AN ABSTRACT OF THE THESIS OF

<u>Betty Lou Carman</u> for the degree of <u>Master of Arts</u>

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Title: <u>AN ATTEMPTED STANDARDIZATION OF READING AND</u>

<u>WRITING SKILLS TEST USED AT OREGON STATE</u>

<u>UNIVERSITY'S SKILLS CENTER</u>

Abstract approved: *Redacted for Privacy*
_____
Dr. Faith Norris

The objective of the investigator in carrying out this study is: to evaluate the reliability and validity of the ENGLISH SKILLS TEST-REVISED (EST-R); to construct local norms based on a small sample of subjects from Oregon State University's WR. 40X; to investigate the statistical terms and methods used in educational test standardizations; to review standardized tests used for placement in college English programs; to probe the general issue of campus communication skills centers; and to study the application of reading instruction in remedial English programs.

The EST-R is a revision of the test currently used by several departments at Oregon State University as an English proficiency test. It is also used by the Communication Skills Center for placement in English composition classes. The test consists of five subtests: Reading, Spelling, Grammatical Usage, Vocabulary and Essay

Correction. This study outlines administration and scoring procedures and provides information regarding assessment of EST-R scores.

The standardization is based on three EST-R administrations: as a pre-test to 33 WR. 40X students; as a post-test to 16 WR. 40X students; and as a pre-test to 45 WR. 230 students. Test scores, frequencies, mean, median, standard deviation and range for each group are given for the Reading Test and for the combined Spelling, Grammatical Usage, Vocabulary and Essay Correction test. Transformed scores (percentile rank, z- and Z-scores) are provided for the Wr. 40X Reading pre-test and combined pre-test.

The Kuder-Richardson 20 (K-R 20) subtest reliability for the tested groups ranges from -0.059 to 0.891. The K-R 20 reliability of the Spelling, Grammatical Usage, Vocabulary and Essary Correction tests combined ranges from 0.750 to 0.849.

Criterion-related validity was explored using validity coefficients and group separation. This data indicates the EST-R is a valid indicator of the effects of WR. 40X instruction.

AN ATTEMPTED STANDARDIZATION OF
A READING AND WRITING SKILLS TEST
USED AT OREGON STATE UNIVERSITY'S
COMMUNICATION SKILLS CENTER

by

Betty Lou Carman

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I. INTRODUCTION

One of the developments in higher education during the last two decades is the recognition that not all students who are accepted into universities are adequately prepared to survive the challenge. This dilemma has prompted many institutions to set up learning centers to serve the needs of their open-enrollment constituency. These usually offer a variety of services, including diagnosis of skill weaknesses, auto-instructional skill lessons, tutoring, and placement counseling.

There are two major subdivisions of learning facilities: those which give mathamatics instruction and those which offer English/study skills assistance. Both mathamatics and language skills centers are common, but, it seems likely that, because every student must be able to read, write and study (and because English skills among college students seem to be declining more rapidly than mathamatics skills), English skills centers may be found on more community college and university campuses than can mathamatics centers.

This study is an outgrowth of the investigator's two-year experience as a graduate teaching assistant at one

such learning center, Oregon State University's Communication Skills Center (CSC). The CSC offers a number of services to students including: study skills lectures to living groups as well as individual tutoring; individualized reading instruction by graduate students in reading; writing tutoring; vocabulary classes; self-instructional packages for grammar, usage, punctuation, spelling and paper organization; individual help with resumes, theses, papers, and reports; and WR. 40X, a remedial English class for students who need supplemental instruction prior to enrolling in freshman composition (WR. 121). The Center also offers to the university an English proficiency test (the ENGLISH SKILLS TEST). Several schools, including Forestry, Health, P.E., and Agriculture, require that all their students pass this examination before they may graduate.

The ENGLISH SKILLS TEST (EST) is also used as a tool to determine placement in some English classes. At the beginning of the term, each freshman composition student is given the test, and, if the instructor decides remedial work is appropriate, the student is then transferred to WR. 40X.

The EST is also used to help the CSC assess the effectiveness of WR. 40X instruction. Students take the test at the beginning and the end of the course and scores

are compared. Since one objective of 40X instruction is to raise the student's skills to a level sufficient to enable him to pass the EST, it is hoped that each student will pass the post test or, at the very least, show some improvement in score. The test score does not, however, figure into the student's 40X grade; whether he receives an I, P, or N is dependent solely on his performance on regular 40X coursework.

The English Skills Test was developed by the staff of the CSC with the cooperation of members of the English Department and has been in use since fall, 1976. It consists of four subtests: Grammatical Usage, Spelling, Vocabulary and Essay Correction. Each of these is scored separately, and the independent subtest scores are interpreted as being broadly diagnostic. The scoring is non-compensatory; if a student's score falls below the passing level on any subtest, he is considered skill-deficient in that area, and some sort of remedial work is required--depending upon the particular use being made of the EST.

Because the test is locally written and relatively new, no standardization has been performed. Little information is available regarding reliability, and test validity has not been systematically approached and questioned. These shortcomings have proved to be

disadvantageous in the investigator's work, both as tutor of writing skills and as 40X teacher at the Communication Skills Center. The purpose of this study, therefore, is to provide the first step toward standardization of the EST, i.e., to analyze the test and construct a set of local norms.

In conducting this study, the investigator made one major revision of the previous form of the EST; a ten-minute reading subtest was added in the belief that reading skills are an integral part of language skill. In order to keep the test within the 50-minute class period time limit, the vocabulary test was shortened (from 15 to 10 items) as was the spelling test (from 24 to 10 items). The format of the latter was also changed, however, so that 40 spelling words could be tested rather than just 24. Hundreds of students have already taken the original EST, so the questions used on both vocabulary and spelling tests were changed. (These are the easiest to memorize and pass on to a friend.) The Grammatical Usage and Essay Correction sections were left unchanged.

The testing population used for this study consisted of two groups: the spring 1977 WR. 40X class to whom a pre-test and post-test of the revised EST (EST-R) were given, and a Writing 230 class, i.e., students who had successfully completed regular freshman composition.

II. REVIEW OF LITERATURE

A. Skills Centers

Most language skills centers seem to be an institutional response to the fact that more students than ever before are entering post-secondary education without the English skills prerequisite to academic success. There is a great deal of disagreement regarding the reason for the decline of language proficiency among post-secondary students; some complain of a deterioration in the quality of English instruction at the grade and high school levels, while others attribute the lower skills range to the open-enrollment policy adopted by many universities.[1] Such policies, it is argued, entice speakers of dialects other than standard English to college campuses where they have much difficulty meeting the demands to read, write and speak standard English. It seems likely that both ineffective skill instruction and open enrollment as well as other factors (e.g., the rise in popularity of television viewing at the expense of recreational reading) contribute to the problem.

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[1]Arthur H. King, "Notes on Remedial English at the Higher Education Level," ENGLISH LANGUAGE TEACHER, XXVII (June, 1973), 245.

Although the goal of every skill center is to assist students requiring remedial English training, there are great inter-campus differences in the constituent teaching staff, the philosophical organization, the materials and methods used to meet this goal.

Some learning centers are staffed by regular members of the school's English department;[2] however, many argue, as does Arthur H. King, that few university instructors are adequately trained to deal with, or sufficiently enthusiastic about coping with, the level of remedial work required by many students.[3] One alternative is to hire a team of specialists, but this incurs higher costs than most colleges can sustain. A more commonplace resolution of this problem is the employment of student teachers supervised by one or more specialists. In most colleges, (e.g., Oregon State University) student tutors are paid through teaching assistantships or work-study programs; but some schools, like Miami-Dade Community College[4] staff their centers with supervised student volunteers who

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[2]Ada Y. Hatch, "Reading-Centered Composition Course," JUNIOR COLLEGE JOURNAL, XXVI (March, 1956), 395-99.

[3]King, "Notes on Remedial English," pp. 245-50.

[4]Grace W. Welch, "Organizing a Reading and Writing Laboratory in which Students Teach," COLLEGE COMPOSITION AND COMMUNICATION, XXV (December, 1974), 437-39.

receive academic credit rather than remuneration for their work.

The employment of peer tutors makes sense from more than a merely fiscal standpoint. Since much of the instruction consists of individualized learning packages, the demands of teaching are limited to tasks well within the ability of most tutors. An extra advantage of student-operated centers is that such facilities are much more likely to provide the relaxed, non-threatening atmosphere so essential to attracting remedial students.[5]

Centers on different campuses also differ in the way students enter remedial instruction. Some run strictly voluntary, drop-in programs[6] while others draw their constituency from referrals by English professors.[7] These referrals may come as a result of classroom placement testing or informal diagnosis. Most educators would agree with Arthur King that "English is not simply a skill to be learned in English periods but a means of teaching and

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[5]Welch, "Organizing a Reading and Writing Laboratory," p. 438.

[6]Ibid., p. 437.

[7]John W. Gregory, "An Approach to Functional English in a Four-Year Junior College," JUNIOR COLLEGE JOURNAL XXIX (December, 1958), 203-5.

learning other subjects;"[8] the staffs of many learning centers, however, are only now successfully convincing departments other than English that they, too, share responsibility for the English skill levels of their students.

In addition to inter-campus differences in the procurement of learning center students, there are also a variety of ways in which instruction is carried out. A few centers group students into remedial classes which meet regularly and are traditionally structured. These classes are usually supplemented by individualized (usually self-instructional) skill lessons in spelling, agreement or other areas of particular weakness.[9] Other centers are organized for strictly individualized tutoring or lesson packages. Some facilities, like Oregon State University's Communication Skills Center, offer both remedial coursework for those with broad-based skill deficiencies and tutoring or individualized instruction packages for those with more specific handicaps.

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[8]King, "Notes on Remedial English," p. 245.

[9]Gregory, "An Approach to Functional English, p. 205.

B.   Reading in Remedial English Programs

Although most educators would agree that reading is a language skill, some colleges still do not include reading instruction in their remedial language skills centers.   In some instances the reason for this exclusion may be the added expense of instructional materials and personnel.   In many cases, however, reading is not taught on campuses for the same reason that spelling was not taught there twenty years ago; i.e., reading is not deemed by many as an appropriate college subject. It has taken some time to recognize, and answer to, the needs for remedial grammar, punctuation and spelling at the college level, and it may take the best arguments of reading proponents, as well as the evidence offered by existing programs, to convince some academicians to include reading instruction in remedial English.

One remedial program incorporating reading and writing skills instruction is that offered at Miami-Dade Community College's Skill Center. This student-taught center draws its volunteer constituency primarily from composition instructor's referrals. The success of the Center's work is documented in one study by an 8% decrease in drop rate from composition classes among students who participated in

the multiple skills remedial work.[10]

A similar voluntary program of "concentrated work in reading and writing skills" is offered by Brooklyn College's Basic Skills Center.[11] Here, studies indicate that students who received reading instruction showed appreciable gains above those of a control group in reading rate and vocabulary, both skills important to success in English and other academic coursework.

At Staten Island Community College, reading is incorporated into not only remedial instruction but regular-track English, as well. The objectives of the English staff are to:

> Teach the student, regardless of his background, ability, or purpose, to develop to the limits of his capacity his use of the various communication skills, particularly reading, writing, speaking and listening.[12]

Both staff and students report satisfaction with the results of remediation.

Another school which emphasizes reading instruction in all levels of freshman English is Boise Junior College (now

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[10]Welch, "Organizing a Reading and Writing Laboratory," p.437-39.

[11]Shirley W. Wedeen, "Two-Year Basic Skills Study," JOURNAL OF READING, X (January, 1967), 231-37.

[12]Sanford Radnor, "A Three-Track Community College English Program," JUNIOR COLLEGE JOURNAL, XXIX (October, 1958), 97.

Boise State College). The composition courses there are described as "reading-centered," and the school's stated goal is that of helping "the student acquire the basic skills in effective reading and in oral and written communication."[13] In addition to the basic reading skills, the Boise approach stresses reading techniques for math, the sciences, and engineering. This program, too, is rated successful by students and staff.

A similar outline for remedial English is used at Quinsigamond Junior College. The skills course there includes reading, composition and speech skills in a four-hour single semester course. Instruction has been so successful that GPA increases and a decrease in attrition are reported among students completing the course.[14]

The staff of Emory-at-Oxford also believes that "English should now include the broad areas of language arts (reading, writing, speaking and listening)."[15] The reading instruction offered in the college's remedial English program includes content area skills applicable to

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[13]Hatch, "Reading-Centered Composition,"p.395.

[14]James W. Brown, Margaret Watson, and Robert Bowden, "Building Basic Skills at the Community College Level: A New Approach," JOURNAL OF THE READING SPECIALIST, IX (May, 1970), 144-50, 58.

[15]Gregory, "An Approach to Functional English," p. 203.

the individual student's academic concentration.

A similar curriculum incorporating reading skill development into remedial English instruction has also met with success at Wingate Junior College.[16]

What is the rationale behind all these programs which include reading instruction in English skill remediation? Perhaps John Weber best sums up the arguments of most reading proponents when he says:

> Reading is such an important factor for success in English, not to mention in other work and perhaps life after college,. . .that reading improvement should be an integral part of remedial English.[17]

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[16]Ethel K. Smith, "Remedial Work in English at Wingate Junior College," JUNIOR COLLEGE JOURNAL, XXVI (March, 1956), 400-4.

[17]John Weber, "Recommendations for Better English Instruction," JUNIOR COLLEGE JOURNAL, XXXVIII (February, 1968), 34.

C. College-Level English Placement Tests

Freshman English placement testing has long been customary on many college campuses, and yet there is still no consensus about which test, or what kind of test, should be administered. One national study of higher learning institutions which use such examinations revealed that 27 different tests were used. Of the 142 schools studied, 130 used standardized tests available in print; six used locally devised tests and six employed tests which, though printed, were used by only one university.[18]

Aside from the controversy regarding the particular choice of placement test, there is also widespread disagreement about whether an objective test, a writing sample, or both, should be administered. Those who favor a written test argue:

> Freshman English is a course of writing; therefore, a speciman of writing is the only valid evidence of ability to cope with the course.[19]

Detractors contend that written tests create problems both because of the time required to score them and because

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[18]John I. Goodlad, "Diagnosis and Prescription in Educational Practice," EDUCATION DIGEST, XXXI (May, 1966), 8-11.

[19]Kenneth L. Knickerbocker, "Placement of Freshmen in First-Quarter English," JOURNAL OF HIGHER EDUCATION, XXII (April, 1951), 211.

the grading of such tests is necessarily subjective and, therefore, unreliable. A well-written objective test, it is argued, can not only test writing ability, but can save time and money as well as provide for scoring consistency.[20]

Still other educators advocate using both objective tests and writing samples for placement. This seems to be a good compromise, but the problems of reliability and expense of grading written work remain. In addition, the correlation of the two tests is not so simple.[21] Should they be given equal weight? What if one test predicts success and the other predicts failure?

One professor addressed this dilemma by studying the accuracy of composition grade prediction provided by an objective test and a combination of both written and objective tests. He concluded that "The objective test [alone] is a more reliable and vastly simpler predictor of performance."[22]

This conclusion is perhaps supported by the producers of standardized tests. Of the five college-level English

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[20]Knickerbocker, p. 212.

[21]Ibid., p. 211.

[22]Ibid., p. 214.

placement tests which Oscar K. Buros considers important enough to review in the seventh edition of MENTAL MEASUREMENTS YEARBOOK, three are solely objective,[23] and two[24] are objective tests with optional, unstandardized writing sample subtests.

The CLEP SUBJECT EXAMINATION IN ENGLISH COMPOSITION, although it offers both objective and writing subtests, provides neither scoring advice nor standardization for its writing test. The objective test consists of four types of questions: error-recognition in which sentence errors must be picked out but not identified by name; analysis of paragraphs (essentially a reading skill test); a section testing "the students' knowledge of the history of the English language and of modern English grammar;"[25] and a group of sentence-conversion items wherein the student is directed to perform such tasks as "substitute an infinitive for the first gerund."[26] Because of the heavy emphasis

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[23]COLLEGE PLACEMENT TEST IN ENGLISH COMPOSITION, MISSOURI COLLEGE ENGLISH TEST, and WRITING TEST:MCGRAW-HILL BASIC SKILLS SYSTEM.

[24]CLEP SUBJECT EXAMINATION IN ENGLISH COMPOSITION and COLLEGE ENGLISH PLACEMENT TEST.

[25]Oscar K. Buros, THE MENTAL MEASUREMENTS YEARBOOK (Highland Park: Gryphon Press, 1972), p. 186.

[26]Ibid.

upon technical terms and language history, the CLEP test is appropriate only for determining placement in the most tightly traditional English courses.

The COLLEGE ENGLISH PLACEMENT TEST also includes an unstandardized writing test with a standardized objective subtest. The latter largely ignores grammar, mechanics and spelling and concentrates on higher level skills such as:

> judgements relating to the selection of a subject for a composition; identification of dominant, subordinate and irrelevant topics from unorganized data; distinguishing which sentence in a group is most effectively expressed.[27]

Since these skills go beyond sentence structure to focus on paragraph development and style matters, this test might work well for separating advanced placement and regular track composition students. It would, however, be of little use with remedial students.

The COLLEGE PLACEMENT TEST IN ENGLISH COMPOSITION offers only objective items. Faulty diction, grammar and sentence structure are adequately covered, but organization, punctuation and spelling are almost ignored, leaving gaps in information regarding student skills.

The MISSOURI COLLEGE ENGLISH TEST is a power (speeded) test which is applauded for the "technical excellence of

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[27]Buros, p. 189.

its standardization."[28] It also covers a wide skills range, but the effectiveness of the test is somewhat undercut by the format of two-thirds of its questions. Examinees are told to determine whether underlined segments of themes contain errors of capitalization, grammar, punctuation, spelling or no errors. In a number of questions, however, one or more responses may be automatically eliminated, leaving as few as two possible answers.

The WRITING TEST:MCGRAW-HILL BASIC SKILLS SYSTEM is a better-written test which "offers many interesting exercises and represents a commendable effort at measuring important skills;"[29] but it is only casually normed and validated. The publishers advise construction of local norms.

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[28]Buros, p. 201.

[29]Ibid., p. 214.

D.   Statistical Terms and Methods

A number of statistical formulas were used in this study. One of the most basic expressions is that of the mean (the arithmetic average).

(1.) $\bar{X} = \dfrac{\Sigma X}{n}$

Where: $\bar{X}$ = mean

ΣX = the sum of all test scores

n = the number of scores

The standard deviation is a measure of variability which indicates the dispersion of scores.

(2.) $s = \dfrac{1}{n} \sqrt{n\Sigma X^2 - (\Sigma X)^2}$

Where: s = standard deviation

n = the number of scores

ΣX^2 = the sum of the squares of all scores

ΣX = the sum of all test scores

(3.) The variance (s^2) is a measure of total variability in a group of test scores. It is the square of the standard deviation.

A correlation coefficient is used to indicate the relationship between two sets of data. One such coefficient, in this case showing the correlation between

two tests, is secured by application of the Pearson product-moment technique.

(4.) $$r = \frac{n\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{n\Sigma X^2 - (\Sigma X)^2} \ \sqrt{n\Sigma Y^2 - (\Sigma Y)^2}}$$

Where: r = coefficient of correlation

n = the number of scores

XY = the sum of the cross-products of each pair of scores (X represents score on one test; Y represents score on another.)

X = the sum of all X-test scores

X^2 = the sum of the squares of all X-test scores

Y = the sum of all Y-test scores

Y^2 = the sum of the squares of all Y-test scores

The point-biserial correlation is a product-moment coefficient designed to show the relationship between a continuous measure (such as test score) and a dichotomous measure (e.g., success or failure).

(5.) $$r_{pb} = \frac{\bar{X}_a - \bar{X}_t}{s_t} \sqrt{\frac{p}{q}}$$

Where: r_{pb} = point-biserial correlation

X_a = mean of group A

X_t = mean of total group

s = standard deviation of total group

p = number of people in group A (e.g., number of people who succeeded

q = number of people in group B (e.g., number of people who failed.

The Kuder-Richardson formula 20 (K-R 20) procedure yields a reliability coefficient. It provides an index of consistency or homogeneity within a test, indicating the relationship among the test items.

(6.) $$r_{kk} = \frac{k}{k-1} \left[\frac{s^2 - \Sigma p_i q_i}{s^2} \right]$$

Where: r_{kk} = K-R 20 reliability coefficient

s^2 = the variance of total test scores

p_i = the proportion of people passing an item

$q_i = 1 - p_j$ = the proportion of people failing an item

The standard error of measurement represents the standard deviation of a test's errors of measurement and provides an index of the anticipated variability of obtained scores around the true score.

(7.) $$SEm = s\sqrt{1 - r_{kk}}$$

Where: SEm = standard error of measurement

s = standard deviation

r_{kk} = the reliability

A t-test provides criteria for determining the significance of an obtained difference between two sample means. As applied to the present study:

(8.) $$t = \frac{\bar{X}_s - \bar{X}_u}{(s_s^2/n_s) + (s_u^2/n_u)}$$

Where: t = the ratio of mean difference to the standard error of the difference

t = D/SE

$\bar{X}_s$ = mean of successful (passing) students

$\bar{X}_u$ = mean of unsuccessful (failing) students

s_s^2 = variance of successful students

s_u^2 = variance of unsuccessful students

n_s = number of successful students

n_u = number of unsuccessful students

To secure a value of t for the difference between the means for the same test administered to the same group on two different occasions, we must first find the standard error of the difference between correlated means:

(9.) $$SE_D = \sqrt{(SEm_1)^2 + (SEm_2)^2 - 2(r_{12})(SEm_1)(SEm_2)}$$

Where: SE_D = standard error of difference between correlated means

SEm_1 = standard error of measurement for first test administration

SEm_2 = standard error of measurement for second test administration

r_{12} = Pearson product-moment correlation coefficient for first and second administrations of test

In this particular application:

(10.) $$SEm = \frac{s}{\sqrt{n - 1}}$$

Where: SEm = standard error of meansurement

s = standard deviation

n = number of test scores

Standard scores provide a means of converting raw scores to norm-referenced scores. One type of standard score is the z-score which expresses scores on a scale having a mean of zero and a standard deviation of one.

(11.) $$z = \frac{X - \bar{X}}{s}$$

Where: z = z-score

X = the individual's score

$\bar{X}$ = the test (entire group) mean

s = the standard deviation of the test

To eliminate negative numbers we may convert z-scores to Z-scores. The latter express individuals' scores on a scale with a mean of 50 and a standard deviation of 10.

(12.) $\quad Z = 50 + 10z$

Where: Z = the individual's Z-score

z = the individual's z-score[30]

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[30]Formulas 5, 9 and 10 above are from Henry E. Garrett's STATISTICS IN PSYCHOLOGY AND EDUCATION, sixth edition. All other formulas are from Frederick G. Brown's PRINCIPLES OF EDUCATIONAL AND PSYCHOLOGICAL TESTING, second edition.

III. THE ENGLISH SKILLS TEST-REVISED

A. Administration

Preparation

The ENGLISH SKILLS TEST-REVISED (EST-R)[31] has two time limits. The Reading subtest (questions 1-30) is a speed test and is timed at 10 minutes.[32] The remainder of the test is timed at 40 minutes. This should allow ample time for most students to complete subtests two through five.

Prior to giving the test the administrator should be sure to have sufficient supplies of tests, answer sheets and #2 pencils with good erasers. He must also have a reliable watch or clock with which to time the test.

The examination room should afford a comfortable testing environment. When large groups are being tested, enough room should be provided so that students may sit with one empty desk separating them.

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[31]The EST-R is currently in use and, therefore, will not be published herein. Qualified persons may receive copies of the test upon inquiry to Betty Lou Carman, 1104 NW 29th Street, Corvallis, Oregon, 97330.

[32]The Reading subtest contains seven reading selections which range from 16 to 312 words long. Included are passages from science, English, and social studies texts, as well as excerpts from poetry and newspapers.

Students should be told about the test and what it will be used for prior to administration.

Directions for Administration

When all students are seated, say:

"Clear your desks completely. A pencil will be provided."

Now pass out one #2 pencil and one answer sheet to each student. Say:

"Fill in the area at the top of your answer sheet. Write in your name and social security number. Be sure to also darken the appropriate spaces below your name and social security number. Are there any questions about how to fill out your answer sheet?"

Answer questions. Give students sufficient time to complete this task. Say:

"As you answer the test questions, be sure to make distinct, dark marks in the appropriate spaces on the answer sheet. If you wish to change an answer, erase thoroughly. Make no marks on the test itself. You will be given 10 minutes to do the Reading subtest, questions 1 to 30. Are there any questions?"

Answer questions. Pass out tests. Say:

"You may begin the Reading Test."

After 10 minutes say:

"Stop. Now turn ahead in your test booklet to the Spelling Test. Be sure to also move up on your answer sheet to question 31. Do not go back to work on the Reading Test; it is a special speeded test and we want everyone to have had the same amount of time on it. You will have 40 minutes to complete the remainder of the test. In that time you will do the Spelling Test, the Grammatical Usage Test, the Vocabulary Test, and the Essay Correction Test. Are there any questions?"

Answer appropriate questions concerning test administration, e.g., there is no penalty for incorrect responses. Say:

"When you have finished, turn in your pencil, answer sheet and test. Ready? Begin."

After 40 minutes say:

"Stop."

Collect all test materials.

B. Scoring

1. Reading

a. Speed Score

An ample 40% of reading test time is allowed to re-scan reading selections in response to questions, and to find and mark desired choice on the answer sheet; the reading rate figures, then, are calculated on the basis of six minutes actual reading time. The Reading Test Speed Chart (table I) shows the approximate rate (in words per minute) achieved according to the last response made on the Reading Test. For example, if the last item answered by a student is number 13, his approximate Reading Test rate would be 136 words per minute (wpm).

TABLE I.   READING TEST SPEED CHART

Last Question Answered	WPM	Last Question Answered	WPM	Last Question Answered	WPM
1	72	11	131	21	214
2	74	12	133	22	218
3	74	13	136	23	219
4	77	14	137	24	222
5	69	15	145	25	224
6	84	16	184	26	274
7	87	17	189	27	276
8	96	18	193	28	278
9	102	19	196	29	280
10	103	20	199	30	284

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b. Comprehension Score

The comprehension score is computed by dividing the number of the last Reading Test question answered into the number of correct responses. The quotient is then multiplied by 100. The resulting figure represents a comprehension percentage score, i.e., the percent of questions which were attempted (or skipped) by that student at that speed.

For example, let us say that the last question to which the student responded was number 16. His approximate rate would then be 184 wpm. If, out of the 16 questions, he answered 12 correctly, his comprehension percentage is 12/16 X 100 or 75% at 184 wpm.

c. Evaluation

This test is meant to be diagnostic in only the broadest sense. It will not delineate particular weaknesses, but will provide an approximate reading speed and comprehension score. The intent here is to make students aware of their skill deficiencies and to alert them to the services they may receive from the reading improvement staff at the Communication Skills Center.

It is impossible to set universally agreeable cutting scores; standards differ and it is likely that many

teachers will choose for themselves a level at which they believe remedial or developmental reading instruction should be recommended. These recommendations may be made using a percentile rank cutting point (e.g., everyone whose score on comprehension or speed falls below a given percentile is referred for instruction), or by setting an arbitrary comprehension rate and speed score as cutting points.

Another approach is to inform the student of his approximate reading rate and comprehension score, advise him of his percentile rank in the class (this information will be given for tests scored by Oregon State University's Computer Center) and leave to him/her the decision about whether or not he needs reading instruction.

Students should, however, be advised that anyone whose reading speed is less than 150 wpm or whose comprehension rate is less than 60% is likely to find his college work severely handicapped by his reading ability.

2. Scoring Spelling, Grammatical Usage, Vocabulary, and Essay Correction

The scoring of the Spelling, Grammatical Usage, Vocabulary and Essay Correction subtests is simpler than that of the Reading Test. Computer scoring gives the

number each student answers correctly on each subtest. To hand score, use the key obtainable from the CSC and count the correct responses in each subtest.

If scores are used for placement in English classes, or as an indication of English proficiency as required by the schools of Agriculture, Forestry, and Health and P.E., the cutting scores agreed upon by these schools must be observed. The minimum passing scores are: Spelling Test, 15 correct; Grammatical Usage Test, 20 correct; Vocabulary Test, 7 correct; Essay Correction Test, 25 correct.

These same standards may apply if the test is used to find areas of skill weakness so that students may be referred to the Communication Skills Center for tutoring.

C. Description of Test Results

This study is based on three administrations of the EST-R: one as a pre-test to 33 WR. 40X students; one as a post-test to the 16 students remaining in 40X at the end of the term; and one as a pretest to 45 WR. 230 students. All administrations were made during spring term, 1977, at Oregon State University.

Table II and table III show test scores and frequencies for the Reading Test and for the combined Spelling, Grammatical Usage, Vocabulary and Essay Correction tests administered to students prior to 40X instruction.

TABLE II. WR. 40X READING PRE-TEST

Score	Frequency	Cumulative Frequency	Score	Frequency	Cumulative Frequency
2	2	2	13	1	23
3	0	2	14	2	25
4	4	6	15	0	25
5	1	7	16	2	27
6	4	11	17	2	29
7	1	12	18	1	30
8	2	14	19	1	31
9	3	17	20	1	32
10	4	21	21	0	32
11	1	22	22	1	33
12	0	22			

Mean = 10.18   Standard Deviation = 5.54
Median = 9   Range = 21

TABLE III.   WR. 40X PRE-TEST

SPELLING, GRAMMATICAL USAGE,
VOCABULARY AND ESSAY CORRECTION COMBINED

Score	Frequency	Cumulative Frequency	Score	Frequency	Cumulative Frequency
22	1	1	46	0	8
23	0	1	47	1	9
24	0	1	48	4	13
25	0	1	49	1	14
26	0	1	50	0	14
27	0	1	51	3	17
28	0	1	52	1	18
29	0	1	53	0	18
30	0	1	54	1	19
31	0	1	55	0	19
32	0	1	56	1	20
33	1	2	57	2	22
34	0	2	58	2	24
35	0	2	59	1	25
36	0	2	60	1	26
37	0	2	61	1	27
38	0	2	62	1	28
39	0	2	63	1	29
40	1	3	64	0	29
41	1	4	65	1	30
42	2	6	66	2	32
43	0	6	67	0	32
44	1	7	68	1	33
45	1	8			

Mean = 51.88   Standard Deviation = 10.18
Median = 51   Range = 47

Tables IV and V show Reading Test and combined test scores and frequencies for the EST-R administered as a post-test to 40X.

TABLE IV. WR. 40X READING POST-TEST

Score	Frequency	Cumulative Frequency	Score	Frequency	Cumulative Frequency
5	2	2	15	0	13
6	1	3	16	1	14
7	2	5	17	0	14
8	3	8	18	0	14
9	2	10	19	0	14
10	1	11	20	0	14
11	1	12	21	1	15
12	0	12	22	0	15
13	1	13	23	1	16
14	0	13			

Mean = 10.38   Standard Deviation = 5.37
Median = 8   Range = 19

TABLE V.   WR. 40X POST-TEST

SPELLING, GRAMMATICAL USAGE,
VOCABULARY AND ESSAY CORRECTION COMBINED

Score	Frequency	Cumulative Frequency	Score	Frequency	Cumulative Frequency
46	4	4	66	0	13
47	0	4	67	0	13
48	0	4	68	0	13
49	1	5	69	0	13
50	0	5	70	0	13
51	0	5	71	1	14
52	1	6	72	0	14
53	0	6	73	1	15
54	0	6	74	0	15
55	0	6	75	0	15
56	6	12	76	0	15
57	0	12	77	0	15
58	0	12	78	0	15
59	1	13	79	0	15
60	0	13	80	0	15
61	0	13	81	0	15
62	0	13	82	0	15
63	0	13	83	0	15
64	0	13	84	0	15
65	0	13	85	1	16

Mean = 56.81   Standard Deviation = 11.01
Median = 56   Range = 40

Tables VI and VII contain Reading Test and combined test scores and frequencies for the EST-R administered as a pre-test to WR. 230 students.

TABLE VI. WR. 230 READING PRE-TEST

Score	Frequency	Cumulative Frequency	Score	Frequency	Cumulative Frequency
5	1	1	17	0	27
6	1	2	18	1	28
7	4	6	19	1	29
8	1	7	20	1	30
9	3	10	21	3	33
10	3	13	22	0	33
11	4	17	23	3	36
12	2	19	24	4	40
13	2	21	25	4	44
14	3	24	26	0	44
15	3	27	27	1	45
16	0	27			

Mean = 15.49   Standard Deviation = 6.69
Median = 14   Range = 23

TABLE VII. WR. 230 PRE-TEST

SPELLING, GRAMMATICAL USAGE,
VOCABULARY AND ESSAY CORRECTION COMBINED

Score	Frequency	Cumulative Frequency	Score	Frequency	Cumulative Frequency
37	1	1	56	4	18
38	0	1	57	0	18
39	0	1	58	3	21
40	0	1	59	2	23
41	2	3	60	2	25
42	0	3	61	2	27
43	0	3	62	1	28
44	0	3	63	4	32
45	0	3	64	2	34
46	0	3	65	0	34
47	1	4	66	0	34
48	0	4	67	2	36
49	0	4	68	1	37
50	1	5	69	1	38
51	3	8	70	2	40
52	0	8	71	1	41
53	3	11	72	3	44
54	1	12	73	1	45
55	2	14			

Mean = 59.18   Standard Deviation = 8.64
Median = 59   Range = 37

D. Standardization

1. Validity

Test validity is determined by ascertaining how well, or to what extent, the test measures what it is designed to measure. There are several ways to quantify the validity of a test; this investigation utilized two such approaches to study the validity of the EST-R, i.e., the validity coefficient and group separation.

a. Validity Coefficient

To find a validity coefficient for the EST-R, we correlated success (a "pass") or failure (a withdrawal, an incomplete or a "no pass") on WR. 40X with pre-test and with post-test scores using the point-biserial calculation.

The point-biserial correlation of pre-test EST-R score and success/failure on WR. 40X is r=+.16. This correlation is not significant at the 0.10 level. We have, therefore, no evidence for an inference that the EST-R, as administered as a 40X pre-test, is a valid predictor of success in the course.

The point-biserial correlation coefficient for post-test EST-R score and success/failure on WR. 40X is r=+.57. This coefficient is significant at the 0.05 level. Thus, we have evidence of a real relationship between the

content of the EST-R and the content of WR. 40X.

Why is there such a difference in the validity coefficients for the pre-test and post-test? One reason is that 40X instruction intervened between the two tests. The significant validity coefficient shows that those who profited most from the course were those whose post-test scores best correlated with success in WR. 40X; those who profited least were those whose post-test scores best correlated with failure in WR. 40X. This validates both the EST-R post-test as an indicator of the effects of 40X instruction and the adequacy of procedures used for evaluating WR. 40X students.

b. Group Separation

Group separation examines test validity by comparing the means of two groups to determine whether there is a significant difference between them. The two EST-R groups studied were those who were successful and those who were unsuccessful in WR. 40X. The method used was a t-test, performed first on the two groups' pre-test scores and then on their post-test scores.

The pre-test t-value of 1.1151 is not significant at the 0.10 level; the post-test t-value of 3.4553, however, is significant at the 0.01 level, indicating the EST-R post-test is likely to be a valid indicator of separation

between those who fail and those who pass WR. 40X, after the instruction is completed.

Thus the group separation and the validity coefficient methods both support the EST-R post-test as a valid indicator of success or failure in WR. 40X. Again we may attribute the greater validity of the post-test (compared with that of the pre-test) to the effects of instruction; those who profited most from instruction (passed 40X) scored significantly higher on the post-test than did those who did not succeed in WR. 40X.

One method of directly testing the EST-R's validity as an indicator of the effects of instruction is to perform a t-test on both successful and unsuccessful 40X students' pre-test and post-test EST-R scores to see if there is a significant difference between the pre-test and post-test group means. The t-value=3.16 and is significant at the 0.01 level. There is, then, a high probability of a difference between post- and pre-test means. This supports our earlier findings and underscores the validity of the EST-R as an indicator of the improvement that results from WR. 40X instruction.

One further t-value is calculated to determine whether there is a significant difference between the means of the 40X EST-R pre-test and of the WR. 230 pre-test. This t-value is 1.52 and is not significant at the 0.10 level.

Again we find that the EST-R is not a valid predictive instrument when administered prior to instruction.

The above data are summarized in tables VIII and IX.

TABLE VIII. VALIDITY COEFFICIENTS (r)

Groups Correlated	r
WR. 40X Pre-test: Successful x Unsuccessful	+0.16
WR. 40X Post-test: Successful x Unsuccessful	+0.57*

*Significant at 0.05 level

TABLE IX. GROUP SEPARATION

Group	t
40X Pre-test x Post-test	3.116**
40X Pre-test x 230 Pre-test	1.52
40X Pre-test:Successful x Unsuccessful	1.12
40X Post-test: Successful x Unsuccessful	3.46**

**Significant at the 0.01 level

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2. Reliability

When we investigate a test's reliability, we are attempting to determine what proportion of the total variance of test scores is attributable to true (not error) variance. We are also interested in how stable the test is over time; i.e., if no instruction intervenes would the same person score similarly on a test adminstered and then re-administered after a period of time? Since it is often impractical, however, to administer the test twice and since it may be difficult to insure that no learning of test content has occurred between administrations, we often use another means of finding test reliability. This approach involves determination of the test's internal consistency, of the consistency of performance on the test items.

To determine the internal consistency of the EST-R, the Kuder-Richardson 20 (K-R 20) reliability formula was used. The K-R 20 is a type of split-half reliability which allows us to correlate each item on the test with every other item. The reliability coefficients thus obtained are shown on table X.

Table X shows the K-R 20 reliability of each individual test for all three groups: 40X pre-test, 40X post-test and 230 pre-test. Reliabilities for all three groups are also given for the combined Spelling,

Grammatical Usage, Vocabulary and Essay Correction tests.

A combined test reliability for the pooled 40X and 230 pre-test scores is also given. This calculation is included because it comes closer to representing a mixed group of students, i.e., students with a broader range of abilities, than do the 40X or 230 students alone. Since the combined Spelling, Grammatical Usage, Vocabulary and Essay Correction test is often administered as an English proficiency test to mixed groups of students, some information regarding the reliability of these tests is likely to be useful.

Several other considerations should be noted regarding the figures reported on table VI. First is the fact that, although the Reading Test shows the highest reliability figures, that test is speeded, and, because the K-R 20 is a type of split-half reliability formula, these coefficients are spuriously high.

Another important consideration is the fact that reliability coefficients are affected by test length; all else being equal, a longer test is more reliable than a shorter one. This explains why the combined tests' reliability coefficients are higher than those of any individual test except those of the artificially high Reading Test.

The range of scores (the heterogeneity of the group tested) also contributes to the size of the reliability coefficient. The more the range is reduced, the more the reliability coefficient is reduced. Since, on the 129-item combined Spelling, Grammatical Usage, Vocabulary, and Essay Correction test, the ranges for WR. 230 pre-test, WR. 40X pre-test and post-test were only 50, 59 and 57 respectively, the reliability coefficient is not as high as it would be if the range were more extended.

A reliability of 0.90 or higher is expected of standardized educational tests.[33] The EST-R does not achieve this level in the present study, indicating that further revision, addition and deletion of items is in order.

The standard error of measurement for the combined Spelling, Grammatical Usage, Vocabulary and Essay Correction tests is shown in row seven, table X. The standard error of measurement may be used to calculate the expected variability (error) in an individual's test score. Using the standard error of measurement we can figure a score band or range (confidence interval) within which we can state, with a given degree of confidence, that the individual's true score lies.

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[33]Frederick G. Brown, p. 78.

$$CIp = X \pm (z)(SEm)$$

Where: CIp = confidence interval for a given probability

X = an individual's test score

z = a factor. When:

p (probability) = 0.68, z = 1.00

p = 0.85, z = 1.44

p = 0.90, z = 1.64

p = 0.95, z = 1.96

p = 0.99, z = 2.58

For example, then, to compute an individual's score range in which we can be 95% confident we use the formula for the limits:

$$X \pm 1.96 \ SEm$$

If a student's score is 50 and the SEm = 4.426

50 $\pm$ 1.96 (4.426)

50 $\pm$ 8.675

50 $\pm$ 9

41 to 59

Therefore, the student's score range at the 95% confidence level is 41 to 59.

TABLE X. RELIABILITY

	Pre-test WR. 40X	Post-test WR. 40X	Pre-test WR. 230	Pre-test WR. 40X and WR. 230 pooled
1) Reading Test 30 items	.851	.854	.891	
2) Spelling Test 20 items	.622	.735	.502	
3) Grammatical Usage 35 items	.526	.676	.352	
4) Vocabulary Test 10 items	-.059	.552	.360	
5) Essay Correction 34 items	.778	.576	.798	
6) Tests 2-4 Combined 99 items	.811	.849	.750	.803
7) SE Test 2-4 Combined	4.426	4.278	4.320	4.412

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3. Norms

The following tables XI and XII represent norms for the EST-R administered as a pre-test to Wr. 40X. The test population consisted of 33 students enrolled in Oregon State University's WR. 40X spring term, 1977. The transformed scores given are percentile ranks (PR), z- and Z-scores.

Percentile ranks convert raw scores to class rank; the percentile score represents the percent of the group scoring at, or below, a particular raw score. For example, if a student's PR is 83, he scored as well as, or better than, 83% of those in his group.

A z-score is a conversion of the raw score to a standard scale with a mean of zero and a standard deviation of one. A z-score of two indicates a score two standard deviations above the group mean.

Z-scores represent raw scores which have been converted to a standard scale with a mean of 50 and a standard deviation of 10. A Z-score of 65 indicates a score 1.5 standard deviations above the mean.

Separate norms are given for the Reading Test (table XI) and for the combined Spelling, Grammatical Usage, Vocabulary and Essay Correction tests (table XII).

Although the EST-R administered as a pre-test cannot be considered a valid predictor of 40X success or failure,

it should be useful to both WR. 40X and to WR. 121 instructors to compare their students' EST-R pre-test scores to these 40X norms.

TABLE XI.   SCORE TRANSFORMATION TABLE

WR. 40X PRE-TEST: READING

X	PR	z	Z
2	2	-1.48	35
3	5	-1.30	37
4	11	-1.21	39
5	18	-0.94	41
6	26	-0.76	42
7	33	-0.57	44
8	38	-0.39	46
9	45	-0.21	48
10	56	-0.03	50
11	64	0.15	51
12	65	0.33	53
13	67	0.51	55
14	71	0.69	57
15	74	0.87	59
16	77	0.05	61
17	83	1.23	62
18	88	1.41	64
19	91	1.59	66
20	94	1.77	68
21	95	1.95	70
22	97	2.13	71

Mean = 10.18   Standard Deviation = 5.54
Median = 9   Number of Scores = 33

TABLE XII. SCORE TRANSFORMATION TABLE

WR. 40X PRE-TEST

SPELLING, GRAMMATICAL USAGE,

VOCABULARY, AND ESSAY CORRECTION COMBINED

X	PR	z	Z	X	PR	z	Z
22	1	-2.94	21	46	23	-0.58	44
23	2	-2.84	22	47	24	-0.48	45
24	2	-2.74	23	48	32	-0.38	46
25	2	-2.64	24	49	39	-0.28	47
26	2	-2.54	25	50	41	-0.18	48
27	2	-2.44	26	51	45	-0.09	49
28	2	-2.35	27	52	52	0.01	50
29	2	-2.25	28	53	53	0.11	51
30	2	-2.15	28	54	55	0.21	52
31	2	-2.05	29	55	56	0.31	53
32	2	-1.95	30	56	58	0.41	54
33	3	-1.86	31	57	62	0.50	55
34	5	-1.76	32	58	68	0.60	57
35	5	-1.66	33	59	73	0.70	57
36	5	-1.56	34	60	76	0.80	58
37	5	-1.46	35	61	79	0.90	59
38	5	-1.36	36	62	82	0.99	60
39	5	-1.27	37	63	85	1.09	61
40	6	-1.17	38	64	86	1.19	62
41	9	-1.07	39	65	88	1.29	63
42	14	-0.97	40	66	92	1.39	64
43	17	-0.87	41	67	95	1.49	65
44	18	-0.77	42	68	97	1.58	66
45	21	-0.68	43				

Mean = 51.88   Standard Deviation = 10.18
Median = 51   Number of Scores = 33

IV. SUMMARY

It is the conviction of this investigator that, when possible, reading instruction should be included in remedial English courses. To encourage an awareness of individual's reading deficiencies, a reading subtest was added to the ENGLISH SKILLS TEST, a placement/proficiency test used at Oregon State University (OSU). This new test, consisting of Reading, Spelling, Grammatical Usage, Vocabulary and Essay Correction subtests, was entitled the ENGLISH SKILLS TEST-REVISED (EST-R).

Standardized administration and scoring procedures for the EST-R were defined, and three administrations of the test were made. The EST-R was given as a pre-test to 33 WR. 40X students, as a post-test to 16 WR. 40X students, and as a pre-test to 45 WR. 230 students. Test scores, frequencies, mean, median, standard deviation and range for each group were given for the Reading Test and for the other four subtests combined. Transformed scores (percentile rank, z- and Z-scores) were provided for the WR. 40X Reading pre-test and combined test pre-test.[34]

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[34]Raw data used in this study is available from: Betty Lou Carman, 1104 NW 29th Street, Corvallis, Oregon, 97330.

Criterion-related validity studies indicated that EST-R scores, when the test is administered as a post-test to WR. 40X, have concurrent validity with WR. 40X grades. Subtest reliability ranged from -0.059 to 0.891. Since good educational tests have a reliability of 0.90 or better, the EST-R must undergo more research to increase the reliability of the test.

The researcher's next step will be to administer the EST-R to a much larger and more heterogeneous population, e.g., a representative sample of incoming Oregon State University freshmen. Such an administration should yield higher figures for both range and reliability. Validity should also be re-appraised, and the task of systematic item revision begun.

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APPENDIX

TABLE XIII.   EST-R TEST SCORES

WR. 40X PRE-TEST

Student	Reading Score	Spelling Score	Gram. Usage Score	Vocab. Score	Essay Correctn. Score
1	2	6	18	5	4
2	4	10	13	4	15
3	8	6	16	4	21
4	11	9	16	3	23
5	6	5	15	4	18
6	19	15	15	6	26
7	10	12	18	4	24
8	18	13	15	4	26
9	20	10	12	5	25
10	9	8	18	3	16
11	22	14	17	4	25
12	9	11	10	3	16
13	54	10	15	2	21
14	6	8	15	4	22
15	7	8	16	7	20
16	14	11	19	4	23
17	6	13	19	3	22
18	10	14	23	5	24
19	17	11	20	6	24
20	16	12	25	6	22
21	10	10	18	5	18
22	4	9	11	6	15
23	13	14	21	8	25
24	4	7	11	4	26
25	6	6	20	3	19
26	4	4	17	6	21
27	9	5	23	7	19
28	8	12	18	5	24
29	16	12	20	5	26
30	2	4	10	2	6
31	10	14	20	3	29
32	14	9	13	2	20
33	17	12	17	4	23

TABLE XIV.   EST-R TEST SCORES

WR. 40X POST-TEST

Student	Reading Score	Spelling Score	Gram. Usage Score	Vocab. Score	Essay Correctn. Score
1	7	5	19	2	20
2	13	14	16	7	22
3	16	11	15	4	26
4	9	12	18	2	20
5	5	12	21	1	22
6	8	9	14	5	18
7	9	12	15	7	22
8	21	15	26	5	25
9	11	14	15	6	21
10	10	10	16	5	25
11	5	10	12	7	30
12	23	16	28	9	32
13	8	11	16	7	22
14	6	6	14	6	20
15	7	4	17	4	21
16	8	15	23	6	29

TABLE XV. EST-R TEST SCORES

WR. 230 PRE-TEST

Student	Reading Score	Spelling Score	Gram. Usage Score	Vocab. Score	Essay Correctn. Score
1	25	13	25	5	29
2	11	14	23	2	17
3	20	14	22	8	26
4	15	12	20	3	28
5	7	17	16	2	26
6	7	13	20	5	25
7	24	13	21	5	29
8	7	13	19	5	24
9	5	13	19	4	18
10	18	10	18	4	20
11	19	19	20	5	6
12	14	14	19	2	28
13	7	11	17	2	21
14	12	16	15	5	25
15	25	16	22	8	26
16	25	11	16	3	23
17	13	11	17	8	17
18	10	11	17	6	26
19	24	16	16	7	28
20	15	13	12	4	24
21	25	12	16	7	24
22	23	14	21	4	24
23	11	15	19	5	25
24	21	15	19	8	22
25	24	13	17	6	23
26	11	13	21	6	29
27	13	13	25	5	13
28	23	12	16	6	22
29	21	5	11	2	19
30	15	16	17	5	25
31	10	14	20	7	27
32	12	10	16	4	26
33	9	13	17	5	20
34	9	11	13	4	13
35	27	16	23	6	27
36	24	17	23	7	23

TABLE XV.   EST-R TEST SCORES

WR. 230 PRE-TEST, CONTINUED

Student	Reading Score	Spelling Score	Gram. Usage Score	Vocab. Score	Essay Correctn. Score
37	14	13	23	5	33
38	6	10	18	5	14
39	14	14	23	9	25
40	21	9	16	4	13
41	23	12	16	5	25
42	11	8	19	3	28
43	9	11	17	6	24
44	8	9	21	3	18
45	10	9	20	4	25