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ANALYSIS OF ACCURACY OF SPELLING IN WRITTEN COMPOSITIONS OF ELEMENTARY SCHOOL CHILDREN AND THE EFFECTS OF PROOFREADING EMPHASIS UPON ACCURACY

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ANALYSIS OF ACCURACY OF SPELLING IN WRITTEN COMPOSITIONS OF ELEMENTARY SCHOOL CHILDREN AND THE EFFECTS OF PROOFREADING EMPHASIS UPON ACCURACY

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CHAPTER I

INTRODUCTION

The need for accuracy in spelling asserts itself any time one individual wishes to communicate with another in writing. Whether one does his own writing or has his communication prepared for him, the effectiveness of the effort will depend to a considerable extent upon the degree of accuracy of the spelling in the composition.

Not infrequently schools are censured on the basis of letters of application or on-the-job performance when one's inability to spell has cost an employer time and money. Yet there is probably no other subject in the curriculum where high scores or ratings are given more consistently for performance than in spelling. This leaves much to be desired when an analysis is made of the end results of the spelling program.

Much worth-while research on spelling has been done during the past half century, but improvement has been slow. One of the chief difficulties seems to have been the failure to make the results of research and experimentation readily available to teachers. Horn stated:

> Shortcomings in the teaching of spelling are . . . due not so much to the absence of satisfactory evidence as to the lack of knowledge of existing evidence, to the failure to apply it intelligently, or to erroneous interpretations.[1]

This study was designed to involve a portion of the teaching personnel of one educational system in a form of experimentation for the following purposes: (1) to bring to the attention of teachers the results of research already done, and (2) to carry that research still further in an effort to find more effective means of achieving a goal of good spelling. Evidence of shortcomings in the present program, as well as possible worthy implications for improvement, when produced within the local school system will be more likely to receive favorable consideration than similar findings or recommendations from without.

The aims of spelling have been stated variously; however, there seems to be general agreement that the chief aim

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[1]Ernest Horn, "Research in Spelling," Elementary English Review, XXI (January, 1944), p. 6.

is to teach the learner to spell correctly the words he needs in writing. Fitzgerald states:

> The success of a spelling program cannot be measured by the number of difficult words the best speller in the class can spell orally. Its success must be evaluated rather by the effectiveness with which the ordinary child writes in the situations that call for written expression.[1]

Foran says, "Ability to spell dictated words will not guarantee the spelling of the same words in the writing of connected discourse." This he attributes to the concentration of one's attention on the meaning of what is being written, thus lessening the attention to such habitual activities as handwriting and spelling.[2]

Foran[3] and Fitzgerald[4] suggest the development of "spelling consciousness" as an objective of the spelling program. Hildreth suggests three aims which seem to apply specifically to the middle grades program of instruction in spelling and which summarize the statements of others on the subject. These are as follows:

1. To memorize the spelling of all commonly used

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[1]James A. Fitzgerald, The Teaching of Spelling (Milwaukee: The Bruce Publishing Company, 1951), p. 2.

[2]Thomas George Foran, The Psychology and Teaching of Spelling (Washington, D. C.: The Catholic Education Press, 1934), p. 189.

[3]Ibid., pp. 1, 6.

[4]Fitzgerald, op. cit., p. 24

words not clinched in the lower grades, and to learn other frequently used words, about 2500-3000 in all.

2. To continue to establish the habits that make for self-dependence in writing.

3. To practice spelling as a tool for writing.[1]

The second of these aims is especially important for the middle and upper grades because of the increasing amount and scope of context writing to be done. The pupils must develop increasing independence and self-responsibility for their own written work and should be expected to take more responsibility for correct spelling in writing and for checking their own work. Skill in checking written work will be referred to in this paper as the ability to proofread.

Perhaps the persons most closely associated with the problem of teaching proofreading are those who help in preparing students for jobs in business. Certainly the recent emphasis placed upon proofreading processes and activities in the business world would indicate a demand by business concerns that the office worker be better prepared for his job. Prior to World War II the Business Education World carried proofreading exercises entitled "World's Worst Transcript." These were discontinued during the war years but were reintroduced in 1947. The "World's Worst Transcript"

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[1]Gertrude Hildreth, Teaching Spelling (New York: Henry Holt and Company, 1955), pp. 167-68.

became tremendously popular not only as a teaching device but as an instrument of evaluation. Even business men found the exercises useful as employment tests and as aids for inservice training programs.[1]

Further evidence of the concern of employers over the poor spelling of employees is expressed in the actions of the Foundation for Business Education. Member clients of the Foundation are now promoting a program of controlled practice and testing in the skill of proofreading. They encourage the teaching of proofreading by making such services available for use in the business education classrooms, free of charge.

Watson points out:

> The efficiency and reliability of a commercial house may be judged by a prospective customer on the evidence of the correctness and accuracy of form in the letters it sends out. It is perhaps for this reason that so much pressure is brought to bear by the business world upon the schools in the matter of spelling. Little short of perfection is expected.[2]

Not only in the area of business is the skill of

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[1]Teachers' Service Department, "A Bright, Brand-New School Year," Business Education World, XXIX (September, 1948), p. 47.

[2]Alice E. Watson, Experimental Studies in the Psychology and Pedagogy of Spelling, Contributions to Education, No. 638 (New York: Bureau of Publications, Teachers College, Columbia University, 1935), p. 2.

proofreading important, however. Wherever and whenever it becomes necessary or desirable to communicate through the medium of writing, the skill of proofreading or the lack of such skill is a factor in the effectiveness of the communication.

Fitzgerald has suggested that "mastery of spelling is effected through active participation in real writing experiences and well-planned curriculum procedures, practices, and drills based upon worth-while materials."[1] Hildreth states that learning to spell requires the automatization of a set of habits. She identifies two of these; as, (1) habits of automatic response while writing, which includes recall of word-building principles and efficient habits of studying words so as to learn them, and (2) habits of checking the correctness of written work.[2] She contends that "the chief criterion of successful achievement in spelling is the extent to which the child can help himself achieve correct spelling."[3]

Fitzgerald affirms the necessity for the proper

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[1]Fitzgerald, op. cit., p. 7.

[2]Hildreth, op. cit., p. 26.

[3]Gertrude Hildreth, Learning the Three R's, 2nd ed. (Minneapolis: Educational Test Bureau, Educational Publishers, Inc., 1947), p. 511.

attitude and the ability of each individual to proofread his work. He states, "The individual pupil must develop a real desire to write correctly. Eventually, he must check his own writing and correct his own errors. He must assume responsibility for correct writing and for measures to correct that writing."[1]

The teacher must help the child to help himself. It is important that the pupil become more and more independent in learning and mastering basic skills as soon as possible. This is especially true in the area of spelling, which involves such a large number of items to learn and check.

Review of Related Studies

In an effort to report to classroom teachers the most important suggestions for the teaching of spelling which have been produced by research, Ernest Horn of the State University of Iowa has prepared a statement of the practical implications of research and offered recommendations which he believes to be soundly supported by research. In his brief review he suggested that:

> The advantages of good spelling ability and the disadvantages of poor spelling ability amply justify careful, systematic planning for helping pupils learn to spell correctly. This involves (a) the improvement of the

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[1]Fitzgerald, op. cit., p. 87.

> curriculum, including the selection of content and its grade arrangement, (b) the choice of efficient methods of teaching, and (c) the use of tests for guiding instruction and appraising its results.[1]

Research has shown many causes for poor spelling. Among those more generally recognized are poor study habits, inadequate mental control, and lack of motor coordination. Research has also indicated abilities and attitudes needed if one is to become a good speller and the role of motivation in the teaching and learning of spelling. These areas are treated in this review of research because of their close relationship to the study of proofreading as an aid to spelling.

The Relationship of Poor Study Habits to Spelling Achievement

In his study of the characteristics of good and poor spellers, Russell pointed out that the methods of study used by poor spellers were erratic. He found that words were frequently misspelled even though the child looked at them while spelling; that there was no definite check on writing; and that there was little or no concentration on the processes involved.[2]

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[1]Ernest Horn, Teaching Spelling, What Research Says to the Teacher, N.E.A. Bulletin No. 3 (Washington, D. C.: National Education Association Press, 1954), p. 3.

[2]David Harris Russell, Characteristics of Good and Poor Spellers, Contribution to Education, No. 727 (New York: Bureau of Publications, Teachers College, Columbia University, 1937), pp. 72, 73.

Fitzgerald concurred in the findings of Russell in indicating that many children used study techniques that were ineffective; that they lacked purpose and direction. He stated, "They do not spell carefully or write legibly; they do not apply or transfer spelling knowledge to their writing; they do not achieve independence in working out their spelling problems."[1] (Italics mine.)

Abernethy, reporting on eye movements in studying spelling, states that good and poor spellers "differ mainly in the more marked tendency of the good spellers to recognize difficulties and to make a systematic attack in studying words." She concludes by saying that "analysis of eye-movements probably needs to be supplemented by a more subjective method of analysis."[2]

Spelling errors may vary with the degree of ability of the pupil, his age, experience, and other conditions of learning. Foran says:

> Many of them are due to careless writing and failure to adopt a critical attitude in regard to written work. . . . It is not so much a question of inability to spell

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[1]Fitzgerald, op. cit., pp. 1, 2.

[2]Ethel M. Abernethy, "Photographic Eye Movements in Studying Spelling," Journal of Educational Psychology, XX (December, 1929), p. 701.

> some words as it is an indifferent attitude towards mistakes.[1]

The Relationship of Inadequate Mental Control and Poor Motor Coordination to Spelling Achievement

Book and Harter, in classifying the 18,804 mistakes in spelling found in 5,196 spelling tests and compositions of pupils from the second grade to students in colleges, attributed half the errors to inadequate mental control over the process of writing the words. The authors indicated that the pupils really knew how to spell the words in fifty per cent of the cases but made some mistake in the writing.[2] Although Foran asserts that the interpretation of the data and the classification of some of these errors may be challenged, he states that this classification is extremely suggestive and deserves consideration.

> If this classification is valid, a tremendous improvement in spelling could be produced through greater emphasis on care and on reviewing the writing of words. . . . Perhaps many of the difficulties attributed to spelling are produced by such interference as poorly developed writing habits contribute.[3]

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[1]Foran, op. cit., pp. 109, 110.

[2]William F. Book and Richard S. Harter, "Mistakes Which Pupils Make in Spelling," Journal of Educational Research, XIX (February, 1929), pp. 106-118.

[3]Foran, op. cit., pp. 99-102.

Mendenhall, in a study of spelling errors of pupils in grades one through six, obtained 280,000 spellings and classified the mistakes that were found in the spellings. Forty-eight per cent of the errors were due to substitutions of letters. The omission of a letter or letters contributed to 37.3 per cent of the mistakes. Errors due to the addition of a letter or letters accounted for 10.4 per cent, and transposition of letters accounted for 4.1 per cent.[1]

Watson attributes much misspelling to "temporary functional inadequacy of established habits" (a condition of stress, haste, illness, fatigue, preoccupation, excitement, etc.) which, under ordinary conditions, are known to be quite dependable. "These are usually classed as lapses or slips and are considered to be due to faulty sensory-motor coordination."[2] Hollingworth observed that some have a constant tendency to specific errors of these sorts and termed them "idiosyncrasies."[3] Book and Harter found approximately

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[1]James E. Mendenhall, An Analysis of Spelling Errors: A Study of Factors Associated with Word Difficulty (New York: Bureau of Publications, Teachers College, Columbia University, 1930), p. 8.

[2]Watson, op. cit., pp. 39, 40.

[3]Leta S. Hollingworth, The Psychology of Special Disability in Spelling, Contribution to Education, No. 88 (New York: Bureau of Publications, Teachers College, Columbia University, 1918), p. 40.

twenty per cent of the errors in their study to be errors of lapses or idiosyncrasies. These were evidenced by the omission of a letter or letters, produced by a lapse resulting from the tendency of the mind to forge ahead of the actual writing, with the result that a letter was omitted through a concentration of the attention on difficulties in advance. It was further indicated that anticipation of a letter or letters resulted in repetition and transposition of letters.[1] Foran states that "such errors of anticipation are common in typewriting as well as in handwriting and are clearly errors of writing rather than mistakes resulting from ignorance of the word spelled."[2] He further maintains that "such errors should be readily apparent to the writer if any review is made of what has been written, for it is not ignorance of the word or mere guessing that leaves such mistakes to disfigure the composition."[3]

Brendel, however, points out a problem which must be faced as one attempts to teach his pupils to review their work to see if errors have been made. He points out the importance of a proper mental attitude if one is to discover

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[1]Book and Harter, op. cit.

[2]Foran, op. cit., p. 99.

[3]Ibid., p. 100.

errors in his own work. He states:

> There is a human desire to succeed, which implies the human dislike to fail. To pupils, their errors indicate failure. They like to feel they are accurate typists, which is nothing more than a reflection of this success "bug." They "feel" they "know" when they make errors; therefore, when a typing job is finished, they "feel" it is accurate. This "knowing" and "feeling," however, set up a mental block which blinds them to the errors they make so that they see only what they want to see--correctly typed words.[1]

The same condition appears to hold true with letters and other compositions prepared in handwriting.

Hollingworth suggests that errors in spelling may be due to motor awkwardness and lack of coordination and to spontaneous lapses which are for the most part unconscious.[2]

Tidyman says:

> The more we become absorbed in thought and composition the less sure we are of the spelling of words. . . . We may regard a word as learned when it is used freely and with a high degree of accuracy in ordinary composition such as letter writing.[3]

And again:

> Our spelling has stopped short of actual mastery of words. . . . Spelling words in content is more than spelling words in isolation. . . . In contextual use the

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[1]Leroy A. Brendel, "Yes, They Proofread, If," Journal of Business Education, XXIX (March, 1954), pp. 241-43.

[2]Leta S. Hollingworth, "The Psychological Examination of Poor Spellers," Teachers College Record, XX (March, 1919), pp. 126-132.

[3]W. F. Tidyman, The Teaching of Spelling (Yonkers-on-Hudson: World Book Company, 1919), p. 39.

> attention is mainly given to thinking and the selection and placing of words. To be of practical value spelling must be carried to the point of free and accurate use in writing. . . . It seems wise to supplement regular drill work by the use of words in written sentences, dictation and the like.[1]

Studies Relating to Abilities and Attitudes Needed in Spelling

Hollingworth conducted a teaching and testing program with a class of fifteen pupils who were two years retarded in spelling but retarded in not more than one other subject. From this study she concluded that disability is not necessarily a function of the quality of general intelligence, that ability to spell correctly is a complex process, that the most extreme cases of disability differ only in degree of defect from children in general, and that there is no one specific remedy for poor spelling.[2]

In her study of the cause of chronic bad spelling, Carmen concluded that "ability to spell well . . . probably implies not a general habit or power of observation, but a special ability to notice small differences in words."[3]

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[1] Ibid., p. 213.

[2] Hollingworth, op. cit., The Psychology of Special Disability in Spelling, p. 100 ff.

[3] Kate E. Carmen, "The Cause of Chronic Bad Spelling," Journal of Pedagogy, XIII (January, 1900), p. 89.

Schonell, in a study of causes of spelling disability among educated adults, indicates that general emotional instability, general disregard for details, inferiority attitude toward spelling disability, and apathy with regard to disability account for much poor spelling.[1] Cole says, "Children's main defects of handwriting are due to particular mistakes on particular letters. . . . Only diagnosis will reveal the defects, only self-analysis will convince the pupil, and only individualized drill will provide a remedy."[2] Russell points out that handwriting relates to the spelling situation in the case of the child whose unclosed "a's" look like "u's," whose uncrossed "t's" look like "l's," etc.[3]

Research in the field of spelling reveals that the majority of authorities agree on certain types of ability which they consider closely related to spelling and which they believe condition spelling success. Those abilities are proofreading, word comprehension, handwriting, visual discrimination, and auditory discrimination.

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[1]Frederick J. Schonell, "Ability and Disability in Spelling among Educated Adults," British Journal of Educational Psychology, VI (June, 1936), pp. 123-146.

[2]Luella Cole, "A Successful Experiment in the Teaching of Handwriting by Analytical Methods," Journal of Psychology, I (1933-36), pp. 209-221.

[3]Russell, op. cit., p. 221.

Nichols found a positive correlation between spelling achievement and each of the types of ability listed above.[1]

The Relationship of Motivation to Spelling Achievement

In his review of what research says to the teacher about teaching spelling, Horn stresses the importance of motivation in bringing about the desired results. He states:

> How well a pupil learns to spell depends largely upon his interest. The nature and strength of his interest determine what he will undertake to do, how hard he will work, and how persistent he will be in his efforts.[2]

Horn suggests the following ways in which a classroom teacher can aid pupils to develop interests and attitudes which will bring about improvement in their spelling. Pupils can be led to appreciate the fact that spelling errors in letters and other written work make a poor impression and that the penalty for errors may be quite severe in certain types of writing, such as letters written in applying for jobs. Pupils should be helped to realize that the words they are studying are needed now as well as in the future and that it is important that they learn efficient methods for

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[1]Augusta M. Nichols, "The Analysis and Correction of Spelling Difficulties," The Elementary School Journal, L (November, 1949), pp. 154-161.

[2]Horn, op. cit., p. 19.

studying the spelling lesson. They must be convinced that they can improve; they need evidence of progress. Pupils should be encouraged to help set the goals and assume responsibility for learning to spell. They must be given abundant opportunities for writing on subjects of interest. "Pupils can be led to take pride in correct spelling in all written work and to proofread their writing for errors in spelling. . . . Mutual helpfulness is better than competition."[1]

Fitzgerald says:

> Each child needs some guidance in his efforts to become independent in the spelling and use of words. . . . Success is achieved through guided effort and interesting activities, and awareness of success is pleasant and motivating.[2]

Fitzgerald suggests further that some children are retarded in spelling because the motivation which is provided is either harmful or inane. It is the teacher's responsibility to provide reasonable motivation but that motivation must provide a goal and make it attractive.[3]

Foran recommends a definite goal, such as a number of words to be spelled correctly. He would have some form of competition in the teaching of spelling: competition with

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[1] Ibid., pp. 19, 20.

[2] Fitzgerald, op. cit., pp. 8, 9. [3] Ibid., pp. 29, 30.

one's own previous achievement, competition with the achievement and performance of someone else, competition with an objectively stated norm or standard. He would also encourage cooperation as a form of motivation. However, even in group activities he would have competition.[1]

Proofreading as an Aid to Spelling

Since accuracy in spelling depends so much upon the powers of observation it seems reasonable to suppose that many errors in written compositions would be discovered and corrected if a concerted effort were made with children to develop a systematic method of checking their work. Whether one communicates through the medium of typewriting or handwriting the effectiveness of his efforts will be determined to a large measure by his ability to detect and correct his own errors in spelling, punctuation, and grammatical usage.

If one is to experience a sense of freedom in expression and attention to thought, he must master the fundamentals of spelling and writing so that there will be no interference with the thinking process. However, in spite of the precautions taken to avoid spelling errors in writing, they cannot all be prevented. So, it is important to review what

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[1]Foran, op. cit., p. 155.

has been written to correct those errors which, for various reasons, may have been committed. With reference to the findings of Book and Harter, Foran states:

> The fact that the same types of errors are found in the writing of college students as in the second grade indicates the failure of the higher grades to develop habits and ideals of accuracy. . . . The cultivation of carelessness is furthered by all practices which tolerate it in any form whatever. It is the line of least resistance which will be taken unless there are powerful incentives to the irksome task of being careful in whatever work is being done.[1]

Dolch strongly advocates the formation of habits of proofreading and spelling analysis and insists that proofreading must be taught. He states that proofreading for spelling means looking at each word individually, disregarding for the moment what the sentences say.[2]

Coard recommends proofreading three times for accuracy; once for content, once for word correctness, and once for luck.[3] Cleary contends that "every student <u>can</u> learn to proofread."[4]

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[1] <u>Ibid</u>., pp. 103-104.

[2] E. W. Dolch, "Good Spelling Habits," <u>Secondary Education</u>, XII (November, 1945), pp. 7-8.

[3] Robert L. Coard, "Proofread, Proofread, Proofread!" <u>Journal of Business Education</u>, XXXIII, No. 1 (October, 1957), pp. 20-22.

[4] Joseph B. Cleary, "Let's Teach Proofreading," <u>Balance Sheet</u>, XXXVI (September, 1954), pp. 14-15.

Concerning business students Brendel writes:

> The pupil's initial desire to learn to proofread is unlike his initial desire to learn typewriting. In fact it is conspicuous by its absence; therefore, in addition to developing the know-how in proofreading, the teacher must also create a desire.[1]

Horn, referring to school children in middle and upper elementary grades, says they "are ordinarily not very good at proofreading, but the habit can be established and the ability improved thru practice."[2]

Rowe states:

> The skill of proofreading is based on awareness and alertness and can be developed much better by rewards and motivated activities than by grade penalties. So long as pupils are penalized for finding errors, they develop supernatural blindness; if they are rewarded for finding errors, they develop the skill we want them to have.[3]

Again, Rowe declares:

> In proofreading, pupils must develop the ability to look and <u>see</u>, must <u>want</u> to find every inaccuracy. They must read intently for . . . errors and misspellings; they must put into use their knowledge of grammar and punctuation; they must quickly distinguish between words that sound alike but have different meanings; they must read for sense and they must want to do these things.[4]

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[1]Brendel, <u>op. cit.</u>

[2]Horn, <u>op. cit.</u>, p. 13.

[3]Margaret Forcht Rowe, "Do Your Students Have Blind Spots?" <u>Business Education World</u>, XXIX (September, 1948), pp. 48-51.

[4]Margaret Forcht Rowe, "Why's and Wherefore's," <u>Business Education World</u>, XXIX (February, 1949), pp. 272-73.

She states further:

> In proofreading as in any skill, the state of perfection reached depends on the attention given to details and on motivated practice. . . . Teaching of proofreading requires giving attention to detail and exciting learners to strive for perfection.[1]

Horn, stressing the importance of continuous evaluation of pupil progress in spelling achievement, says:

> Achievement in spelling cannot safely be taken for granted. Whatever goals have been set up to guide instruction, whether the learning of the most useful words, the ability to use the dictionary, the knowledge of rules, the ability to correctly associate letters with sounds, or the ability to proofread written work, it is essential that both classroom teachers and pupils know the degree to which their goals have been reached. This is true of short range goals, as for the day or week, as well as goals for the term or year.[2]

Hildreth, in a summary of the newer goals of spelling instruction, emphasizes the need for developing habits of self-dependence in writing and ability to check the accuracy in written work.

> 1. The modern school seeks to develop spelling power, not mere mechanical competence in spelling a limited number of drilled words. It encourages habits of self-dependence in writing, knowledge of how to locate correct spellings, and ability to check the accuracy of spelling and other details in all written work.
> 2. Spelling is taught as a language related skill which serves the child's purposes in written expression both in and out of school. . . .

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[1]Margaret Forcht Rowe, "Proofreading Is a Skill, Too!" Business Education World, XXIX (October, 1948), pp. 113-14.

[2]Horn, op. cit., p. 28.

> 3. Spelling is learned and practiced as a functional tool for written work in content studies and school-life activities.
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> 4. The individual pupil, his background of experience, his learning capacities, and his needs as a learner constitute the basis for setting up instructional goals. Individual differences must be considered and provided for in class instruction.
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> . . . . . .
>
> Children will never advance in spelling power without direct instruction from the teacher in such matters as checking their written work, learning how to study words, learning about word structure, word analysis, and word building, and learning to take pains with spelling.[1]

Hildreth suggests that even pupils in primary grades should be reminded to think about the correctness of what they have written. She recommends practice in proofreading by letting pupils check other children's written material and spelling papers.[2]

She points out that even good spellers make errors in writing when they are writing rapidly and are concentrating on the thought. However, by the time pupils are in the upper grades they should become more sensitive to spelling errors. They should learn to take the responsibility for self-correction of all written work and be sure that it has been checked carefully before it is considered a finished product.

> The habit of proofreading is characteristic of all persons who take pride in accurate writing. . . .

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[1]Hildreth, op. cit., pp. 14-15. [2]Ibid., pp. 93, 94.

> Proofreading helps a child evaluate his work, develop critical judgment, and set a higher standard for himself. Proofreading skills practiced at school should carry over to writing done outside of school and after school days are over. . . . The teacher should make a rule never to accept a paper without requiring the pupil to check it over before handing it in. . . . Upper elementary-grade pupils are only at the threshold of becoming good proofreaders, but when practice in this skill is begun in the primary grades, they are ready to develop a high degree of independence in this skill.[1]

In the light of research findings which indicate that children know how to spell better than they do spell in written compositions, the need for checking one's written work is quite generally recognized. It is further recognized that few children are good at proofreading but that most of them can be taught to proofread their work if given proper motivation, instruction, and experiences in the skill.

Statement of the Problem

This study is concerned with the degree of accuracy of spelling in written compositions of fifth grade pupils and the effects of proofreading emphasis upon accuracy. The purposes of the study were: (1) to determine the extent to which spelling errors in written compositions are due to factors other than lack of knowledge of correct spelling; and (2) to determine the effect of consistent teaching of

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[1] Ibid., pp. 215, 216.

and practice in proofreading upon accuracy in written compositions.

Definition of Terms

1. Accuracy of Spelling -- implies the correct use of capital letters and apostrophes as well as correct spelling of words.

2. Proofreading -- the practice of reviewing what has been written, with careful attention being given to the spelling of words as well as to other features of the writing, such as capitalization, punctuation, and grammatical correctness.

3. Homeroom Program -- the part of the total instructional program that is carried on under the direction of a single teacher for a half day and includes the teaching of the language arts, social studies, health, and arithmetic.

CHAPTER II

THE EXPERIMENTAL PROCEDURE

A. Design of the Experiment

In order to determine the extent to which spelling errors in written compositions are due to factors other than lack of knowledge of correct spelling and to determine the effects of emphasis on proofreading upon spelling accuracy in written compositions, an experiment was designed and carried out as described below.

Boys and girls in sixteen fifth grade homeroom classes were asked by their teachers to write a story on a topic of their own choice and interest. The time allowed was not rigid; however, the children were asked to spend not more than twenty-five minutes writing. They were encouraged to turn their papers in as soon as they were through writing. Such a procedure was followed in order to get the papers before any thought was given to proofreading the stories. Considerable emphasis is placed on proofreading as a regular practice in some classrooms and some children would have

gone over their work automatically had they been given time to do so. Papers were received from 543 pupils.

The director of the experiment checked the papers carefully for misspelled words. A card was prepared for each child on which a record was kept of his misspelled words. No marks were made on the papers. After all papers were checked they were taken back to the schools and the teachers returned the papers to the children with the comment that "when the papers were written we didn't take time to look over them to see if they were written as we intended them to be. Let's look over them now and see if there are any words that are misspelled. Circle the words you think are misspelled, write the correction above the word if you want to, and turn your papers back to me." After the original compositions had been proofread and turned in, a reproduction of a letter prepared in cursive handwriting was given to each pupil to proofread. He was instructed to circle the words he believed to be misspelled. The papers were taken up as they were completed. The original compositions and the prepared proofreading exercises were kept for the purpose of comparing achievement in proofreading at the beginning and at the end of the experiment.

With this necessary preliminary work accomplished,

the children were then informed that their original compositions had been checked for misspelled words and that the misspelled words had been recorded. The director of the experiment explained to the pupils that sometimes words are misspelled through carelessness or for reasons other than lack of knowledge of the correct spelling. It was further explained that the teacher and the director would like to call each child individually and give out the words he had missed in his original composition in order to find out if he did or did not know how to spell the words.

In each classroom the teacher assigned seatwork which could be done independently by the children, making it possible for both the director of the experiment and the teacher to give out words.

The director and teacher stationed themselves in opposite corners of the room and each called one child at a time to give out his misspelled words. As a child returned to his seat he would send the next child to spell.

Each child was permitted to spell orally or on paper as he chose. It is true that practically all spelling is written and for that reason it was necessary to justify the procedure followed here. Considering, however, that the complex process of writing was, in fact, a recognized

obstacle to orderly thinking or concentration when spelling a word, the procedure was followed in order to free the child of this possible handicap. Approximately ninety per cent of the children chose to spell orally. Words were marked on the individual card to indicate correct or incorrect responses as the child spelled.

Words misspelled more than one time on a paper were given out only once. A word that was spelled correctly was counted correct for its multiple usage. Accordingly, a word that was misspelled was counted wrong for its multiple usage. In the case of homonyms, a word was given out more than one time if the use varied, as it might for the words "too," "to," and "two." Under such circumstances the word, when given out, was used in the child's own frame of reference by using his sentence as an example.

Results of the performance of every child who was present when the compositions were written and when the spelling was checked were included in the data for determining the extent to which errors in written compositions are due to factors other than lack of knowledge of correct spelling.

To determine the effects of emphasis on proofreading upon spelling accuracy in written compositions, the study

was designed for an experimental group to be given special instructions and experiences in proofreading for a period of twelve weeks and for a control group to be given no special instruction in proofreading for the same period of time.

The effects of these different treatments were measured in terms of the changes in performance on two types of activities involving proofreading techniques. One activity utilized in evaluating changes was the writing of two original compositions, one at the beginning of the experiment and one at the end of the experiment. These compositions were evaluated individually in terms of the percentage of misspelled words that were discovered by proofreading.

The second activity involved the use of a prepared proofreading exercise at the beginning and again at the end of the experiment. The spelling errors in this activity were words taken from spelling lists for grades below five. It was not intended that this should be a test of spelling ability, but rather an indication of each individual's ability to look for details. This exercise was evaluated in terms of the number of errors discovered by each individual.

B. Selection of Subjects

The study was planned to involve approximately 560 fifth grade pupils of selected elementary schools of Tulsa.

This necessitated the participation of eight homeroom teachers, each of whom had two fifth grade classes daily. Most Tulsa public elementary schools operate on a semi-departmentalized plan of organization and instruction. Under such a plan, approximately one-half of the pupils are in homeroom in the morning while the other half are attending special subject classes, such as music, art, science, physical education, and library. In the afternoon the schedule changes; the morning homeroom group attends special classes while the other group goes to homeroom.

The schools that participated in the study were selected somewhat by the process of elimination. First, the school was to have at least two sections of fifth grade pupils taught by the same teacher. Schools with four sections of fifth grade pupils taught by two teachers were preferred. Second, the teacher was to have taught in Tulsa not less than two years and at least one year of that time in the homeroom program, preferably fifth grade. Since teachers with new assignments are required to attend special orientation meetings throughout the year, it was decided that they should not be asked to participate in the study unless they indicated a special desire to do so.

From the schools meeting these specifications

adjoining school districts were selected in order to restrict the study to one general section of the city and to make it possible for all participating teachers to attend necessary planning meetings with the least possible inconvenience.

The final condition in the selection of participating schools was willingness on the part of the principals and teachers in these schools to engage in the study.

The fifth grade was chosen for the study in an effort to discover whether children at this level of achievement could profit by a program stressing proofreading techniques. The fourth grade was not used because it is not until fourth grade in Tulsa schools that children are encouraged to do the major part of their writing in cursive form. Experience or practice in cursive writing had been so limited up to that level that attention to letter formation might have had too great a bearing on spelling to furnish valid results.

The classes chosen to participate in the study were regular class groups of fifth grade pupils and their teachers. Pupils who were included in the final results of the study for determining the effects of emphasis on proof-reading upon spelling accuracy in written compositions were selected on the basis of whether they had taken the spelling

section (Test 6) of the Metropolitan Achievement Tests, Elementary Battery: Form S, for Grades 3 and 4, the previous spring. Of this number it was necessary to eliminate those who were not in attendance to complete each of the four evaluative exercises. Data on pupils with a reading level of 3.0 and below on Test 1 of the Metropolitan Achievement Tests, Elementary Battery: Form S, for Grades 3 and 4, were eliminated from the tabulations. The number of classes was set at sixteen to insure two hundred pupils for participation in each group after necessary eliminations.

Half of the experimental classes were in morning homeroom and half were in afternoon homeroom. Each teacher taught one experimental class and one control class, thus eliminating the possibility of wide variation in teacher power.

In two schools where there were four fifth grade sections in the same school, one control and one experimental group were in morning homeroom and one of each was in afternoon homeroom.

Sectioning of pupils into class groups was done at the beginning of the school term before any schools were considered for participation in the study. These sections remained unchanged except for pupils gained or lost by

transfer from one district to another. By the use of an equal number of control and experimental classes from each school and the arrangement of an equal division of morning and afternoon homeroom groups into control and experimental class situations, a definite effort was made to equate the socio-economic factor and the "time of day" factor.

Age spread and sex were comparable in each group. The spelling scores as measured by Test 6 of the Metropolitan Achievement Tests, Elementary Battery: Form S, for Grades 3 and 4, indicated no statistically significant difference in the mean score of each group, as is shown in Table 1 below.

TABLE 1

TEST MEANS, STANDARD DEVIATIONS, AND STANDARD ERRORS FOR CONTROL AND EXPERIMENTAL GROUPS DERIVED FROM SCORES ON TEST 6, METROPOLITAN ACHIEVEMENT TESTS, ELEMENTARY BATTERY: FORM S, FOR GRADES 3 AND 4

	Control	Experimental
Mean	25.4	25.53
Standard Deviation	9.81	9.36
Standard Error	.625	.585

The actual difference between the means was .13; the

standard error of this difference was .7328; and the resulting critical ratio was .177. The CR of .177 does not reach the .05 level of significance.

C. A Description of the Experimental Treatments

Two groups of fifth grade pupils from selected elementary schools in Tulsa, Oklahoma, received instructions as follows:

Treatment for the Experimental Group

Pupils in the experimental group received training sessions of approximately fifteen minutes each, twice a week, extending over a period of twelve weeks. The training consisted of class discussions and participation in proofreading activities. Verbal instructions from the teacher were designed to teach children how to proofread and to arouse in them a desire to discover and correct errors in prepared proofreading exercises. This was done to create within the child the feeling that many errors are made through carelessness, that discovering errors can be rewarding, and that it can be even more rewarding to find and correct one's own mistakes.

The exercises were planned to provide for self-competition. Each child was encouraged to keep a chart

showing his proofreading achievement on each exercise. A chart was provided for recording progress. Errors in the exercises were limited to spelling. However, children were instructed that the improper use of homonyms, improper use of capital letters or failure to use capital letters when needed, improper use of the apostrophe in possessive forms of words or failure to use the apostrophe properly in contractions would be considered as errors in spelling. In each exercise the errors were limited to words on the spelling level of grades two through five and no words were included from the fifth grade level which had not been studied prior to the exercise. The activities were not substituted for the regular spelling lesson but were used to supplement the regular language arts program.

Treatment for the Control Group

Pupils in the control group were given no special instructions or activities related to proofreading. Teachers were encouraged to follow their normal procedure in teaching spelling and the language arts and to call attention to proofreading in the spelling and language program only when the textbook assignment specified proofreading activities.

D. Testing Procedures

The spelling test (Test 6) of the Metropolitan

Achievement Tests, Elementary Battery: Form S, for Grades 3 and 4, given in the spring of 1957 was used to determine whether or not there was any statistically significant difference in spelling achievement between the two groups at the beginning of the study. On the basis of reading scores from Test 1 of the Metropolitan Achievement Tests, Elementary Battery: Form S, for Grades 3 and 4, pupils who were reading at a 3.0 level and below were excluded from the data used in final tabulations.

E. Program of Instruction

Materials Used

The special proofreading activities which were used with the experimental group were planned to supplement the homeroom instructional program. The reading units studied during the twelve-week period were "How Our Nation Grew Westward" and "The Age of Machines." The language program included letter writing, invitations and acknowledgments, reviews of interesting or exciting events in stories and books, and preparation of booklets as culminating activities for the units of study. Special holidays were given consideration as the occasion warranted. All of these activities afforded opportunities for emphasizing the

importance of accurate spelling in written compositions.

On the basis of these pre-planned units of work for the homeroom program, the proofreading activities were developed around such topics as the following: Daniel Boone, John Chapman, William Cody, Alexander Graham Bell, Thomas A. Edison, Henry Ford, Charles A. Lindbergh, George Washington, Abraham Lincoln, Louisa May Alcott, Samuel Langhorne Clemens, and letters and short sentence exercises.

For an introduction to the proofreading emphasis, the first four exercises were typewritten on stencils and mimeographed. This afforded easy recognition of letters as they normally appear in reading lessons. The remainder of the lessons were prepared in cursive writing and multilithed. This procedure was followed in order to relate the activity more closely to the children's own handwriting.

Some of the practice exercises had an abundance of errors, many of them being very simple words. Such a procedure was followed to add emphasis to the need for attention to details rather than to the difficulty of words. A progress chart for proofreading activities was provided for each pupil. The teachers were provided keys to the exercises and a scale for graphing progress.

The control group had no special instructional

materials during the experimentation period.

Number and Length of Instructional Periods

The experimental group received twenty-four instructional periods of approximately fifteen minutes each. Training began on February 3, 1958, and ended April 25, 1958. The teachers were encouraged to provide time for two instructional periods each week at such times as the activities could best be used to supplement the regular instructional program.

Techniques Used During Instructional Periods

The following are suggestions made to teachers for assisting pupils to develop habits of proofreading:

1. Demonstrate the technique or procedure involved in proofreading.

    a. Read a paragraph for meaning. (In order to save time, the teacher or a pupil may read the exercise aloud to the class.)

    b. Read for errors. Call the children's attention to the difference in regular reading and proofreading. In the latter case we must examine every detail for correctness. Example: Is each word spelled as I meant to spell it?

Read in this manner when checking for errors: Is (with a capital I) each (e-a-c-h) word (w-o-r-d) spelled (s-p-e-l-l-e-d) as I (capital letter) meant (m-e-a-n-t) to (t-o) spell (s-p-e-l-l) it? (i-t, question mark). Check small, simple words carefully; they are often misspelled and overlooked in checking because children know they know how to spell them and they just fail to consider them in proofreading. Watch for reversals as "saw" for "was," "ti" for "it." Be alert for the omission of final letters as y in they, ed on verbs, and s on verbs and nouncs.

Point out common types of errors in writing, i.e., gril for girl or gald for glad (transposition of letters), allways for always or leter for letter (double letters), moring for morning (omission of letters within words).

c. Check for homonyms to be sure the right form has been used.

d. Check carefully for proper use of capital letters.

2. For the twelve weeks of the experiment give two

prepared practice exercises each week.

3. Take advantage of opportunities to proofread materials on the board or on charts.

a. These materials might be outlines, stories, questions, descriptions of story characters, arithmetic problems.

4. Give encouragement, praise, recognition for work well done.

5. Encourage pupils to find and bring to class newspaper articles that have misspelled words in them.

6. Let each child keep a "progress" or self-rating chart to indicate his score for each practice exercise.

7. After the pupils have completed a practice exercise let them list or give orally all the errors they have found.

8. Help children accept the challenge of knowing why each error is an error.

9. The skill of proofreading is based on awareness and alertness and can be developed much better by rewards and motivated activities than by grade penalties. They must feel rewarded for finding errors.

10. Teaching of proofreading requires giving attention to details and exciting learners to strive for perfection.

11. The attitude or philosophy that a paragraph is guilty of errors until proved innocent might be challenging to some. Or the idea of G-Men could be used as a motivating technique. Suggest that errors creep in while we are thinking about something else and that they must be searched out.

12. Permission to have proofreading partners to check original compositions might add incentive to the activity.

13. Deliberate failure to indicate errors in one's own work because of dishonesty should never be suggested.

CHAPTER III

ANALYSIS OF DATA

A. Analysis of Accuracy of Spelling in Written Compositions

In order to determine the extent to which spelling errors in written compositions are due to factors other than lack of knowledge of correct spelling, the misspelled words, discovered on the first compositions prepared by 543 fifth grade pupils, were counted. There were 4,329 spelling errors recorded. Each child was asked to attempt to spell only the words he had missed on his own composition, and the correct responses were so indicated. Of the total number of misspelled words in the written compositions, 2,400 were spelled correctly and 1,929 were misspelled when given out as a spelling list to be spelled orally or in writing as the pupils chose.

These data indicate that the pupils tested in this study were able to spell 55.44 per cent of the words misspelled in the written compositions.

B. Analysis of the Effects of Proofreading Emphasis Upon Accuracy in Written Compositions

The primary statistical techniques employed in analyzing the data to determine the effect of consistent teaching and practice in proofreading on accuracy in written compositions were the median test and the Chi Square test of significance.

Prepared Proofreading Exercises

The median test was used in comparing average performance of an experimental and a control group on the prepared proofreading exercise given before and after a twelve-week experimental period. Members of the two pupil groups were exposed to different instructional conditions; an experimental group was given special instructions and experiences in proofreading for a twelve-week period; a control group was given no special emphasis or instruction in proofreading for the same period of time. An effort was made to employ proofreading emphasis as a variable, thus permitting its possible influence to be examined critically.

Because it was obvious from performance scores of the two groups that normality of distribution could not be assumed, and since the study was concerned with a comparison of the difference in average performance of the two groups

in discovering errors in the prepared exercises, it was necessary that a statistic be used that did not involve the assumption of normality. The median test was used for comparing average performance of the two groups. Edwards states that in comparing the difference in average performance for two groups, when, for one reason or another, it may not be possible to assume normality of distribution, instead of testing some null hypothesis about the means in terms of the t test, which would involve the assumption of normality, a somewhat different approach can be made.

> We can test the null hypothesis that the two groups are random samples from a population with a common median. The test of this null hypothesis will not involve any assumption concerning the nature of the distribution of the X measures, that is, we shall not have to make any assumption about normality.[1]

Edwards refers to Mood's description of the median test.[2] He states:

> Mood points out that the test is primarily sensitive to differences in location and is relatively uninfluenced by differences in the shapes of the distributions.[3]

Table 2 shows the X_1 values for 224 subjects in a

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[1]Allen L. Edwards, Statistical Methods for the Behavioral Sciences (New York: Rinehart and Company, Inc., 1954), pp. 387-88.

[2]A. M. Mood, Introduction to the Theory of Statistics (New York: McGraw-Hill, 1950), pp. 394-395.

[3]Edwards, op. cit.

control group and the X_2 values for 210 subjects in an experimental group as recorded on the prepared proofreading exercise given at the beginning of the experiment. The scores have been arranged in descending order and the frequency distribution has been given to conserve space. Plus and minus signs are used merely to indicate the number of

TABLE 2

SCORES FOR THE CONTROL AND EXPERIMENTAL GROUPS ON THE PREPARED PROOFREADING EXERCISE GIVEN AT THE BEGINNING OF THE EXPERIMENT

Control Group			Experimental Group		
X_1	f	Sign	X_2	f	Sign
18	4	+	18	15	+
17	11	+	17	10	+
16	24	+	16	24	+
15	18	+	15	13	+
14	12	+	14	26	+
13	25	+	13	19	+
12	26	-	12	19	-
11	20	-	11	19	-
10	16	-	10	16	-
9	21	-	9	12	-
8	11	-	8	11	-
7	9	-	7	8	-
6	10	-	6	7	-
5	9	-	5	3	-
4	6	-	4	2	-
3	2	-	3	3	-
			2	1	-
			1	2	-

scores above and below the common median.

Table 3 shows the frequency distribution for the combined scores of the two groups shown in Table 2.

TABLE 3

FREQUENCY DISTRIBUTION FOR THE COMBINED SCORES OF THE CONTROL AND EXPERIMENTAL GROUPS ON THE PREPARED PROOFREADING EXERCISE GIVEN AT THE BEGINNING OF THE EXPERIMENT

X	f	
18	19	
17	21	
16	48	
15	31	
14	38	
13	44	
12	45	
11	39	
10	32	
9	33	
8	22	
7	17	
6	17	
5	12	
4	8	
3	5	
2	1	
1	2	Total Frequency 434

Now, according to Edwards, if the samples come from a population with a common median, it would be expected that approximately half of the X_1 values would be above the median

of 12.14 and approximately half below. Similarly, it would be expected that about half of the X_2 values would be above the median of 12.14 and about half below.

In Table 2 a plus has been assigned to every observation that is above the median and a minus to every observation that is below. In the control group there are 94 plus values and 130 minus values. In the experimental group there are 107 plus values and 103 minus values. These frequencies have been entered in Table 4.

TABLE 4

THE 2x2 TABLE FOR THE OBSERVATIONS OF TABLE 2

Groups	Signs		Total
	-	+	
Experimental Group	103	107	210
Control Group	130	94	224
Total	233	201	434

Applying the Chi Square test to the data in Table 4, with the correction for continuity, a value of 3.17 with 1 degree of freedom was obtained. This value is not significant at the .05 level of confidence. Thus, it may be concluded that the null hypothesis is tenable. The two

groups of observations may very well be samples from a population with a common median.

Table 5 shows the X_1 values for 224 subjects in a control group of pupils who have been given no special instruction in proofreading, and the X_2 values for 210 subjects in an experimental group following a twelve-week

TABLE 5

SCORES FOR THE CONTROL AND EXPERIMENTAL GROUPS ON THE PREPARED PROOFREADING EXERCISE GIVEN AT THE END OF THE EXPERIMENT

Control Group			Experimental Group		
X_1	f	Sign	X_2	f	Sign
18	23	+	18	66	+
17	15	+	17	36	+
16	31	+	16	32	+
15	32	-	15	18	-
14	24	-	14	16	-
13	30	-	13	9	-
12	18	-	12	8	-
11	12	-	11	8	-
10	12	-	10	7	-
9	6	-	9	5	-
8	7	-	8	2	-
7	6	-	7	1	-
6	6	-	6	2	-
5	0	-			
4	1	-			
3	0	-			
2	0	-			
1	1	-			

period of systematic instruction and practice in proofreading. Scores have been arranged in descending order and the frequency of occurrence indicated. Plus and minus signs have been used to point out the scores above and below the common median of 15.22, determined from the data presented in Table 6 which gives a frequency distribution for the

TABLE 6

FREQUENCY DISTRIBUTION FOR THE COMBINED SCORES OF THE CONTROL AND EXPERIMENTAL GROUPS ON THE PREPARED PROOFREADING EXERCISE GIVEN AT THE END OF THE EXPERIMENT

X	f	
18	89	
17	51	
16	63	
15	50	
14	40	
13	39	
12	26	
11	20	
10	19	
9	11	
8	9	
7	7	
6	8	
5	0	
4	1	
3	0	
2	0	
1	1	Total Frequency 434

combined scores of the control and experimental groups on the prepared proofreading exercise given at the end of the experiment.

In the control group there are 69 plus values and 155 minus values. In the experimental group there are 134 plus values and 76 minus values. These frequencies have been entered in Table 7.

TABLE 7

THE 2x2 TABLE FOR OBSERVATIONS OF TABLE 5

Groups	Signs		Total
	-	+	
Experimental Group	76	134	210
Control Group	155	69	224
Total	231	203	434

The Chi Square test was applied to the data in Table 7 to determine whether or not there was any significant difference in the average performance of a control group and an experimental group in proofreading a prepared exercise after only the experimental group had been given a specified program of proofreading emphasis. The obtained Chi Square value, corrected for continuity, was 46.1 with 1 degree of

freedom. This value was significant at the .05 level of confidence and indicated that the two groups of observations were no longer samples from a population with a common median. The reason for this, it may be assumed, lies in the nature of the experimental set of conditions to which the individuals in the experiment were subjected before the final prepared proofreading exercise was given. The experimental conditions, it is believed, did something to the subjects of the experimental group which resulted in a significantly greater frequency of successes at the time of the final proofreading exercise.

The proofreading activities considered in Tables 2 to 7 inclusive were exercises prepared in cursive handwriting. The results obtained indicated what boys and girls were able to do in terms of proofreading another person's work. Persons closely associated with the area of business education indicate, however, that before students at the high school level become effective in proofreading their own typewriting they must overcome the feelings of failure and threat attendant on finding errors in one's own work. Brendel[1] and Rowe[2] emphasize this point. For this reason the investigator felt that it was necessary to evaluate performance in

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[1]Brendel, op. cit.

[2]Rowe, op. cit.

proofreading one's own work.

The prepared exercises provided a means of evaluating the effect of consistent teaching and practice in proofreading for errors in another person's written compositions. In order to determine the effect of the special emphasis on proofreading in correcting one's own work, compositions written by the boys and girls at the beginning and at the end of the experimental period were used as a means of evaluating performance. Each child was asked to check his own composition for errors.

Proofreading One's Own Compositions

Book and Harter[1] concluded that pupils from the second grade to students in colleges, whose compositions they investigated, really knew how to spell the words in fifty per cent of the cases where errors were made. Similar results have been found by the present study. On these bases the criterion for success in learning to proofread one's own work was that he should have discovered fifty per cent or more of his errors.

The Chi Square test of significance of the difference between two correlated proportions was used to evaluate the

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[1]Book and Harter, op. cit.

change in performance of a control group and of an experimental group in discovering spelling errors in one's own compositions over a period of twelve weeks.

In order to evaluate the change in performance of the same group at two different times or under two different sets of experimental conditions, it is possible to compare the difference between the proportion of successes, where success is the achievement of a certain performance standard under investigation in the two experimental conditions.

With discovery of fifty per cent or more of one's spelling errors in written compositions as the criterion for successful performance, a pair of observations for each subject were obtained by evaluating one composition written and proofread before, and another written and proofread after experiencing a set of experimental conditions. If fifty per cent or more of the spelling errors were discovered on a paper, it was called a success; if not, it was called a failure. Thus there were two ways a subject could be rated on the first composition and two ways that he could be rated on the second composition, so that there were (2) (2) or 4 possible patterns of response: $S_1 F_2$

$S_1 S_2$

$F_1 S_2$

$F_1 F_2$

The control group was given no special instruction or practice in proofreading beyond the emphasis called for in the spelling textbook in the preparation of weekly lessons and brief practice exercises which were a part of the language program during the experimental period. Teachers were asked, however, to encourage neat, careful work. The results of proofreading performance of the control group are presented in Table 8, where a comparison is made of the proportion of successes based on the criterion stated above.

TABLE 8

FREQUENCY OF FAILURES AND SUCCESSES OF 224 SUBJECTS DESIGNATED AS A CONTROL GROUP AS RECORDED AT THE BEGINNING AND AT THE END OF THE EXPERIMENTAL PERIOD

		Final Composition		
		Failure	Success	Total
Initial Composition	Success	25	25	50
	Failure	125	49	174
	Total	150	74	224

Using Edwards' computational model, the obtained Chi Square, when corrected for continuity, was 7.15, for 1 degree

of freedom.[1] This value exceeds the 3.841 value required to satisfy the .05 level of confidence and indicates that the change in performance was greater than would be expected to occur by chance.

The improvement made in discovering spelling errors in written compositions, even though no special emphasis had been given to proofreading, would indicate that an effective program for teaching accuracy was being carried on in the classrooms represented in the study.

By voluntary admission, however, some teachers stated that there was unavoidable carryover of enthusiasm for emphasis on proofreading from the experimental to the control group. Some practice that proved quite successful with the experimental group would be suggested to the control group somewhat non-consciously. Bulletin board displays of newspaper clippings with spelling errors discovered and marked by pupils in the experimental classes elicited a "voluntary" search and positive response from pupils in control groups. It would be impossible to say to what extent the data of the control group were contaminated by these contacts with the proofreading program.

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[1] Allen L. Edwards, Experimental Design in Psychological Research (New York: Rinehart and Company, Inc., 1950), pp. 87-90.

The experimental group was given special instruction and practice in proofreading for a period of twelve weeks. Approximately fifteen minutes, twice a week, was given for such proofreading emphasis. The results of proofreading performance by the experimental group are presented in Table 9, where a comparison is made of the proportion of successes based on the criterion that success indicated discovery of fifty per cent of the spelling errors in the child's own composition.

TABLE 9

FREQUENCY OF FAILURES AND SUCCESSES OF 210 SUBJECTS DESIGNATED AS THE EXPERIMENTAL GROUP AS RECORDED AT THE BEGINNING AND AT THE END OF THE EXPERIMENTAL PERIOD

		Final Composition		
		Failure	Success	Total
Initial Composition	Success	24	20	44
	Failure	104	62	166
	Total	128	82	210

The resulting Chi Square, corrected for continuity, was 15.92, for 1 degree of freedom. This value is well beyond the 3.841 value required to satisfy the .05 level of

confidence and indicates that the difference in performance is quite significant.

There is reason to believe that the nature of the experimental set of conditions to which these individuals were subjected may have resulted in a greater frequency of successes on the final proofreading activity.

To compare performance of the control and experimental groups on proofreading the initial compositions prepared by the pupils and to compare performance of these two groups on proofreading the final composition prepared by the pupils, the investigator employed the Chi Square test for the difference between uncorrelated proportions.

The frequency of successes and failures for the two groups on the initial composition is given in Table 10.

TABLE 10

FREQUENCY OF FAILURES AND SUCCESSES FOR THE CONTROL AND EXPERIMENTAL GROUPS AS RELATED TO PERFORMANCE ON PROOFREADING THE INITIAL COMPOSITION PREPARED BY THE PUPILS

	Failure	Success	Total
Experimental Group	166	44	210
Control Group	174	50	224
Total	340	94	434

The comparison of performance of the control and experimental groups was made to determine whether or not the sampling was from a common population and therefore comparable in the skill of proofreading their own compositions. Using Edwards' computational model, the obtained Chi Square value, corrected for continuity, was .21, a value not significant at the .05 level of confidence.[1] Although a difference was found in the proofreading performance, it was so slight that it could be assumed to be a chance variation, which would indicate that the sampling was from a common population.

The frequency of successes and failures in terms of proofreading performance for the two groups on the final compositions prepared by the pupils is shown in Table 11.

The Chi Square test for the difference between these two uncorrelated proportions, corrected for continuity, yielded a value of 1.45. Although this difference is considerably greater than that exhibited by the performance on the proofreading activity at the beginning of the experimental period, it is not great enough to give complete confidence that the performance change was a result of the set of experimental conditions. The obtained Chi Square

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[1] Ibid., pp. 80-86.

value was not significant at the .05 level of confidence.

TABLE 11

FREQUENCY OF FAILURES AND SUCCESSES FOR THE CONTROL AND EXPERIMENTAL GROUPS AS RELATED TO PERFORMANCE ON PROOFREADING THE FINAL COMPOSITIONS PREPARED BY THE PUPILS

	Failure	Success	Total
Experimental Group	128	82	210
Control Group	150	74	224
Total	278	156	434

CHAPTER IV

SUMMARY AND INTERPRETATION OF RESULTS

The purposes of this study were (1) to determine to what extent errors in spelling in written compositions are due to factors other than lack of knowledge of the correct spelling and (2) to determine the effect of consistent teaching of and practice in proofreading upon accuracy in written compositions.

Written compositions prepared by 543 fifth grade pupils were checked carefully for spelling errors, and the misspelled words were recorded. Each pupil was asked to spell only the words he misspelled in his own composition. Of the 4,329 spelling errors recorded, 2,400 were spelled correctly and 1,929 were misspelled when given out as a spelling list. These data indicate that the pupils tested were able to spell 55.44 per cent of the words misspelled in the written compositions. This evidence supports the findings of Book and Harter who indicated that pupils really knew how to spell fifty per cent of the words where errors were made,

but made some mistake in the writing.[1] It also supports the statement by Foran that one's ability to spell dictated words will not guarantee the spelling of the same words in the writing of compositions.[2]

Although some of these words were spelled correctly by chance, as was evidenced by laborious, uncertain responses on the part of some pupils, the most frequently cited causes for poor spelling in written compositions indicate that many of the errors should be readily apparent to the writer if any review is made of what has been written.

In order to determine the effect of consistent teaching and practice in proofreading on accuracy in written compositions of fifth grade pupils, two groups of pupils from selected schools of Tulsa, Oklahoma, were exposed to two different experimental conditions. An experimental group was given special instructions and experiences in proofreading for a twelve-week period, and a control group was given no special emphasis or instruction in proofreading for the same period of time. An effort was made to employ proofreading emphasis as a variable, thus permitting its possible influence to be examined critically.

One measure of the effectiveness of the proofreading

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[1]Book and Harter, op. cit. [2]Foran, op. cit., p. 189.

emphasis resulted from a comparison of performance by the two groups on a prepared proofreading exercise which was administered to both groups at the beginning and again at the end of the twelve-week experimental period. The median test was used for comparing average performance of the two groups. The Chi Square test of significance was applied to these data. Comparison of performance by the two groups on the first prepared proofreading exercise showed a Chi Square value, when corrected for continuity, of 3.17, for 1 degree of freedom. This Chi Square value was not significant at the .05 level of confidence; therefore, it was concluded that the difference between the two groups was a random difference and not significant. The two groups of observations may very well be samples from a population with a common median.

Comparison of performance of the two groups on the final prepared proofreading exercise showed a Chi Square value, corrected for continuity, of 46.1, for 1 degree of freedom. This Chi Square value was well beyond the .05 level of confidence and it was concluded that the difference in performance between the two groups was significant and, therefore, not a chance difference.

The reason for this, it may be assumed, lies in the nature of the experimental set of conditions to which the

individuals in the experiment were subjected before the final prepared proofreading exercise was given. The experimental conditions, it is believed, did something to the subjects of the experimental group which resulted in a significantly greater frequency of successes at the time of the final proofreading exercise.

A further comparison was made of the performance of the two groups in proofreading their own compositions: one written at the beginning of the experiment and the other written at the end of the twelve-week experimental period.

Performance of the control group in proofreading the first compositions written by the pupils was compared with performance of the same group in proofreading the final compositions written by the pupils. The Chi Square test of significance of the difference between two correlated proportions was used to evaluate the change in performance over the twelve-week period. Discovery of fifty per cent or more of the misspelled words in an individual's own written composition was the criterion for success in setting up the Chi Square computational table.

In comparing performance of the control group at the beginning and at the end of the twelve-week period in terms of ability to proofread their own written compositions, it

was discovered that a significant gain had been made even though no special emphasis on proofreading had been given to this group. As was pointed out early in Chapter II, considerable emphasis is placed on proofreading as a regular practice in some classrooms and teachers were asked not to de-emphasize the practice to the point of permitting substandard or careless work. It is evident that a significant program with emphasis on accuracy is being carried on in the classrooms represented in this study. A Chi Square value of 7.15 exceeded the 3.814 value required to satisfy the .05 level of confidence and indicated that the difference in performance was significant and not a chance difference. There was some evidence that the control group was affected positively by carryover of teacher enthusiasm for reviewing written work and by contact with display projects involving proofreading which the experimental group volunteered to arrange. Teachers were inclined to point out to the control group "things to look for" in going over a paper. This was not a consistent practice but did happen involuntarily as was indicated by the teachers.

Similarly, comparison was made of performance of the experimental group in proofreading the first compositions written by the pupils and in proofreading the final

compositions written by the pupils. Again the Chi Square test of significance of the difference between two correlated proportions was used to evaluate the change in performance over the twelve-week experimental period.

The obtained Chi Square, when corrected for continuity, was 15.92, for 1 degree of freedom. This value is well beyond the 3.841 value required to satisfy the .05 level of confidence and indicates that the difference in performance was not a chance difference. It may be assumed that the reason for this significant difference lies, to some extent, in the nature of the experimental set of conditions to which the individuals in the experiment were subjected before the time of the final proofreading activity. There is reason to believe that the nature of the experimental set of conditions to which these individuals were subjected may have resulted in a greater frequency of successes on the final proofreading activity.

Finally, performance of the control group in proofreading compositions written by the pupils at the beginning and at the end of the experimental period was compared with performance of the experimental group in proofreading compositions written by pupils of that group.

The frequency of successes and failures on the first

composition for the control and experimental groups is shown in Table 10. The Chi Square value, corrected for continuity, was .21, for 1 degree of freedom. This value was not significant at the .05 level of confidence; therefore, it was concluded that the difference in performance between the two groups was a random difference and not significant.

The frequency of successes and failures on the final compositions for the two groups is shown in Table 11. The Chi Square test of significance of the difference between these two uncorrelated proportions, corrected for continuity, yielded a value of 1.45. This difference is considerably greater than that exhibited by the performance on the proofreading activity at the beginning of the experimental period, but it is not great enough to give complete confidence that the performance change was a result of the set of experimental conditions to which the experimental group was subjected.

Although this value fails to indicate a significant difference in the performance of the two groups, there are certain points to be considered before it can be concluded that proofreading emphasis at the fifth grade level is misplaced. First, one must keep in mind the highly significant difference which was indicated in the performance of the control and experimental groups on the final prepared

proofreading exercise. This would support the opinion that one finds it easier to discover another person's errors than to discover errors in his own work where a feeling of threat or failure is involved.

The difference in proofreading one's own work and proofreading another person's work was evidenced by the enthusiasm toward proofreading prepared exercises in contrast to the lack of enthusiasm in proofreading one's own work. For this reason a longer period of time would be required to cultivate the attitude that the ability to find one's own errors is a sign of success and to develop habits of reviewing one's own work with an awareness that errors are often made through carelessness, even when the writer feels that he has made no mistakes.

Second, one must consider the fact that both the control and experimental groups made significant improvement in their ability to discover errors in their own work when compared with their performance twelve weeks earlier. Discounting the possibility that the data on the control group were contaminated by carryover of proofreading emphasis through teacher enthusiasm and bulletin board displays, one would have to conclude that, in the classrooms involved, an effective job of teaching accuracy is being carried on in

the regular program and that there is an indication that better results would accrue through planned instruction and activities involving proofreading techniques.

To assume that the data gathered on the control group were contaminated would broaden the gap or increase the difference in the performance of the two groups. In either case, assuming contamination or not, the evidence seems to indicate that the experimental conditions did bring about a more effective and desirable performance in discovering errors in written compositions on the part of those who were subjected to the special proofreading emphasis.

CHAPTER V

IMPLICATIONS AND RECOMMENDATIONS

Implications

The data discussed in this investigation suggest the following implications:

1. Most children know how to spell better than they do spell in the writing of connected discourse.

2. Children at the fifth grade level can be taught to proofread for spelling errors. They learn to proofread another person's work with less difficulty than to proofread their own. Effective habits of proofreading are best formed through consistent practice and through emphasis on accuracy and careful attention to details.

3. Through a careful, consistent program of teaching proofreading, the schools may be able to produce more effective communicants. However, teachers must be aware of the psychological effects to be overcome by pupils before they will be able to find errors in their own work.

4. Emphasis on proofreading for accuracy in spelling

should not be delayed beyond the fifth grade. Correct letter formation and the ability to write somewhat automatically are developed during the fourth and fifth years. The cultivation of carelessness is furthered by all practices which tolerate it in any form. To develop proper attitudes and skills for doing accurate work at an early grade level will make it possible for teachers on more advanced levels to concentrate on new skills and learnings rather than on correcting faulty habits and indifferent attitudes toward accuracy.

5. To over-emphasize or demand perfection in the first writing of an assignment would destroy much of the spontaneity, the free expression, and the enjoyment of creative writing, and would pose an insurmountable task to many children who write laboriously, have limited use of words, and have brief attention spans.

However, formation of habits of reviewing one's written work, with the proper attitude toward discovering errors, makes it possible to capture one's imagination, to recognize individuality, to encourage creativity, and at the same time to effect accuracy in the communicative process.

6. Instruction and training in proofreading should relate to the overall program in the classroom: spelling

dictation exercises, language activities, social studies reports, arithmetic computation, and, in fact, in every instance where communication is effected through writing.

7. Practice and emphasis on proofreading need not be a tedious, time-consuming chore for the teacher; nor should the cost of preparing exercises present a problem. For teaching the techniques of proofreading, short, simple exercises may be written on the chalkboard by the teacher or a pupil. Use of an opaque projector would make it possible for all pupils to see the same exercise at the same time without taking class time for writing the exercise on the board.

8. Prepared proofreading exercises can be pleasant and seem to motivate interest on the part of most children to discover errors. However, unless there is a carefully planned program for carrying that interest, enthusiasm, knowledge, and skill over into the proofreading of one's own work, the pupil may never see the relationship.

9. Checking children's ability to spell words misspelled in their writing by calling them individually and listening carefully as they spell can offer many clues to difficulties encountered by children in the total communicative process. For example: On spelling lists dictated by

the teacher, a child with a slight speech defect may hear the word correctly pronounced and spell it accordingly. But in his free writing he spells as he would pronounce the word, with a letter omitted or added as his defect may prompt.

Children frequently fail to associate words given in spelling lists with the same words in connected discourse. For Example: The child understands and spells "have" and "to," but he writes in his composition "hafto," or for "once" and "upon" which he knows how to spell, he may write "one's apon a time."

Recommendations

It is recommended that the implications listed above be given careful consideration in the teaching of spelling.

It is also recommended that a program stressing proof-reading be carried on for a longer period of time in order to give more practice in applying proofreading techniques to one's own work. The investigator feels that by the time teachers had been able to "sell" the boys and girls on the idea of proofreading as a satisfying achievement, through the use of prepared exercises, possibly there was not enough opportunity in the remaining portion of the twelve-week period for the boys and girls to see the relationship between prepared exercises and one's own work.

It is further recommended that the study might well include consideration of the effects of emphasis on proof-reading upon reading rate. Children at the fifth grade level are beginning to learn that there are various kinds of reading--determined by what is to be accomplished by the reading. Yet considerable emphasis is placed on development of speed. Would the slow process of proofreading cursive writing tend to retard progress in the development of speed in reading printed matter? This question has been a point of concern throughout the study.

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APPENDIX A

SAMPLES OF INSTRUCTIONAL MATERIALS

Proofreading Exercise

I. Directions: Look over the word groups below and draw a line through each misspelled word. One word of each pair is misspelled.

prsent	present	sure	shur
techer	teacher	friends	freinds
very	vere	swimming	swiming
afther	after	vist	visit
aninals	animals	tulsa	Tulsa
often	ofen	placeses	places
whith	with	improved	inproved
roon	room	fifth	fith
shool	school	hardle	hardly
please	plese	I'am	I'm
tecker	teacher	foor	for
pencil	pensil	glad	gald
that's	thats	everything	everthing
moring	morning	listen	listin
lerned	learned	havn't	haven't
enjoy	injoy	den't	didn't
about	abouth	school	scholl
piace	piece	among	amoung
allways	always	favrite	favorite
when	whin	whether	wheather

II. Directions: In the word lists below, some words are misspelled. Draw a line through the misspelled words.

you	boat	become	storie	talk
time	dere	move	favorite	withowt
pritty	caled	before	brige	signing
Indians	fruit	supprise	cousin	grade
woudn't	careles	eat	gess	there
Sundy	carying	ansered	throught	anything

Proofreading Exercise

Directions: Read the sentences carefully to find any mistakes that have been made. Underline the error and write the corrected form on the line at the side. If there is no error write C on the line.

Example: I wish I could go to. too

1. Havn't you ever been to Philbrook? _____
2. The teacher said, "Listin carefully now. This is something you will all want to hear." _____
3. We have a new baby boy at are house. _____
4. I have to brothers. _____
5. I wish we den't have to move. _____
6. Next year I will be in the sixed grade. _____
7. My teacher has given us a list of things to get. _____
8. Hear are the things we had to get. _____
9. We tolled about our pets and about our vacations. _____
10. We did our arithmetic in fifteen minutes. _____
11. We had a nice summer vacashun. _____
12. I think I'm going to like this school very mush. _____
13. We're go to have a carnival. _____
14. She gave each of use a handkerchief. _____
15. Please don't gave me much homework. _____
16. The theacher spoke with kindness in her voice. _____

17. I thank we should take good care of our new school building. _____

18. My sister sad you were a very nice teacher. _____

19. You will injoy reading about the gold rush. _____

20. We are going to vist my cousin this summer. _____

Paul Revere

You have probly seen the television program called "Whats My Line." Four people try to find out what kind of work another person does by asking him questions. Another program you may have wached is "I've Got a Secret." The point of this program is to guess some unusual thing a person has done. Paul Revere could stump a panel today if he could appear on such a program. Do you no what Paul did for a living? Of course his midnight ride to warn the farmers that the British were comming has made him famous. But Paul did other thangs that are not so well known to us today.

Paul was a silversmith. By hand and small tools he made and decorated beutiful pieces of silver, such as tea-pots and food trays. Because of the heavy tax the colonists had to pay to the British they couldn't afford to by the fine silver. So Paul turned to other work. He published books of psalm tunes and made copper pieces.

The line of work that would puzzle most panels was the making of false teeth. Who knows but that he might have made a set for some important person like George Washington, Samuel Adams, or John Hancock? He was also among the group who "poured tea" at the very important "Boston Tea Party."

Henry Ford

Did you know that Henry Ford who was worth millions of dollars, once worked in Detroit for two and a half dollars a week? Since he had to pay three and a half dollars for food and a place to live he had to take a second job at night to make two more dollars. He worked from seven in the morning until eleven at night.

During the day he worked in a steam-engine shop. He tried to improve his skill with machines by reading and studying. Through his reading he got the idea of building a "horseless carriage" that would run with gasoline as power.

To learn about electricity he got a job in the Edison Light and Power Company. Mr. Ford and Mr. Edison came to be good friends and were of great help to each other.

Henry's neighbors made fun of him for working night after night in his workshop. But one morning, after working all night, he was able to drive an odd looking machine down the street. It had only one cylinder, bicycle wheels, a buggy frame, and no reverse gear. He had to get out and turn it around by hand.

He kep trying to make better and cheaper cars. Befor he died he had built huge factories throughout the world. Henry Ford proved that the common man can be successful in America.

William Cody

Do you know how much it costs to send a letter from Tulsa to California? It costs only three cents. It cost five dollars to send a letter from Missouri to California when Bill Cody carried the mail as a Pony Express rider.

Eighty of the best riders that could be found were hired to carry the mail from St. Joseph, Missouri, to the Pacific Coast. Four hundred twenty horses were bought and stations were set up fifteen miles apart from St. Joseph to the west coast. The riders rode from forty-five to a hundred twenty-five miles straight, with a change of horses every fifteen miles. Two minutes was allowed for a station change but half the time was usually enough.

William Cody was one of the most famous of these riders, although he was only fourteen years old. One time he arrived at a station wher another rider was to take over but he found the rider had bean killed, so he quickly remounted on a freel horse and continued on a new and strange route. He reached the next station, picked up the east-bound mail and started back. When he returned he had ridden three hundred twenty-two miles in twenty-two hours. He had set a Pony Express record.

Clara Barton

What a wondrful Christmas present! The four Barton children were sure that no better gift could have come to them. They had a new baby sister, and the named her Clara.

Clara started to skool when she was only three years old. But her brothers and sisters had allready taught her how to read and spell. She walked too miles to school and no matter how deep the snow, she walked right along with the older childern.

At the age of five Clara lerned to ride a horse with her brother David and she became a fearless rider.

When she was eleven David fell from the roof of a hous and was so badly hurt that he was ill fore two years. His little sister became his nurse. For two years she spent only one half day away from home. She gave up school, playing, and riding to tak care of David.

Clara began to teach school when she was fifteen, but afther teaching eighteen years she hade to quit because her voice failed her. She worked for the government for sum time. During the Civil War she served as a nurse on the battlefield. Later she helped to organize the American Red Cross. She was never afrade to do here duty.

213 S. Maple Street
Tulsa, Oklahoma
October 5, 1957

Dear Aunt Ruth,

I dont have to be called this moring because I am on patrol duty this week and that means I must be at skool early. I am going to Lindbergh this year.

I wood like to go back to John Ross School but we have more so I live in another district now.

I want you to meet my techer. She is very nice. The boys and girls I no all go over to Ross and I miss them. The children are friendly hear at Lindbergh though. After a while I'm shur I will like this school very much to.

Aunt Ruth, I am in the fith grade this year. Our teacher tolled us some things we would lern to do in school this year. She sad that we would learn to add an subtract fractions in arithmetic. I just know I'm going to injoy my school work this year.

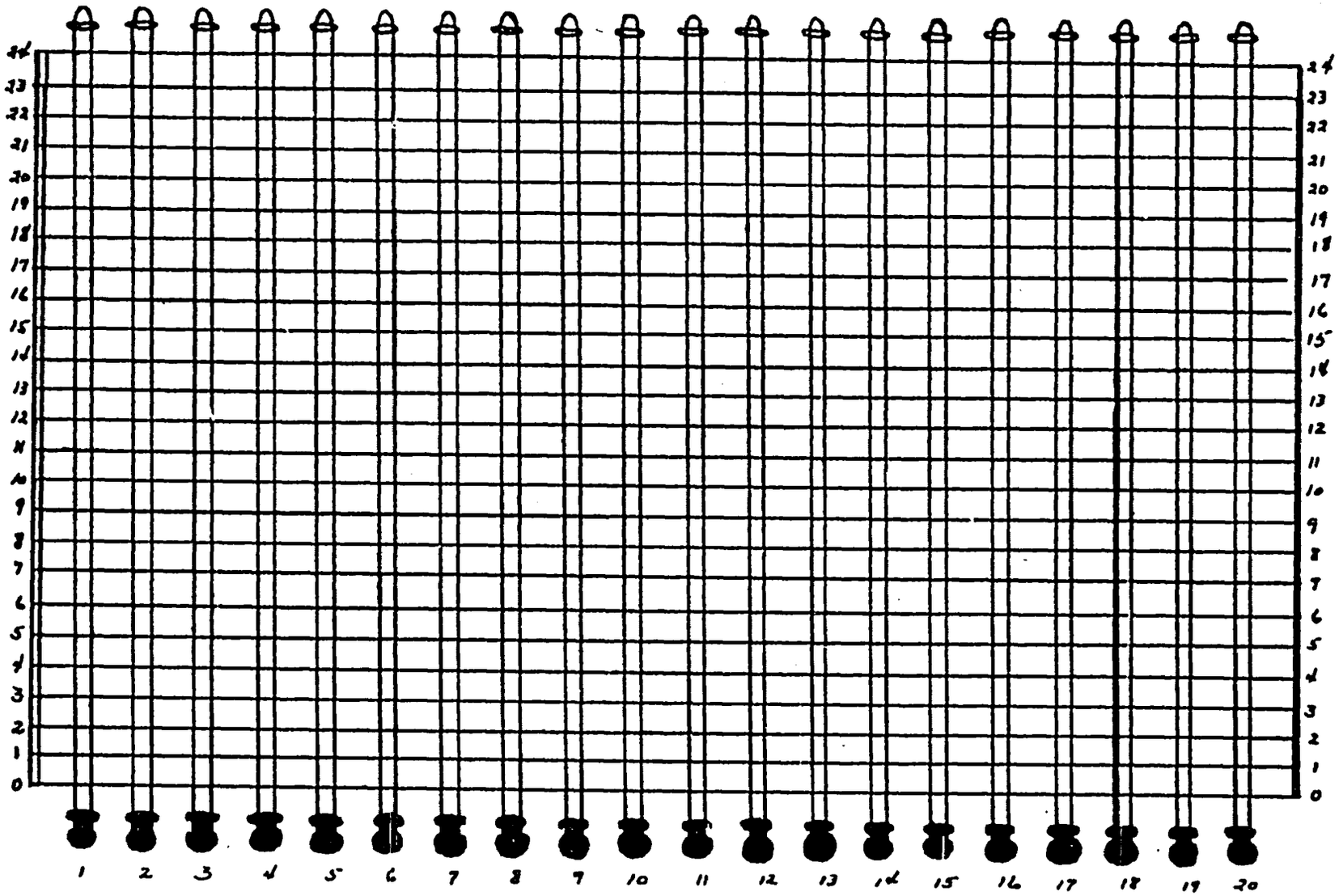
You must come and sit my skool.

Love,
Janie

APPENDIX B

SAMPLE OF PROGRESS CHART FOR PROOFREADING ACTIVITIES

Progress Chart for Proofreading Activities



Name_____ Grade_____ School_____

USE OF THE PROGRESS CHART

SUGGESTIONS TO THE TEACHER

The exercises you have been given have the errors indicated. Also, the number of errors is shown on each sample sheet. (A correctly prepared copy, typewritten, accompanies every exercise prepared in cursive handwriting so that it may be read to the class by the teacher or a pupil without the reader indicating errors by his manner of reading and expression.)

You may find it helpful to tell the children how many errors there are in the first practice exercise.

For use of the progress chart use the following scales:

24 errors - 1 line per error discovered

12 errors - 2 lines per error discovered

6 errors - 4 lines per error discovered

18 errors - (Use these equivalents.)

errors - lines		errors - lines	
1	1	10	13
2	3	11	15
3	4	12	16
4	5	13	17
5	7	14	19
6	8	15	20
7	9	16	21
8	11	17	23
9	12	18	24

9 errors - (Use these equivalents.)

errors	-	lines	errors	-	lines
1	-	3	6	-	16
2	-	5	7	-	19
3	-	8	8	-	21
4	-	11	9	-	24
5	-	13			

APPENDIX C

DATA ON INDIVIDUAL PUPILS WHICH HAVE BEEN SUMMARIZED FOR USE IN TABLES IN CHAPTER III

DATA ON INDIVIDUAL PUPILS WHICH HAVE BEEN SUMMARIZED FOR USE IN TABLES IN CHAPTER III

(Column 1 indicates pupils; column 2 indicates the number of errors discovered in the first prepared proofreading exercise; column 3 indicates the number of errors discovered in final proofreading of prepared exercise; column 4 indicates number of errors made in first composition prepared by pupil; column 5 indicates number of errors discovered by proofreading first composition prepared by pupil; column 6 indicates success or failure on the basis of discovery of fifty per cent of errors made; column 7 indicates number of errors made on final composition prepared by pupil; column 8 indicates number of errors discovered by proofreading the composition; and column 9 indicates success or failure on the basis of discovery of fifty per cent of errors made.)

Control Group

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
1.	8	16	30	2	F	11	1	F
2.	7	18	2	0	F	3	0	F
3.	3	1	22	2	F	24	10	F
4.	9	18	3	0	F	2	1	S
5.	10	16	4	0	F	3	0	F
6.	13	18	1	0	F	0	0	S
7.	6	8	29	3	F	2	1	S
8.	15	14	11	3	F	4	1	F
9.	10	18	2	0	F	0	0	S
10.	12	16	18	5	F	4	4	S
11.	5	11	16	6	F	5	3	S
12.	9	18	15	4	F	8	1	F
13.	11	18	2	2	S	4	1	F
14.	10	13	19	6	F	18	3	F
15.	12	18	10	7	S	3	0	F
16.	16	16	4	3	S	1	0	F
17.	13	18	11	11	S	0	0	S
18.	7	17	23	7	F	13	1	F
19.	9	15	22	4	F	12	6	S
20.	17	17	6	3	S	1	1	S

Control Group--Continued

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
21.	13	17	3	0	F	0	0	S
22.	12	17	3	2	S	2	2	S
23.	17	18	3	3	S	1	0	F
24.	12	18	5	3	S	4	0	F
25.	15	16	3	1	F	1	1	S
26.	5	17	15	2	F	11	2	F
27.	11	16	15	3	F	7	2	F
28.	16	17	2	2	S	2	1	S
29.	16	18	10	2	F	4	2	S
30.	16	18	0	0	S	0	0	S
31.	16	18	0	0	S	1	1	S
32.	15	17	4	4	S	1	0	F
33.	16	18	1	1	S	4	2	S
34.	12	16	12	1	F	8	2	F
35.	7	10	5	0	F	6	0	F
36.	12	7	9	1	F	8	0	F
37.	4	6	16	0	F	25	2	F
38.	13	14	11	3	F	8	2	F
39.	9	6	21	1	F	17	5	F
40.	9	13	9	0	F	4	1	F
41.	10	10	6	0	F	7	1	F
42.	12	14	4	0	F	2	0	F
43.	11	14	13	0	F	12	0	F
44.	10	10	4	1	F	3	0	F
45.	16	14	4	0	F	5	0	F
46.	7	9	9	3	F	11	3	F
47.	11	14	13	0	F	8	1	F
48.	10	16	16	6	F	5	1	F
49.	12	9	5	0	F	21	5	F
50.	13	15	4	0	F	6	0	F
51.	15	15	2	0	F	4	0	F
52.	7	12	1	0	F	4	0	F
53.	13	13	2	0	F	5	4	S
54.	15	13	18	2	F	3	1	F
55.	15	17	4	1	F	4	0	F
56.	10	12	9	1	F	8	2	F
57.	9	12	15	3	F	19	4	F
58.	9	13	4	0	F	4	0	F

Control Group--Continued

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
59.	16	16	2	0	F	8	0	F
60.	17	16	10	2	F	7	1	F
61.	14	13	10	3	F	6	1	F
62.	13	15	16	4	F	3	1	F
63.	15	15	3	0	F	5	2	F
64.	12	12	7	2	F	11	2	F
65.	9	16	19	8	F	19	8	F
66.	10	12	7	1	F	7	2	F
67.	8	7	9	0	F	11	1	F
68.	10	11	18	12	S	4	0	F
69.	15	15	6	0	F	0	0	S
70.	11	13	4	0	F	2	0	F
71.	11	15	3	0	F	6	1	F
72.	9	11	19	3	F	14	6	F
73.	14	15	0	0	S	0	0	S
74.	4	4	7	0	F	2	2	S
75.	10	11	5	0	F	3	1	F
76.	6	7	14	2	F	3	0	F
77.	13	13	7	0	F	0	0	S
78.	11	12	1	0	F	0	0	S
79.	13	15	2	0	F	2	1	S
80.	5	7	7	2	F	3	0	F
81.	11	14	2	1	S	0	0	S
82.	11	13	7	1	F	4	0	F
83.	12	13	9	1	F	8	1	F
84.	15	15	11	6	S	2	0	F
85.	9	14	6	2	F	2	2	S
86.	6	6	8	3	F	5	2	F
87.	12	16	6	3	S	3	2	S
88.	12	14	6	4	S	0	0	S
89.	12	12	2	0	F	0	0	S
90.	10	12	7	1	F	3	0	F
91.	12	14	13	3	F	7	0	F
92.	16	17	0	0	S	0	0	S
93.	15	15	16	4	F	3	1	F
94.	13	13	13	6	F	5	1	F
95.	6	6	5	1	F	2	0	F
96.	9	14	2	0	F	12	4	F

Control Group--Continued

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
97.	8	11	9	2	F	2	2	S
98.	11	13	2	0	F	7	0	F
99.	8	12	10	5	S	8	3	F
100.	15	15	4	2	S	4	1	F
101.	16	18	9	0	F	9	1	F
102.	16	15	2	2	S	5	1	F
103.	8	13	10	4	F	1	1	S
104.	7	11	10	2	F	6	3	S
105.	6	13	13	2	F	18	3	F
106.	5	13	13	3	F	8	5	S
107.	11	16	2	1	S	3	2	S
108.	8	13	15	9	S	17	3	F
109.	17	16	0	0	S	1	0	F
110.	13	14	4	0	F	4	2	S
111.	11	14	4	1	F	9	3	F
112.	11	13	26	1	F	6	2	F
113.	14	17	2	2	S	13	7	S
114.	14	15	5	0	F	4	1	F
115.	17	18	9	3	F	5	1	F
116.	16	18	0	0	S	4	2	S
117.	9	11	3	1	F	9	2	F
118.	14	14	3	2	S	6	2	F
119.	13	13	9	2	F	7	1	F
120.	5	15	6	2	F	8	3	F
121.	12	14	1	0	F	4	1	F
122.	11	14	2	0	F	4	0	F
123.	17	16	8	1	F	9	2	F
124.	15	14	7	0	F	12	0	F
125.	9	9	7	1	F	5	0	F
126.	17	15	3	0	F	6	4	S
127.	14	15	5	0	F	6	1	F
128.	12	7	29	6	F	25	6	F
129.	11	10	14	3	F	15	4	F
130.	16	16	10	2	F	3	1	F
131.	10	10	9	1	F	7	1	F
132.	16	15	10	5	S	5	3	S
133.	9	12	2	0	F	4	2	S
134.	13	11	7	0	F	7	4	S

Control Group--Continued

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
135.	13	15	7	0	F	4	2	S
136.	12	13	8	3	F	12	3	F
137.	13	10	10	4	F	9	2	F
138.	11	16	5	2	F	13	4	F
139.	15	18	2	1	S	0	0	S
140.	17	17	0	0	S	2	1	S
141.	18	16	4	0	F	1	1	S
142.	17	16	1	1	S	6	1	F
143.	6	6	13	0	F	13	4	F
144.	13	10	9	5	S	13	5	F
145.	16	12	14	2	F	6	0	F
146.	18	13	6	2	F	2	2	S
147.	16	16	6	1	F	3	1	F
148.	16	15	4	3	S	3	1	F
149.	8	10	17	0	F	21	11	S
150.	16	15	2	1	S	2	0	F
151.	6	6	30	2	F	22	6	F
152.	12	8	28	1	F	18	0	F
153.	12	12	9	0	F	8	0	F
154.	4	8	32	9	F	12	7	S
155.	9	11	7	0	F	8	0	F
156.	16	15	2	0	F	6	0	F
157.	8	7	5	0	F	13	0	F
158.	10	13	13	0	F	6	1	F
159.	13	14	4	0	F	3	2	S
160.	13	13	15	3	F	2	0	F
161.	10	12	11	3	F	12	1	F
162.	18	18	2	0	F	1	0	F
163.	8	13	7	1	F	6	3	S
164.	13	16	12	2	F	9	1	F
165.	6	11	5	0	F	2	0	F
166.	13	14	10	2	F	7	3	F
167.	17	16	4	0	F	4	0	F
168.	13	15	2	0	F	2	1	S
169.	4	12	11	3	F	9	5	S
170.	5	8	5	4	S	16	1	F
171.	7	8	2	0	F	1	0	F
172.	9	14	9	0	F	17	6	F

Control Group--Continued

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
173.	5	11	6	1	F	26	7	F
174.	16	16	9	3	F	2	1	S
175.	11	15	5	0	F	2	0	F
176.	14	16	2	1	S	8	1	F
177.	13	13	5	0	F	5	0	F
178.	8	8	19	5	F	12	6	S
179.	9	13	18	3	F	9	3	F
180.	4	10	7	1	F	5	1	F
181.	8	13	13	3	F	4	1	F
182.	11	15	6	1	F	3	1	F
183.	14	15	3	3	S	2	1	S
184.	16	17	4	0	F	13	3	F
185.	12	16	10	0	F	2	1	S
186.	12	12	13	2	F	8	6	S
187.	3	10	8	0	F	11	3	F
188.	10	15	0	0	S	3	2	S
189.	14	15	4	0	F	4	2	S
190.	12	10	4	2	S	5	2	F
191.	6	14	6	1	F	3	1	F
192.	16	18	2	2	S	1	1	S
193.	13	18	5	0	F	6	3	S
194.	4	13	13	6	F	20	7	F
195.	9	15	6	1	F	2	0	F
196.	15	15	2	0	F	4	2	S
197.	13	9	6	2	F	8	1	F
198.	14	13	7	2	F	8	4	S
199.	15	18	2	0	F	0	0	S
200.	15	16	5	4	S	3	2	S
201.	11	10	5	0	F	22	2	F
202.	5	13	4	0	F	11	1	F
203.	9	12	2	0	F	5	3	S
204.	15	14	1	1	S	1	1	S
205.	6	9	12	5	F	10	2	F
206.	5	12	10	3	F	8	2	F
207.	12	14	11	1	F	9	0	F
208.	7	8	8	2	F	8	2	F
209.	12	12	7	3	F	11	1	F
210.	10	11	2	1	S	1	0	F

Control Group--Continued

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
211.	9	16	2	1	S	15	4	F
212.	16	17	2	0	F	2	1	S
213.	13	18	1	0	F	2	2	S
214.	11	16	2	1	S	11	5	F
215.	12	15	2	0	F	3	0	F
216.	15	17	4	1	F	0	0	S
217.	9	9	15	5	F	7	2	F
218.	14	16	1	1	S	1	1	S
219.	18	17	2	2	S	2	0	F
220.	7	14	14	8	S	12	2	F
221.	14	13	1	0	F	4	0	F
222.	12	16	5	0	F	3	3	S
223.	17	16	0	0	S	0	0	S
224.	16	15	4	1	F	1	0	F

Experimental Group

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
1.	10	18	11	0	F	2	0	F
2.	12	18	6	5	S	1	1	S
3.	16	17	12	2	F	2	2	S
4.	9	12	2	1	S	9	6	S
5.	7	10	18	3	F	20	15	S
6.	10	11	8	1	F	4	0	F
7.	9	18	1	0	F	3	0	F
8.	11	18	3	0	F	8	3	F
9.	11	15	5	1	F	8	3	F
10.	13	18	1	0	F	2	2	S
11.	8	15	16	6	F	13	4	F
12.	13	13	5	1	F	2	1	S
13.	11	14	31	6	F	9	2	F

Experimental Group--Continued

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
14.	16	18	5	3	S	2	1	S
15.	13	18	1	0	F	0	0	S
16.	17	18	0	0	S	1	1	S
17.	12	18	4	2	S	3	2	S
18.	16	17	4	1	F	0	0	S
19.	12	18	0	0	S	1	0	F
20.	11	18	7	1	F	2	0	F
21.	11	18	4	0	F	0	0	S
22.	11	15	5	0	F	2	0	F
23.	18	18	1	1	S	0	0	S
24.	14	18	16	3	F	2	2	S
25.	14	15	12	5	F	5	1	F
26.	18	18	2	0	F	1	0	F
27.	16	18	3	1	F	1	1	S
28.	16	18	2	1	S	1	1	S
29.	14	13	6	1	F	2	0	F
30.	6	10	20	2	F	6	2	F
31.	13	9	8	0	F	12	1	F
32.	13	16	3	0	F	3	3	S
33.	11	13	7	2	F	5	1	F
34.	10	13	16	1	F	10	3	F
35.	10	9	15	3	F	17	0	F
36.	6	10	12	1	F	21	2	F
37.	13	14	5	2	F	2	0	F
38.	8	7	5	0	F	44	0	F
39.	14	17	9	3	F	7	2	F
40.	14	16	2	0	F	2	1	S
41.	13	16	0	0	S	6	0	F
42.	15	16	20	6	F	9	2	F
43.	9	12	11	2	F	19	4	F
44.	16	18	4	1	F	5	2	F
45.	17	16	1	0	F	3	0	F
46.	17	16	1	0	F	0	0	S
47.	14	14	8	2	F	1	0	F
48.	11	16	12	1	F	6	4	S
49.	9	14	9	0	F	5	1	F
50.	13	15	5	2	F	3	3	S
51.	15	16	5	2	F	4	1	F

Experimental Group--Continued

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
52.	13	13	11	5	F	4	1	F
53.	12	10	18	3	F	6	0	F
54.	16	17	1	0	F	7	5	S
55.	13	15	9	1	F	4	1	F
56.	14	16	13	0	F	7	1	F
57.	13	9	30	2	F	17	0	F
58.	16	11	2	1	S	11	0	F
59.	14	18	6	0	F	4	1	F
60.	13	12	16	4	F	11	8	S
61.	11	18	9	1	F	4	2	S
62.	11	18	5	1	F	2	1	S
63.	14	17	6	3	S	14	2	F
64.	14	14	3	1	F	4	1	F
65.	16	18	7	1	F	1	1	S
66.	2	6	19	2	F	10	8	S
67.	8	13	17	5	F	8	0	F
68.	14	16	1	0	F	2	0	F
69.	13	16	2	0	F	1	0	F
70.	15	16	8	0	F	3	3	S
71.	11	15	5	0	F	5	2	F
72.	17	17	5	0	F	0	0	S
73.	14	16	0	0	S	6	1	F
74.	14	15	10	1	F	6	3	S
75.	12	12	25	9	F	7	2	F
76.	13	18	12	2	F	1	1	S
77.	13	15	15	6	F	6	1	F
78.	14	18	0	0	S	2	0	F
79.	16	18	7	2	F	4	1	F
80.	10	15	23	4	F	13	1	F
81.	16	16	2	2	S	0	0	S
82.	15	16	6	2	F	3	2	S
83.	16	16	8	2	F	2	1	S
84.	16	18	3	0	F	2	2	S
85.	16	17	0	0	S	6	3	S
86.	10	14	6	2	F	6	0	F
87.	17	18	2	0	F	1	0	F
88.	10	17	5	2	F	6	5	S
89.	12	15	4	3	S	1	1	S

Experimental Group--Continued

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
90.	3	13	12	1	F	11	6	S
91.	10	18	11	4	F	7	0	F
92.	4	6	2	0	F	9	3	F
93.	16	18	2	0	F	1	0	F
94.	9	16	5	1	F	5	1	F
95.	14	16	4	1	F	22	1	F
96.	15	18	1	1	S	6	2	F
97.	7	10	8	2	F	10	2	F
98.	17	18	0	0	S	1	0	F
99.	12	17	1	0	F	10	2	F
100.	10	14	22	3	F	3	2	S
101.	12	17	6	2	F	2	0	F
102.	10	17	8	0	F	3	0	F
103.	16	17	4	4	S	1	0	F
104.	18	17	9	6	S	7	5	S
105.	10	17	21	5	F	5	2	F
106.	13	12	8	1	F	10	0	F
107.	13	18	3	2	S	0	0	S
108.	18	18	12	1	F	3	2	S
109.	14	18	7	3	F	0	0	S
110.	12	18	2	0	F	15	9	S
111.	6	18	2	1	S	13	8	S
112.	15	18	2	0	F	4	1	F
113.	14	16	5	1	F	4	2	S
114.	12	13	9	3	F	13	6	F
115.	18	18	1	0	F	3	0	F
116.	13	18	0	0	S	0	0	S
117.	18	18	2	0	F	2	2	S
118.	18	16	4	0	F	4	0	F
119.	17	14	0	0	S	7	2	F
120.	18	18	5	1	F	0	0	S
121.	16	16	7	0	F	6	0	F
122.	18	18	1	0	F	0	0	S
123.	17	14	11	0	F	4	2	S
124.	18	18	7	4	S	14	7	S
125.	14	18	10	2	F	7	4	S
126.	16	16	1	1	S	1	0	F
127.	16	17	8	5	S	4	0	F

Experimental Group--Continued

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
128.	7	8	46	13	F	30	10	F
129.	9	12	6	3	S	2	1	S
130.	1	13	18	3	F	15	3	F
131.	9	17	1	0	F	2	0	F
132.	8	15	8	6	S	8	1	F
133.	18	18	0	0	S	0	0	S
134.	8	17	5	0	F	4	3	S
135.	3	17	17	2	F	9	2	F
136.	12	17	10	1	F	7	2	F
137.	7	17	35	3	F	21	4	F
138.	15	17	5	0	F	3	0	F
139.	3	9	43	13	F	48	35	S
140.	10	17	15	1	F	7	2	F
141.	8	16	20	1	F	18	5	F
142.	15	17	14	2	F	6	0	F
143.	11	15	11	1	F	2	0	F
144.	15	18	2	0	F	0	0	S
145.	6	16	8	2	F	13	6	F
146.	9	11	26	2	F	22	3	F
147.	14	17	8	0	F	0	0	S
148.	9	11	2	0	F	8	4	S
149.	1	11	51	8	F	52	20	F
150.	15	16	6	0	F	5	1	F
151.	5	12	7	0	F	4	2	S
152.	14	17	2	0	F	12	4	F
153.	7	11	18	10	S	10	8	S
154.	14	17	6	5	S	5	2	F
155.	6	15	10	5	S	4	1	F
156.	5	14	19	6	F	5	3	S
157.	6	16	9	4	F	26	8	F
158.	11	16	5	3	S	3	1	F
159.	7	17	10	6	S	6	1	F
160.	12	17	1	0	F	2	2	S
161.	6	10	11	8	S	1	0	F
162.	11	15	8	0	F	8	7	S
163.	7	14	8	3	F	11	6	S
164.	16	18	6	1	F	10	5	S
165.	4	14	22	8	F	26	23	S

Experimental Group--Continued

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
166.	11	17	12	5	F	3	0	F
167.	9	16	5	0	F	14	4	F
168.	8	17	3	0	F	1	1	S
169.	5	16	20	7	F	13	5	F
170.	11	17	6	0	F	1	0	F
171.	14	18	5	0	F	1	0	F
172.	10	18	4	3	S	3	1	F
173.	14	18	3	0	F	1	1	S
174.	10	16	4	3	S	1	1	S
175.	12	18	5	1	F	4	1	F
176.	8	14	9	0	F	4	4	S
177.	12	17	5	3	S	2	1	S
178.	9	14	9	1	F	6	1	F
179.	12	18	6	2	F	5	0	F
180.	7	9	11	0	F	26	6	F
181.	13	17	6	0	F	4	0	F
182.	17	18	0	0	S	1	0	F
183.	18	18	3	0	F	1	1	S
184.	9	15	5	0	F	4	0	F
185.	14	10	6	0	F	6	0	F
186.	14	17	4	1	F	8	1	F
187.	18	18	0	0	S	1	0	F
188.	8	11	16	5	F	6	2	F
189.	10	15	9	3	F	3	1	F
190.	11	12	13	3	F	5	1	F
191.	15	18	1	0	F	4	1	F
192.	14	18	3	0	F	6	1	F
193.	18	18	2	0	F	1	1	S
194.	16	18	2	1	S	10	0	F
195.	15	18	8	1	F	0	0	S
196.	16	18	2	0	F	1	0	F
197.	12	16	7	1	F	6	1	F
198.	11	15	4	1	F	6	4	S
199.	8	14	4	1	F	2	1	S
200.	15	18	4	1	F	1	0	F
201.	8	8	11	2	F	13	2	F
202.	12	17	4	0	F	11	3	F
203.	16	17	4	2	S	3	0	F

Experimental Group--Continued

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
204.	12	18	6	1	F	2	0	F
205.	12	16	7	5	S	4	1	F
206.	11	14	3	1	F	6	1	F
207.	18	18	3	0	F	0	0	S
208.	10	11	7	1	F	8	3	F
209.	17	18	1	0	F	3	2	S
210.	16	18	1	0	F	4	3	S

APPENDIX D

FORMULAS USED IN TREATMENT OF DATA

The Chi Square Test of Significance (Uncorrelated Data)

$$\text{Chi Square (Corrected for Continuity)} = \frac{N\left(\left|bc-ad\right| - \frac{N}{2}\right)^2}{(a+c)(b+d)(a+b)(c+d)}$$

$$\text{Chi Square} = \frac{434\left(\left|(107)(130) - (103)(94)\right| - \frac{434}{2}\right)^2}{(233)(201)(210)(224)}$$

$$= 3.17 \quad \text{(Table 4)}$$

$$\text{Chi Square} = \frac{434\left(\left|(134)(155) - (76)(69)\right| - \frac{434}{2}\right)^2}{(231)(203)(210)(224)}$$

$$= 46.1 \quad \text{(Table 7)}$$

The Chi Square Test of Significance (Correlated Data)

$$\text{Chi Square (Corrected for Continuity)} = \frac{(|d-a|-1)^2}{\frac{N^2}{d+a}} = \frac{(|d-a|-1)^2}{d+a}$$

$$\text{Chi Square} = \frac{(|49-25|-1)^2}{74} = 7.15 \quad \text{(Table 8)}$$

$$\text{Chi Square} = \frac{(|62-24|-1)^2}{86} = 15.92 \quad \text{(Table 9)}$$

The Chi Square Test of Significance (Uncorrelated Data)

$$\text{Chi Square (Corrected for Continuity)} = \frac{N\left(\left|bc-ad\right|-\frac{N}{2}\right)^2}{(a+c)(b+d)(a+b)(c+d)}$$

$$\text{Chi Square} = \frac{434\left(\left|(44)(174)-(166)(50)\right|-\frac{434}{2}\right)^2}{(340)(94)(210)(224)}$$

$$= .21 \quad \text{(Table 10)}$$

$$\text{Chi Square} = \frac{434\left(\left|(82)(150)-(128)(74)\right|-\frac{434}{2}\right)^2}{(278)(156)(210)(224)}$$

$$= 1.45 \quad \text{(Table 11)}$$