision Screening Machine[g]		AR[a], AR, CT[a], DE[ah], FL[ah], GA[ah], HI[h], IL, KS[ah], LA, MD[ah], MA, MI[a], MN[ah], MO[ah], NM[a], NJ[ah], NC, ND, PA[a], TN[a], TX[a], VT[a], WV[a]	24

NOTES	
a	Optional;
b	Criteria near distance;
c	Starting distance, move inwards;

d	Distance and angle not specified;
e	No equivalent distance given
f	Near distance varies among screening machines;
g	Some states limit use to far setting;
h	Limited as to age and grade;
i	After passing far tests.

Table 17:
Inquiry Responses, 1985-86: Status of Vision Screening

State	Status of Vision Screening	Near Tests	Grades Screened	Special Population(s)	Special Conditions(s)
AK	L[a]	NS	- - -	- - -	- - -
AL	L, P	NS	AC	- - -	- - -
AR	RG, G	Y	NI	- - -	- - -
AZ	R, G	Y	K/1, 3, 4, 6, 8, 10, 12	SE	LD
CA	L, G	Y	K/1, 3, 6, 9/10	- - -	NE, RT
CO	L, G	Y	K/1, 3, 5, 7, 9	SE	NE, RT RPG, DGG HR
CT	L	N	K-6, 9	- - -	- - -
DC	NS, G[b]	Y	K, 2 ,3, 6, 8, 10, UG	- - -	NE, RT
DE	NS, G[b]	Y	K/1, 3/4, 5, 8, 10/11	- - -	NE, RT, DE
FL	L, G[b]	Y	K-3, 5/6, 7/8 9/10, 11/12	- - -	NE, RT, BC, LD
GA	L, G[b]	Y	M:(K/1), R:(3) 5/6, 8/9, 10/12	- - -	NE
HI	L, G[b]	N	K-3, 4-6, 7, 10	SE	- - -
IA	CH	CH	- - -	- - -	- - -
ID	R, G[a], CH	NS	1,3,5,7,9,11	- - -	NE, RE RT, RS
IL	L, G[bc]	Y	(K/1, 5, 9)[e]	SE[e]	NE, RT
IN	L[b], G	MCT[b]	1,3,8	- - -	NE, RT
KS	L, G[a]	Y	K-1, 3, 5, 7, 9, 11	SE	NE
KY	RG	CH	K/1	- - -	NE

LA	L, G[b]	Y	K, 1, 3, 5, 7, 9, 11	- - -	RT, NE
MA	L, G[b]	Y[b], MVT	K-4, 6 (7, 9, 11) or (8, 10, 12)	- - -	NE, SE, RT, BC
MD	L, G	Y	K/1, 4, 5/6, 9	NPSE	NE, SE
ME	L, G[b]	NS	K, 1, 3, 5, 7 9, 11[e]	- - -	RT, NE, RS
MI	L, G[b]	Y	1, 3, 5, 7 (9-11)/DE SN: EG	- - -	SRD
MN	R, G[b]	Y	K, 1, 3-5, 7, 10	SE	NE, HR
MO	R, G[b]	NS	K, 1, 3, 5 7, (9-11) 10	SE	NE, RT
MS	RG, G, CH	CH	1, 4 CH R:(1-12)	- - -	- - -
MT	R[b], CH	NS	CH	- - -	- - -
NC	L, P, G	Y	K-3 5, 8, 11	- - -	RT
ND	R	Y	K-6	DE	NE, RT LD, BC
NE	L	NS	AC	- - -	NE, RT
NH	R, G[b]	Y	K-12	- - -	- - -
NJ	R, G[ab], CH	Y[d]	K/1, 2, 5 8, 10/11	DE	LP, HR, RT, NE, SF
NM	R, G	Y[b]	K, (6-12)[e] SN:(1-5)	SE	NE
NV	L[b], CH	CH	K, 4, 7, 8, 10	SE,NE	RT, FSLY HR, LP
NY	L, G[b]	NS	K-12	DE,SE	SR, NE, RT HR, LP
OH	L, G[b]	Y	R:([K/1]/3) 5, 7, 9	- - -	RT, NE
OK	CH	CH	- - -	- - -	- - -
OR	AR, G	N	K-8, 10, 12	- - -	- - -
PA	L, G, CH	Y	AC	- - -	ARP
RI	L, G	Y	AC	- - -	RT, NE
SC	R, G	Y	K, OG	SE	NE, RPG, PB FPS, HR

SD	CH	CH	CH	- - -	- - -
TN	L, G	Y	K, 1-3[g] 4-8[h]	- - -	- - -
TX	L, G[b], AR	R	K/1, 3, 5 7, 9	SE	NE, RT
UT	L, RG	N	R:(K, 3, 7) O/DE	DE, SE	RR, ARP
VA	L, R, G	N	R:(K, 3, 7, 10)	- - -	NE, RT
VT	L, G[b]	Y	K-3, 5, 7, 9/10	SE	SR, HR, NE RPG, FSLY RT, WG
WA	L	N	K, 1, 3, 5, 7, 10	- - -	NE, RT
WI	L, AR, CH	NS	K-2, 5, 8, 10/11	DE	SF, NE, RT RPG, HRM, LP
WV	L, R, G[b]	Y[b]	R:(1, 2, 3, 5, 7, 10)	DE	NE
WY	R[be]	NS	P, 1-2	- - -	- - -

NOTES	
a	Not yet funded or implemented;
b	Optional;
c	Limited as to age and/or grade;
d	Chicago's version accepted;
e	Students enrolled in public, private, parochial, or independent schools;
f	Recommended;
g	Sent only these proposed changes; present status not known
AC	all children;
AR	administrative rule;
ARP	all students with reading problems;
BC	with behavior change;
CB	complete battery;
CH	local choice;
DE	driver's education;
DGG	failed screening, did not get glasses;
EG	even-numbered grades
FPS	failed past screening;
FSLY	failed screening last year;
G	guidelines;
HR	high risk cases;

HRM	high risk: mental retardation, Down's syndrome, cerebral palsy, deafness, diabetes;
K	kindergarten
L	by legislation;
LD	learning disability;
LP	learning problems, including dyslexia or reading difficulties;
MCT	modified clinical technique;
MVT	Massachusetts Vision Test;
N	no;
NE	new enrollees;
NI	not implemented;
NPSE	nonpublic, cerified regular or special education facility;
NS	not specified;
OG	odd-numbered grades;
P	by policy;
PB	premature birth;
R	recommended;
RG	by regulation;
RPG	repeating a grade;
RT	referred by teacher;
SC	special conditions;
SE	special education;
SF	scholastic failure;
SN	Snellen, far only;
SR	self-referred;
Y	yes;
WG	wears glasses;
>	Older than;
/	or;
-	through;

Table 18:
Excerpts from TEA Statistical Brief SB81SAR: Annotated Definitions of Terms

Category Number	District Category	Description
1	Major Urban	The largest school district(s) located within the central city of each of the state's six largest Standard Metropolitan Statistical Areas (SMSA's), (i.e. Austin,

		Corpus Christi, Dallas/Fort Worth, El Paso, Houston, and San Antonio). SMSAs are defined by the U. S. Bureau of the Census.
2	Other Central City	Districts which are considered by TEA to be the "most central" to the state's remaining SMSAs.
3	Suburban - Fast Growing	Generally, suburban districts of 1,000 or more refined ADA which grew at least five percent (5%) from 1970-75 and some smaller suburban districts which displayed rapid growth for the same period.
4	Suburban - Stable	Suburban districts which are similar to those in the previous category but which do not demonstrate high ADA growth rates.
5	Non-metro With 1000+ ADA	Districts which have more than 1,000 refined ADA and which are not included in the previous categories.
6	Non-metro With Town	Districts which have 1,000 ADA or less than 1,000 ADA and which encompass a town having a population of approximately 1,000 or more.
7	Rural	Districts which have less than 1,000 ADA and which have no central town within their boundaries.

Table 19:
Participating Public Schools:
Texas Education Agency Category Analysis, 1985-86

Name of School District (ISD)	TEA Category[a]	Refined Average Daily Attendance	Percentage of Minorities	Highest Tax Category[b]	Density[c]	Number of Participating Schools
Carrollton - Farmers Branch	Suburban - Stable	13,389	20-30	business	100+	3
Celeste	Rural	369	< 10	land	5-20	1
Community (Nevada)	Rural	747	10-20	resident	20-100	1
Coppell	Suburban - Fast Growing	1,554	10-20	land	20-100	2
Ferris	Non-metro (Town)	1,061	50-75	resident	5-20	1
Pottsboro	Rural	862	< 10	resident	5-20	1
S and S Consolidated (Southmayd and Sadler)	Rural	589	< 10	oil and gas	< 5	1
Savoy	Rural	289	< 10	business	5-20	1
Wylie	Non-metro (1,000+ ADA)	1,777	< 10	resident	20-100	1

NOTES

a	See Table 18, Appendix Q for a description of TEA categories;
b	As determined by the State Property Tax Board;
c	Number of students per square mile;

Table 20:
Participating Parochial School

Name	Enrollment	Percentage of Minorities	Density (City)[a]	Grades Taught
St. Phillip's School	116	100[b]	100+	Preschool 1-3

NOTES

a	Based on Texas Education Agency report for the City of Dallas, Texas
b	The minority percentage for the City of Dallas is 75+

Table 21:
Description of Equipment Used in the Study

Chair		Desk
	American Desk Manufacturing Company Dallas, Texas 76501	
0506-F20-13-DOO Quadraline 111/2 "		1308-W02-10-D-00 Jr. Exec. Adj. RH 22-29" side book box
0506-F50-13-DOO Quadraline 131/2 "		1107-L0D-O0-V-00 Open Front RH 22-29" Quadraline Open Front
1610-ARD-13-D-DO Student Chair Duraline 151/2 "		1020-WOO-23-D-00 Utility Table 23 " Non- adjustable walnut
	Carter Craft Division Smith System Manufacturing Company P.O. Box 415 Plano, Texas 75074	
SMO2001 (15 1/2")		SMO1310 RH
SMO2002 (13 1/2")		SMO1330 21-29" Side Book Box

SMO2003 (11 1/2")		SMO1330 21-29" Open Front

Table 22:
Maximum Available Desk-to-Eye Distance (MA-DED) Means by Grade and Desk Style

Grade Level		Side Desk			Across Desk	
	N	Mean	SD	N	Mean	SD
		Single Semester				
1^1	197	12.749	1.453	197	11.619	1.572
1^2	381	13.456	1.774	381	11.493	1.627
2^1	194	13.308	1.358	194	12.384	1.576
2^2	363	14.441	1.704	363	12.305	1.640
		Full Grade				
1^{1+2}	578	13.215	1.665	578	11.536	1.608
2^{1+2}	557	14.046	1.584	557	12.333	1.618
		Total				
1^{1+2} + 2^{1+2}	1,135	13.623	1.625	1,135	11.927	1.613

Table 23:
Maximum Available Desk-to-Eye Distance (MA-DED) Means by Sex, Grade, and Desk Style

Grade Level		Side Desk			Across Desk	
	N	Mean	SD	N	Mean	SD
Boys						
1^1	73	12.673	1.24	73	11.505	1.45
1^2	180	13.305	1.82	180	11.389	1.69
1^{1+2}	253	13.122	1.65	253	11.423	1.62
2^1	79	13.231	1.44	79	12.405	1.58
2^2	178	14.287	1.76	178	12.209	1.72
2^{1+2}	257	13.460	1.66	257	12.270	1.68
1-2	510	13.545	1.66	510	11.851	1.65
Girls						
1^1	124	12.693	1.56	124	11.607	1.64
1^2	201	13.598	1.74	201	11.609	1.56

1^{1+2}	325	13.253	1.67	325	11.608	1.59
2^{1}	115	13.371	1.32	115	12.388	1.60
2^{2}	185	14.625	1.68	185	12.414	1.62
2^{1+2}	300	14.144	1.54	300	12.404	1.61
1-2	625	13.681	1.61	625	11.990	1.60

Table 24:

Maximum Available Desk-to-Eye Distance (MA-DED) Means by Age, Grade and Desk Style

Grade(s)		**Side Desk**			**Across Desk**	
	N	**Mean**	**SD**	**N**	**Mean**	**SD**
Age 6						
Grade 1^{1}	113	12.600	1.45	113	11.502	1.68
Grade 1^{2}	153	13.134	1.66	153	11.076	1.63
Grade 2^{1a}	---	---	---	---	---	---
Grade 2^{2a}	---	---	---	---	---	---
All	268	12.911	1.159	268	11.259	1.66
Age 7						
Grade 1^{1}	79	12.866	1.42	79	11.736	1.39
Grade 1^{2}	196	13.599	1.79	196	11.800	1.54
Grade 2^{1}	120	13.138	1.35	120	12.266	1.51
Grade 2^{2}	151	14.205	1.64	151	11.965	1.71
All	546	13.599	1.67	546	11.939	1.57
Age 8						
Grade 1^{1a}	---	---	---	---	---	---
Grade 1^{2}	29	14.246	1.86	29	11.793	1.62
Grade 2^{1}	67	13.593	1.37	67	12.599	1.70
Grade 2^{2}	196	14.654	1.66	196	12.543	1.58
All	297	14.326	1.70	297	12.447	1.63
Age 9						
Grade 1^{1}	---	---	---	---	---	---
Grade 1^{2a}	---	---	---	---	---	---
Grade 2^{1a}	---	---	---	---	---	---
Grade 2^{2}	15	14.033	2.73	15	12.691	1.82
All	24	14.797	2.62	24	12.266	2.00

NOTES

a	No central tendency statistics available; fewer than 10 children.

Table 25:

Maximum Available Desk-to-Eye Distance (MA-DED) Means by Age, Sex and Desk Style

Grade(s)		Side Desk			Across Desk	
	N	Mean	SD	N	Mean	SD
6 Years						
Boys	107	12.833	1.46	107	10.896	1.60
Girls	161	12.965	1.62	161	11.493	1.65
All	268	12.911	1.59	268	11.259	1.66
7 Years						
Boys	224	13.415	1.60	224	11.882	1.53
Girls	322	13.661	1.58	322	11.986	1.57
All	546	13.599	1.67	546	11.939	1.57
8 Years						
Boys	163	14.236	1.63	163	12.385	1.63
Girls	134	14.434	1.54	134	12.528	1.55
All	297	14.326	1.70	297	12.447	1.63
9 Years						
Boys	16	13.055	2.72	16	12.196	2.17
Girls	8	15.281	1.26	8	12.406	0.43
All	24	13.797	2.62	24	12.266	2.00

Table 26:

Maximum Available Desk-to-Eye Distance (MA-DED) Means by Sex and Desk Style

(Time 1 and Time 2)

Sex		Side Desk			Across Desk	
	N	Mean	SD	N	Mean	SD
Boys	66	12.939	1.47	66	11.941	1.66
Girls	85	13.154	1.56	85	11.878	1.64
Both	151	13.060	1.52	151	11.906	1.65

Table 27:

Maximum Available Desk-to-Eye Distance (MA-DED) Means by GRade and Desk Style

Grade		Side Desk			Across Desk	
	N	Mean	SD	N	Mean	SD
Time 1						
1^1	48	12.518	1.51	48	11.326	1.70
2^1	54	13.220	1.21	54	12.234	1.42
1^1+2^1	102	12.890	1.35	102	11.807	1.55

Time 2						
1^2	49	13.416	1.70	49	12.112	1.71
Times 1 & 2						
$1^1...2^1$	151	13.060	1.52	151	11.906	1.65

Table 28:

Linear Range of Emmetropic Clear Vision for Given Accommodation, With No Reserve

Plus Diopters Accomodation	Plus Diopters +/-0.25 Range	Linear Range Centimeters	Linear Range Inches
1.00	0.75-1.25	133.00-80.00	52.49-31.50
1.25	1.00-1.50	100.00-66.67	39.37-26.25
1.50	1.25-1.75	80.00-57.14	31.50-22.50
1.75	1.50-2.00	66.67-50.00	26.25-19.69
2.00	1.75-2.25	57.14-44.44	22.50-17.50
2.25	2.00-2.50	50.00-40.00	19.69-15.75
2.50	2.25-2.75	44.44-36.36	17.50-14.32
2.75	2.50-3.00	40.00-33.33	15.75-13.12
3.00	2.75-3.25	36.36-30.77	14.32-12.11
3.25	3.00-3.50	33.33-28.57	13.12-11.25
3.50	3.25-3.75	30.77-26.67	12.11-10.50
3.75	3.50-4.00	28.57-25.00	11.25- 9.84
4.00	3.75-4.25	26.67-23.53	10.50- 9.26
4.25	4.00-4.50	25.00-22.22	9.84- 8.75
4.50	4.25-4.75	23.53-21.05	9.26- 8.29
4.75	4.50-5.00	22.22-20.00	8.75- 7.87
5.00	4.75-5.25	21.05-19.05	8.29- 7.50
5.25	5.00-5.50	20.00-18.18	7.87- 7.16
5.50	5.25-5.75	19.05-17.39	7.50- 6.85
5.75	5.50-6.00	18.18-16.67	7.16- 6.56
6.00	5.75-6.25	17.39-16.00	6.85- 6.30
6.25	6.00-6.50	16.67-15.38	6.56- 6.06
6.50	6.25-6.75	16.00-14.81	6.30- 5.83
6.75	6.50-7.00	15.38-14.29	6.06- 5.62
7.00	6.75-7.25	14.81-13.79	5.83- 5.43
7.25	7.00-7.50	14.29-13.33	5.62- 5.25
7.50	7.25-7.75	13.79-12.90	5.43- 5.08
7.75	7.50-8.00	13.33-12.50	5.25- 4.92
8.00	7.75-8.25	12.90-12.12	5.08- 4.77
8.25	8.00-8.50	12.50-11.76	4.92- 4.63

Table 29:

Inquiry Responses (1985-86), Screening for Hyperopia by State: Fogging Lens Power at Given Grade(s) or Age(s)

State	Fogging Lens Power	Grade(s)	Age(s)
AL	NHSI	---	---
AK	NHSI	---	---
AR	1.75	NS	NS
AZ	1.75	K-1[a]	NS
CA	1.00	9-12	NS
"	1.50	6-8	NS
"	2.00	1-5	NS
"	2.25	K	NS
CO	PNS[b]	NS	NS
CT	NHSI	---	---
DE	1.75	3-up	NS
"	2.25	K-2	NS
DC	NHSI	---	---
FL	1.75-2.25	K-1	NS
"	2.00	2-up	NS
GA	SM-PNS	NS	NS
HI	NHSI	---	---
ID	NHSI	---	---
IL	1.75	K/1, 5, 9	NS
IN	NHSI	---	---
IA	NHSI	---	---
KS	1.75	4-up	NS
"	2.25	K-3	NS
KY	1.75	---	---
LA	1.50/1.75	NS[c]	NS
ME	NHSI	---	---
MA	1.75	4-up	NS
"	2.25	K-3	NS
MD	1.75	NS	after age 7[d]
"	2.25	NS	after age 7[d]
MI	1.75	1-12	NS
MN	1.75	4-up	NS
"	2.25	1-3	NS

MS	2.00	NS	AA
MO	NHSI	---	---
MT	NHSI	---	---
NC	SM-PNS	NS	NS
ND	NHSI	---	---
NE	PNS	NS	NS
NH	1.50-2.50	1-4, 8, 10, 12	NS
NJ	PNS[e]	NS	NS
NM	2.25	1-12	NS
NV	PNS	NS	NS
NY	2.25	1	NS
OH	2.00	1/3	NS
OK	NHSI	---	---
OR	NHSI	---	---
PA	2.25	K-2	NS
RI	---	---	---
SC	1.75	K/1	NS
SD	NHSI	---	---
TN	1.75-2.25	NS	NS
TX	SM-PNS[b]	NS	---
UT	NHSI	---	---
VT	2.25	K-3	---
"	1.75	4-up	---
VA	NHSI	---	---
WA	NHSI	---	---
WV	SM-PNS	3-up	NS
WI	NHSI	---	---
WY	PNS	any, if trouble with reading[f]	NS

NOTES	
AA	All ages
NHSI	No hyperopia screening indicated
NS	Not specified
PNS	+D power not specified, but hyperopia screening is indicated

SM-PNS	screening machine, +D power not indicated
a	special education students at all grade levels
b	Optional
c	failure criteria vary according to grade
d	do not repeat once determined and recorded
e	reported as near-vision score
f	referred by teacher, any grade

Table 30:

Inquiry Responses (1985-86):
Hyperopia Screening by Grade, Age,
Special Conditions or Populations,
States, and Frequency

Grade	Age	Special Conditions or Populations	Fogging Lens Power +D	States	N
K	NS	NS	2.25	CA[a]	1
K/1	NS		1.75	IL[a], SC	2
K-1	NS	SE-AG	1.75	AZ	1
K-2	NS	NS	2.25	DE[a],PA	2
K-3	NS	NS	2.25	KS[a],MA[a],VT[a]	3
K-12	NS	NS	2.25	NM	1
1	NS	NS	2.25	NY	1
1/3	NS	NS	2.00	OH	1
1-3	NS	NS	2.25	MN	2
1-5	NS	NS	2.00	CA[a]	1
1-12	NS	NS	1.75	MI	1
2-up	NS	NS	2.00	FL[a]	1
3-up	NS	NS	1.75	DE[a]	1
3-up	NS	NS	VSM-PNS	WV	1
4-up	NS	NS	1.75	KS[a],MA[a] Mn[a], VT[a]	4
5,9	NS	NS	1.75	IL[a]	1
6-8	NS	NS	1.50	CA[a]	1
9-12	NS	NS	1.00	CA[a]	1
ANY[c]	NS	ITWR[c]	PNS	WY	1
NS	> 7[b]	NS	1.75	MD[a]	1
NS	> 7[b]	NS	2.25	MD[a]	1
NS	NS	NS	PNS,O	CO	1

NS	NS	NS	PNS	NE,NV,NJ[d]	3
NS	NS	NS	1.75-2.25	FL[ae],TN	2
NS	NS	NS	1.50-2.50	NH	1
NS	NS	NS	1.75	AR	1
NS	NS	NS	2.00[d]	MS	1
NS	NS	NS	1.50/1.75[f]	LA[g]	1
NS	NS	NS	VSM-PNS	GA,NC	2
NHSI[h]	NHSI[h]	NHSI[h]	NHSI[h]	AL,AK CT,DC HI,ID IN,IA KY,ME MO,MT ND,OK OR,RI SD,TX UT,VA WA,WI	22

NOTES	
a	State has more than one power of fogging lens
b	Once determined and recorded, do not repeat
c	If trouble with reading
d	Fogging lens discontinued in 1987
e	Recorded as a near vision score
f	Other power may have specified grade
g	Alternate power
h	no hyperopic screening indicated
AG	All Grades
ANY	Any grade
ITWR	If Trouble With Reading
NHSI	No Hyperopic Screening Indicated
NS	Not Specified
PNS	Power Not Stated
SE	Special Education
VSM	Vision Screening Machine

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