ACADEMIC ACHIEVEMENT AND THE ABILITY OF POST-SECONDARY STUDENTS TO READ ASSIGNED MATERIALS

DISSERTATION

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This study provides a rationale for adopting course materials. It demonstrates the relationship between ability to read assigned materials and academic achievement, and that selection of materials creates two groups having different probabilities of success.

The sample was selected from a population of all students enrolled in Principles of Economics courses at North Texas State University in the spring semester of 1986. The Nelson-Denny Reading Test was used to determine reading ability. Assigned materials were analyzed for readability. A frustration level was determined and used to divide the sample: the group of interest, those with reading abilities below the frustration level who underwent the treatment of reading materials written above their ability to comprehend; and the comparison group, those with reading abilities above the frustration level who did not undergo the treatment.

The hypothesis that reading ability of students is positively correlated with academic achievement was verified. The hypothesis that the group of interest will have significantly lower academic achievement than the

comparison group was verified. The hypothesis that reading ability is a significant factor in forecasting academic achievement was not verified.

The hypothesis that reading ability is negatively related to the presence of frustration was verified. The hypothesis that freshmen, nonwhite ethnics, and users of English as a second language have significantly lower reading ability was verified; that they have significantly lower academic achievement was not.

The findings demonstrate the role of written materials as a barrier and a producer of frustration. Selection of materials produced the demarcation separating students into groups with different experiences encountering a barrier. General reading level of students is related to admissions policy. Selectors of course materials should consider the relationship between reading ability of students and the readability of materials to avoid conflict with admissions policy.

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CHAPTER I

INTRODUCTION

Many students at the post-secondary level do not perform well academically. Picher and Blauchild (9) conducted a survey of poor achievers at the college level and listed several causes of their failure. The researchers included among the causes poor preparation for the rigors of college work, inattentiveness in class, ease of distraction by nonacademic activities, failure to follow instructions and failure to do assigned work. All of these had as one root cause the inhibition of language functions, or the absence of good basic language skills upon entry into a college program. Several studies (3, 4, 6, 7, 8, 9, 10) identify the students who have poor basic language skills as high-risk students.

Some of these students who were labeled as high risk (8, p. 200) were successful. They succeeded because they repeatedly reoriented themselves toward their goal, overcame hardships and obstacles, and maintained high motivation. Their perceived probability of being successful in attaining a goal continued to exceed their perceived probability of failure.

Those high-risk students who failed are described by Roth and Meyersberg (10) as ones who allowed outside activities to interfere with study, who concentrated on what they already knew and avoided difficult material, and who preferred leisure alternatives to academic effort. Their preparation for class or for examinations was superficial or partial. Their goal orientation eroded; their perceived probability of successful goal attainment fell as they encountered difficulty and experienced failure. They adjusted their expectations of success downward until failure became the expected outcome. When expectations of failure dominated, the students reduced effort, avoided trying, became apathetic and withdrew.

It is not necessarily motivation that differentiates those who persist from those who give up. Maxwell (8, p. 197) found that, for underprepared students to have success in a post-secondary program,

> motivation is necessary but not sufficient. Certainly those who would succeed in college must be motivated to perform the tasks and assignments required, but they also need the skills and knowledge necessary to understand their courses and they must be able to learn quickly, for colleges restrict the amount of time one has to complete learning tasks.

Students see the task lying ahead of them and form a perception of their probability of attaining some goal, of succeeding. If this probability of attainment begins to decline as the students encounter obstacles in their

academic coursework, students must intensify or orient their efforts or they will experience frustration at each encounter. They reevaluate their probability of success and, when their probability of success drops below 50 percent, they will cease trying to reach the goal.

Students with less than optimum basic language skills can encounter academic difficulty if they cannot use the textbook as intended or if they must squander some of the scarce time allotted to taking an examination deciphering what is being asked, that is, processing the questions, instead of providing answers in order to demonstrate content mastery. The failure these students experience in the process of trying to use assigned written materials and taking examinations can lead to frustration.

The association between the ability of students to read and their academic achievement raises these questions: Do students in the courses offered by an academic department in fact possess the capability to use the assigned materials and to fully comprehend their content? Are the materials themselves impediments to the progress of the students by being too difficult for them to read and use?

Alternatively, given any particular group of students whose abilities are preset by the institutional admission policies, does the selection of materials for a course help to determine who is to succeed, who is to fail due to

inadequate basic language skills, and who will repeatedly experience frustration and ultimately cease trying?

Statement of the Problem

The problem of this study is the association between the ability of post-secondary students to read assigned course materials and their academic achievement.

Purpose of the Study

The main purpose of this study is to provide a rationale for department chairs, developers of curriculum, and textbook selection committee members to develop courses and adopt course materials that match the abilities of their student clientele.

To accomplish this main purpose, secondary purposes are

1. to demonstrate the relationship between the ability of students to read assigned course materials and their academic achievement, and

2. to demonstrate that the selection of course materials cause students to be divided into two groups having different probabilities of success and probabilities of failure in a course.

Hypotheses

This study examines the general hypothesis that the reading ability of post-secondary students is positively correlated with their academic achievement.

In addition to the general hypothesis, the following sub-hypotheses are examined:

1. The group of interest (those with a reading ability below the readability of the course materials) will have significantly lower academic achievement in the course than the comparison group (those with a reading ability at or above the readability of the course materials).

2. Reading ability is a significant factor in forecasting academic achievement.

3. Reading ability is negatively correlated with indicators of lowered perceptions by students of their probability of success.

4. Freshmen, nonwhite ethnics, and those using English as a second language have, as separate groups, significantly lower reading levels and significantly lower academic achievement than their opposites.

Significance

The study will be significant in that it will relate the two measures--the reading ability of students and the readability of written materials--with the achievement of the students in the class. This study will make available to academic administrators and faculty members a procedure to identify student needs, to tailor their curriculum for students, to select appropriate written materials, and to support the admissions policy of the institution. It is

based on the premise that students having different reading abilities need not be provided courses stratified by level of rigor; many can achieve academically within the context of one course if provided materials they can clearly comprehend.

Definitions

Readability Level--the level at which materials are written, defined by a measurement technique that will yield a U. S. school grade as the indicator. One must be capable of reading at least at that grade level to comprehend the material.

Reading Level--the level at which a person reads, as defined by a measurement technique, such as the Nelson-Denny Reading Test (1), that will yield a U. S. school grade as the indicator of reading level.

Frustration Level--as defined by Flesch (5), a level 1.5 grades below the readability level of written materials. Flesch stated that students having reading levels below this level will experience frustration as they attempt to read the materials.

Limitations

This study uses intact classes, an available sample not randomly selected. Because of this, external validity is threatened and generalization of the findings must be severely restricted. Although the classes were selected for

the convenience of the study, it is assumed that the selected students were assigned in a random manner during registration. Thus it is assumed the group of interest and the comparison group represent random samples of a broad population of students (2, p. 150).

This study focuses only on the role of the ability of students to use assigned reading materials as a factor in academic achievement. Other factors which might be significant, such as method of instruction and proficiency of the instructor, are excluded from the study.

CHAPTER BIBLIOGRAPHY

1. Brown, James I., J. Michael Bennett, and Gerald Hanna, Examiner's Manual, the Nelson-Denny Reading Test, Chicago, Riverside Press, 1981.

2. Borg, Walter R., and Meredith D. Gall, Educational Research, An Introduction, 4th Ed., New York, Longman, Inc., 1983.

3. Covington, M. L. and C. L. Omelich, "As Failures Mount: Affective and Cognitive Consequences of Ability Demotion in the Classroom," Journal of Educational Psychology, LXXIII (December, 1981), 796-808.

4. Daines, Delva, Reading in the Content Areas, Glenview, IL, Scott, Foresman, 1982.

5. Flesch, Rudolf, The Art of Readable Writing, New York, Harper, 1949.

6. Howe, Michael J., A Teacher's Guide to the Psychology of Learning, New York, Basil Blackwell, 1984.

7. Klingelhofer, E., and L. Hollander, Educational Characteristics and Needs of New Students, Berkeley, CA, Center for Research and Development in Higher Education, 1973.

8. Maxwell, Martha, Improving Student Learning Skills, San Francisco, Jossey-Bass, 1979.

9. Picher, R. and B. Blaushild, Why College Students Fail, New York, Funk & Wagnalls, 1970.

10. Roth, R. and A. Meyersburg, "The Nonachievement Syndrome, Personnel & Guidance Journal, XLI (February, 1963), 535-539.

CHAPTER II

REVIEW OF RELATED LITERATURE

Theoretical Basis

A basis for this study exists in the theory of the level of aspiration as expressed by Kurt Lewin (4, pp. 37-62; 15, pp. 337-347). Lewin (15, p. 337) defined locomotion as movement, whether actual or psychological, from one point in the life space of a person to another. He considered every action and decision by the person to be a locomotion. The degree of locomotion that will occur is determined by a number of interacting forces, some promoting or providing energy to the locomotion and some hindering or providing energy against. Lewin considered not only the physical or external stimulative forces that are acting but also the psychological or social meanings the person places on them. Thus, the person judges the stimulus in terms of psychological reality--perception--rather than in terms of its physical intensity. This perception could generate an arousal to a motive state where none existed before or it could elevate a minor concern to one of significance. Lewin defined valence as this ability to generate an arousal or elevate significance. Valence can have either a positive,

approach-initiating value or a negative, avoidance-initiating value.

The valence a person assigns to a perception depends upon previously obtained information. As the valence affects the locomotion and the person makes a change in his life space, he updates his information base. The next time the stimulus generates a perception, a new and possibly different valence level will be assigned and locomotion will be affected in a different way. In this way, the perception of a person directs behavior by making him aware of the value of an action and later feeds back information. The person reorients himself as a result of the action (15, p. 343).

The locomotion of Lewin derives from a mental manipulation of situations, a motivated act emanating from certain forces and directed by those forces toward certain goals. The prime motivation is to maintain or regain equilibrium, a state where stress is removed, where the valences of the many forces balance out and net valence is zero. Equilibrium is reached in one of two ways; by attaining the goal or by abandoning the goal and becoming content with the status quo or with a less stress-provoking goal. Strong desire to attain a goal will generate a perception with an intital, strong positive valence. As a person begins locomotion toward the goal, other forces apply, each having a perception and a valence, either

positive or negative. If the locomotive path is episodic so that intermediate quasi-equilibrium states will exist, each successive step toward the goal will begin with an altered perception based on the updated information base. Thus, the valence assigned to goal attainment will change according to the forces applied at each stage of the locomotive path.

There can be forces that block movement toward a goal. They would have a directive effect on behavior. They could stop further progress or alter the locomotive course either temporarily or permanently. A person faced with such a barrier might try to go around it, to develop some substitute for the intended behavior, or become frustrated. If he becomes frustrated, the person could become angry, engage in some extreme type of behavior, or merely withdraw. Such a barrier leads to an altered state from which the next perception will have a less positive, or more negative, valence. Recurring encounters with this barrier could result in perceptions with increasingly negative valence and become a powerful motivation of avoidance. This avoidance motivation could overwhelm any initial strong desire to attain a goal. The person may abandon further attempts at the actions necessary to attain the goal, thus regain his equilibrium (15, p. 346). Whenever forces act in opposite directions, they create disequilibrium and motivate actions that will re-establish equilibrium. The presence of a barrier will counter a positive force. If the barrier

cannot be overcome and frustration occurs, the person will alter his action to achieve equilibrium. Successive encounters with the barrier will generate increasingly negative valence until frustration is complete and the goal is abandoned. Lewin thought that if an approach-avoidance conflict endured over a long period of time, the negative force would gradually become stronger than the positive force and the person would seek an alternative locomotive path toward an alternative goal (15, p. 346).

John Atkinson (1, p. 371; 4, pp. 53-54) developed a theoretical model to explain how the motive to achieve and the motive to avoid failure influence behavior in a situation where performance is evaluated against some standard of excellence. Atkinson stated that the strength of an achievement motivation is a function of (1) the strength of the motive, (2) the expectancy of goal attainment, and (3) the incentive to attain the goal (1, p. 360). The motive is a nondirective, energized drive to maximize the net worth or satisfaction of a person. It is not necessarily directed to any specific goal achievement; any goal that will maximize satisfaction will do. The expectancy of goal attainment is the person's perceived probability of successful completion of the tasks or actions leading to the goal. The incentive of the person relates the perception of the reward, or benefit derived, for goal

attainment to the nature of the action (or the perception of the unattractiveness, or cost, if the goal is one to avoid).

Atkinson built a model in which strength of motivation is a joint multiplicative function of motive, expectancy, and incentive. The Lewin concept of valence is equivalent to Atkinson's product of motive and incentive, thus the Atkinson model is in agreement with Lewin's theory of aspiration (4, p. 54), where expectancy, or the probability of success, sets the level of aspiration, the perceived difficulty of the action.

Atkinson (1, p. 363) described two principal motivations: motivation to achieve and motivation to avoid failure. He used these motivations to sort people into two groups. The first group includes those who have a stronger achievement motive relative to the motive to avoid failure. This group forms higher subjective probabilities of success (P_s). The second group includes those who have a stronger motive to avoid failure relative to the achievement motive. They form lower subjective probabilities of success and, it follows, higher subjective probabilities of failure (P_f).

For a person in group one, each success results in a raised level of aspiration and a consequent increase in motivation. The P_s of the person increases also. Continued success in repeated trials further increases P_s. As P_s approaches 1.0 (certainty), motivation falls off as the person is satiated, loses interest, or becomes bored. His

incentive, decreasing a bit after each success, drops to zero.

For a person in group one, each failure results in a lowered level of aspiration but with a consequent increase in motivation (1, p. 368). The P_s of the individual decreases but incentive increases as the attractiveness of goal attainment increases. Another failure will increase motivation even more, but P_s will continue to drop. This pattern will repeat until P_s drops below 0.5. Further failures will gradually decrease motivation and lower P_s more. Those with strong achievement motive will persist in trying as long as P_s is high, redoubling efforts in further trials until he perceives his P_s to be below 0.5. Then he loses motivation and loses interest. Soon he will no longer try.

For a person in group two, each success leads to an increased perceived P_s. However, since the fear to avoid failure dominates his actions, he is less willing to repeat the task and face again the prospect of failure. His internal aim is equilibrium. He should almost deliberately fail in order to regain equilibrium. Usually this person will start with a P_s so low, a P_f so high, that the likelihood of a success is remote.

For a person in group two, each failure lowers an already low P_s even more. As P_f approaches 1.0 (certainty), continued attempts and consequent failure no longer produce

added stress. Disequilibrium is abated. The person just tunes out. He plays the game, knowing there is no chance to achieve the goal any more. He will lose motivation to attain the goal. Consequently, the action--the barrier--is no longer hindering his locomotion (1, p. 369).

Relating the Theory to This Study

Students in post-secondary institutions are moving in their life space, experiencing locomotion in their aspiration toward goal attainment and developing the perceptive reality that arouses motivations of different valence levels. Each action completed provides feedback which alters the perceptions of the students about subsequent actions. They reorient themselves as a result of their action.

Students set goals or have goals set for them. The desire to attain a goal generates an initial, positive valence whose strength is linked with the strength of the intitial desire to attain the goal. Most academic goals are achieved in a series of episodic steps, usually courses and examinations. Within this overall goal, successful completion of each course or examination becomes a goal in itself. The tasks required to complete a course are also repetitive episodes consisting of reading assigned materials, doing homework, writing papers, and taking examinations. Intermediate quasi-equilibrium states exist

between episodes and each successive step toward the goal of course completion will begin with a new set of perceptions about success and failure based on feedback from previous episodes. An action required to be performed in a new episode might be a barrier, a force that blocks movement toward the goal, one with strong negative valence. If students cannot circumvent the barrier--alter the locomotive path--they may become frustrated. Successive encounters will yield a diminishing perceived probability of success and an increasing perceived probability of failure. Ultimately, the valence of the student toward this action becomes increasingly negative. The strength of the motive to avoid failure surpasses that of the motive to acheive. The students who experience this no longer attempt the required action and they withdraw.

These successive failures lead to frustration; frustration leads to avoidance and apathy. The student, perceiving only frustration and failure, will no longer attempt to reach the goal. If the goal is reading a text written well above his ability to read, the student will go through this process of perceived probability adjustment until he simply avoids reading the text and either seeks alternative paths to class preparation and, thus, to goal attainment, or not prepare at all. Similarly for examinations, if the examination questions are written above the reading level of the student, the student will quickly

experience failure to attain the goal of understanding the examination questions. He will cease trying to reach that goal, this time under the added pressure from being measured and having a time constraint. The student will begin to guess at the answers, an alternative locomotive path, rather than read and reason.

Studies of Nonachieving Students

Picher and Blauchild (17) conducted a study of failed students in college and found ten reasons for failure. One of these was inhibition of language functions. Students who do not possess good basic language skills--reading, writing, speaking--upon entry to a college program have been labelled "high-risk" (14, p. 200). Maxwell (14, p. 201) found that potentially successful high risk students are distinguished by adaptive mechanisms involving steady orientation toward the goal in question, willingness to study hard and the ability to remove external diversions from the situation, usually with the support from significant others, for example, parents. Successful high risk students overcame hardships. They overcame each barrier set in their path toward goal attainment. They felt they studied harder than the average student did or "should." The motivation of the successful high risk students remained high and their perceived probability of success continued to exceed their perceived probability of failure. Frustration, while

experienced, was not allowed to become dominant. These students found alternative paths to overcome the barriers.

Roth and Meyersberg (19) described poor college achievers. These students let outside problems interfere with their studies. They concentrated on the easy and avoided the difficult. They avoided dedicated concentration of effort, preferring to spend time with friends or in leisure activity. They prepared only partially for exams, reviewing what they knew and avoiding what they did not know. Roth and Meyersberg concluded that the poor achievement was an expression of choice by the students. In the language of Lewin, the students altered their perceived probabilities of success and failure so that failure became the expected outcome. Failure to attain the goal of mastering the hard material was known to be frustrating, so students avoided the material. Overall failure, as represented by examination or course failure, was met with apathy or withdrawal. Students no longer tried to reach the goal.

Klingelhofer and Hollander (10) examined a group they labeled new students--those who have flocked to college as the open admissions concept expanded nationwide. They found those new students who would qualify as high risk had the same traits and characteristics as high risk college students who had been identified in the past. Those who succeed managed to overcome the barriers placed in their

way; those who do not succeed experienced the attributes of having been frustrated over and over again in trying to overcome the barrier.

Howe (9, p. 149) identified the sequence of events expounded by Lewin in a study of college students. A student who encountered failure after failure in school developed into one who had a lower estimate of personal ability. In turn, the student was less happy and less confident of future success. In the process described by Lewin, one would say the student had readjusted the probability of success downward and the probability of failure upward. As failures accumulated, the student became increasingly distressed, experienced feelings of hopelessness, and began to attribute failure to external factors, that is, made excuses. Ultimately, the student ceased trying and inactivity, or alternative leisure activity, became common.

Covington and Omelich (2) stated that the refusal to try in the face of perceived certain failure may well be the best, speaking psychologically, mode of action a student could have taken to deal with the situation. In the classroom, these people are the ones who, after failing to achieve their goal on an examination or in comprehending the text, simply quit coming to class or drop the course.

On Reading Written Materials

Orna (16) described one model of the transaction between reader and author through text and identified the results that may occur as readers tried to satisfy their need for knowledge by using a textbook. Readers, recognizing an unsatisfactory state of knowledge, sought to resolve it in part by means of reading a textbook. The author, who decided to communicate knowledge, structured a text to meet his or her perception of what the potential readers need. Reader and author meet through the text. A satisfactory outcome--success--occurred when the structuring of knowledge by the author has been made accessible to the readers, whose state of knowledge is then transformed, meeting the perceived knowledge need. An unsatisfactory outcome--failure--occurred when the structure of knowledge by the author is inaccessible to the readers, whose state of knowledge remained unchanged or became more confused.

It is the structure of the text that is the determinant of success or failure. Readers must have the capability to decode the message contained in text. According to Neel (15, p. 450), basic communications theory, or information transmission theory, defines a sender--the author--as the one who packages information or encodes a message by writing a text and transmits the message by publishing the book. The receiver--student reader--intercepts the message when he or she buys the text and attempts to decode it by reading.

This decoding process has as its ultimate goal the assimilation of the original information, the knowledge packaged by the author. What was meant by the author was transformed into what was written. What was written must be read, but more than that, it must be read with understanding; this is the decoding process (3, pp. 2-4).

This process, reading with understanding, forms the definition of comprehension which is the goal of the student. Daines (3) stated that comprehension is a process of recognizing information contained in content materials and integrating it with already acquired, processed and assimilated information to construct new or extended meaning. This is a Gestalt process (4, pp. 15-36) of accommodating new information into the reader's cognitive structure. There are two activities in reading that compete for the allotted time: comprehending the content and processing the message. The lower the ability to read, the more time is spent in message processing and the less time is spent with content comprehension. There is a certain point where message processing is unsuccessful and the content of the message is not comprehended. This is where communications failure occurs. Repeated attempts to process the message, met with repeated failures, will lead readers to experience frustration and finally to cause them to cease trying. Frustration occurs when the ability of readers to decode the message is inadequate, either because their

reading ability is low or because the structure of the text requires a high capability to decode it. The very structure of the textbook or any other written materials adopted for a course may become an artificial impediment, or barrier, to learning.

Rudolf Flesch (6) pointed out that readability of course materials is a significant deterrent to comprehension. He stated that students trying to read a text written at a level 1.5 grades higher than their capability to read, such as a person with a reading ability at the 9.0 grade level trying to read material designed for 10.5 grade level or above, cannot comprehend the written material. Flesch stated that these students will experience frustration and ultimately will cease trying to comprehend the text. They will simply quit reading the text. When faced with an incomprehensible examination, these students will quickly cease reading for comprehension and begin to guess at the answers. The examination becomes, in effect, a measure of their ability to read rather than a measure of their knowledge of course content.

Flesch attacked the reading difficulty he encountered in all forms of writing. He developed his two-pronged measure of readable writing which yielded a reading ease score and a human interest score. The human interest score is no longer used in practical applications, but the reading ease score developed by Flesch remains the standard

technique today. Fleach stated in no uncertain terms that it was quite unnecessary to write in a difficult way in order to prove worthiness, academic quality, or brilliance of the author. He cited two speeches given at Gettysburg as a case in point. The short, simple speech given by Abraham Lincoln was significantly more effective and more memorable than the exhortation of over an hour by Edward Everett that preceded it.

Since Fleach, others have worked with variants on his readability formula. The readability graph developed by Edward Fry (7) was a useful extension since it moved from formula manipulation to graphical depiction and yielded a school grade level as the measure of readability. Others have come along since then, but their trend is toward increasing complexity and difficulty of application with only marginal improvement in results.

Although readability formula procedures have proliferated since Fleach popularized them, they have not been accepted completely. Critics state the techniques are unreliable in that any result depends upon the sample taken (20, p. 67); and, therefore, subsequent applications of the technique on the same text will render a different score. The remedy to this criticism is, of course, to select a larger, representative sample of text material and construct an interval estimate, rather than a point estimate, of readability with the desired precision.

Rubin (20) stated that many of the readability techniques are validated only in terms of earlier readability formulas, that there is no method to ascribe validity of any kind to the readability technique. At best, the results of a readability test serve only as an indicator of the difficulty of the structure of the text. Rubin also cited the omission of many crucial variables from readability techniques. The most popular readability tests rely on sentence length and the number of long or uncommon words as the measured variables. They ignore degree of cohesion, inference, new concept introduction, complexity of ideas presented, degree of rhetoric, dialect, and presumed background knowledge. The reply to this criticism is that any readability formula is not to be used as a sole criterion for textbook selection, but only as a guide to the complexity of the mechanical structure of the writing. The usual choice of the two variables--sentence length and number of long or uncommon words--was derived from a factor analysis technique that there was no worthwhile increase in explained variance when other variables are added. Limiting the formula to two variables enabled a person to use the technique manually. Rubin reported correlations of 0.7 and 0.8 between simple formula readability calculations and independent measures of readability. The two-factor formulas predicted between 50 to 65 percent of the variance in the samples and added factors did not increase that by

much. Rubin concluded that the two-variable readability tests were both sufficient and simple, attesting to their popularity. Duffy (5) concurred, stating that the formulas were objective, readily adaptable to computer yet easy to use manually, and simple to interpret.

The principal failing, then, comes from assigning to a text a point estimate of readability based, many times, on an inadequate sample. The indicated remediation is to develop, using sound inferential statistics procedure, an interval estimate of readability level. It would be based upon a random sample of text material sufficient in size to validate the use of interval estimating techniques. A further insurance against invalid results might be to operate as if the lower end of the interval constructed is representative of the readability of the text.

Gallagher and Thompson (8) conducted a readability analysis of fifteen introductory economics textbooks, using the Flesch procedures. They found the seventh edition of the economics text by McConnell (12) to be the hardest to comprehend. Their calculations showed that one must read at the thirteenth grade level to comprehend that edition. The author experienced the departmental adoption of the ninth edition of the text by McConnell (13) without knowledge of the Gallagher and Thompson study. The adoption led to many complaints by students about the difficulty of the textbook

and also about the complexity of the structure of the multiple choice questions in the associated test data bank.

Levy and Dixon (11) conducted a study in a community college setting relating student reading ability to textbook readability. They found that a significant portion of the students read at levels more than two years below the level necessary to assimilate the texts in use. These two studies, Gallagher and Thompson, and Levy and Dixon, were not statistically acceptable for use in comparison of texts because point estimates, rather than interval estimates, were developed using a very small sample of text material.

A search of dissertations in the United States over the past ten years showed that studies of this type have been applied to post-secondary school situations infrequently and then in mainly nonverbal courses, e.g., accounting and mathematics. Much of the work done with reading level and with readability is geared to elementary and secondary schools with the emphasis being on developing the student's ability to read rather than investigating potential impediments to comprehension and selecting course materials.

Significance

The problem with which this study is concerned centers on the placement of one or more potential barriers in the path of students. Because of a mismatch between the ability of students to read and the readability of written materials

and examinations, do students undergo the phenomena theorized by Lewin and Atkinson?

Students form a perception of their probability of attaining a goal; of succeeding. If this probability of attainment begins to decline as the students encounter obstacles in their academic coursework, students must intensify or redirect their efforts or they will experience frustration and, when their probability of success drops below 50 percent, they will cease trying to reach the goal.

Students with poor basic language skills can encounter academic difficulty if they cannot use the textbook as intended or if they must squander some of the scarce time allotted to taking an examination deciphering what is being asked, that is, processing the questions instead of providing answers in order to demonstrate content mastery. The failure these students experience in the process of trying to use assigned written materials and taking examinations can lead to frustration.

How can a department chair or a textbook selection committee determine whether a candidate text is suitable for the type of student expected to use it? Writers and publishers do not publicize the readability levels of their textbooks (18, p. 22). Sellers of textbooks are reluctant to discuss the readability of their wares. Their texts must be marketed to all institutions--from community colleges through open admission regional state universities to

prestigious Ivy League institutions--and published readability figures may show the unsuitability of the text for some of these potential adopters and purchasers. Textbook reviewers normally do not report any measure of readability level or any other suitability measure of new or revised texts.

The suitability of any particular text will vary from one campus to another. Rubin (20, p. 74) states that it is not inconceivable that the ability of students to use written course materials effectively is related to SAT scores, a principal measuring device used for admissions screening. Thus, as admissions policies range from completely open to increased restrictiveness, the ability of the admitted students to use course materials effectively should increase also. Institutions with highly selective admissions policies will have needs for course materials different from the needs of an open admissions institution.

Department chairs and textbook selection committees at institutions allowing only entrants with high SAT scores likely have a clientele with a high capability to use effectively any course materials they might adopt. Those at open admission institutions should recognize that some students taking the course will have difficulty with any written materials assigned, and perhaps a majority of them will not have the ability to perform at the high school graduate level. These chairpersons and committee members

should acknowledge the existence of the admission policies at their institution and face the task to select course materials that afford opportunities for success for a majority of students and not degrade the merit of the program as a college-level course of instruction (20, p. 74).

Maxwell (14, p. 198) states that the policy of open admissions in post-secondary institutions admits students who lack the skills and knowledge necessary to succeed in programs designed for the traditional, usually better prepared college-bound students. With no corresponding program of tailoring instructional materials to this lesser prepared clintele, the policy of open admission is negated.

The policy of open admission can be negated for many if there is no corresponding program of instructional materials selection (14, p. 196). This transforms a policy of equal opportunity to one of guaranteed failure when the student is not prepared to perform at the required level of effort. Motivation to perform is certainly necessary but it is not sufficient. Students, to succeed in college, must be motivated to perform the assigned tasks. They also need the skills to understand the courses, comprehend the assigned materials, assimilate and internalize the knowledge presented, demonstrate their acquisition of knowledge of the course content on examinations. They must do all of this quickly, for the requirements of a normal college load

restrict the amount of time available to complete each learning task.

The association between the ability of students to read and their academic achievement raises the following questions: Do students in the courses offered by an academic department in fact possess the capability to use the materials and fully comprehend their content? Or, are the materials themselves impediments to the progress of the students by being too difficult to be read?

The study will be significant in that it will relate two measures--the reading ability of students and the readability of written materials--with the achievement of students in the class. If successful, it will provide academic administrators and faculty members a procedure to identify student needs, tailor their curriculum, select appropriate written materials, and support the admissions policy of the university. It is based on the premise that students having different reading abilities need not be provided courses stratified by level of rigor; many can achieve academically if provided materials they can clearly comprehend.

CHAPTER BIBLIOGRAPHY

1. Atkinson, John W., "Motivational Determinants of Risk-Taking Behavior," Psychological Review, XLIV (November, 1957), 359-372.

2. Covington, M. L. and C. L. Omelich, "As Failures Mount: Affective and Cognitive Consequences of Ability Demotion in the Classroom," Journal of Educational Psychology, LXXIII (December, 1981), 796-808.

3. Daines, Delva, Reading in the Content Areas, Glenview, IL, Scott, Foresman, 1982.

4. Deutsch, Morton and Robert M. Krauss, Theories in Social Psychology, New York, Schenkman, 1965.

5. Duffy, Thomas M., "Readability Formulas: What's the Use?," Designing Usable Texts, edited by Thomas M. Duffy and Robert Waller, Orlando, FL, Academic Press, 1985, pp. 113-143.

6. Flesch, Rudolf, The Art of Readable Writing, New York, Harper, 1949.

7. Fry, Edward, "A Readability Formula that Saves Time," Journal of Reading, XI (April, 1968), 574-578.

8. Gallagher, D. J., and G. P. Thompson, "A Readability Analysis of Selected Economics Textbooks," Journal of Economic Education, XII (Summer, 1981), 60-63.

9. Howe, Michael J., A Teacher's Guide to the Psychology of Learning, New York, Basil Blackwell, 1984.

10. Klingelhofer, E., and L. Hollander, Educational Characteristics and Needs of New Students, Berkeley, CA, Center for Research and Development in Higher Education, 1973.

11. Levy, Stanley, and Melinda Dixon, "Student Reading Ability vs. Textbook Readability at a Community College." Educational Research Quarterly, IX (Autumn, 1984), 43-47.

12. McConnell, Campbell, Economics, 7th Ed., New York, McGraw-Hill, 1978.

13. McConnell, Campbell, Economics, 9th Ed., New York, McGraw-Hill, 1984.

14. Maxwell, Martha, Improving Student Learning Skills, San Francisco, Jossey-Bass, 1979.

15. Neel, Ann, Theories in Psychology: A Handbook, 2nd Ed., New York, Schenkman, 1977.

16. Orna, Elizabeth, "Writing to Inform," Designing Usable Texts, edited by Thomas M. Duffy and Robert Waller, Orlando, FL, Academic Press, 1983, p. 20-22.

17. Picher, R. and B. Blaushild, Why College Students Fail, New York, Funk & Wagnals, 1970.

18. (Professor X), This Beats Working for a Living, New York, Manor Books, 1974.

19. Roth, R. and A. Meyersburg, "The Nonachievement Syndrome, Personnel & Guidance Journal, XLI (February, 1963), 535-539.

20. Rubin, Andee, "How Useful are Readability Formulas?," Reading Education: Foundations for a Literate America, edited by J. Osborn, P. Willson, and R. Anderson, Lexington, MA, Lexington Books, 1985, pp. 61-77.

CHAPTER III

COLLECTION OF THE DATA

Population and Sample

The population of this study is considered to be a universe of university students enrolled in courses in Principles of Economics at North Texas State University. The sample in this study consists of the students enrolled in ten sections of Economics 1100 (Microeconomics) and Economics 1110 (Macroeconomics) who agreed to complete the Nelson-Denny Reading Test (2). The sample consists of approximately one-fifth of the population. Since this was an available sample selected not randomly but for the convenience of the study, the results of this study cannot be generalized beyond the population. The results can be generalized to the population under the assumption that all sections of the population were randomly filled during registration. The procedures to analyze the ability of students and to identify the suitability of written course materials, select textbooks, and develop examinations may be applied in any academic setting.

Instruments

Two categories of written materials used in the courses were used as instruments in this study. The first was the

assigned textbook, Economics, Ninth Edition, by McConnell (7). The second was the examination question data bank, or test bank, from which the instructors selected multiple choice examination questions.

The Fry technique (6) was used to obtain readability measurements for the textbook and the test bank. A randomly selected sample of the writing of the author was chosen in the following way: on each randomly selected page, start with the first full paragraph of prose written by the author (summaries, exercises and problems, side boxes, and citations were not used). Select a sequence of sentences running approximately 100 words. Count the number of syllables. Compute two quantities: the number of sentences per 100 words and the number of syllables per 100 words. Repeat until a sample of thirty pages is obtained. Construct 99 percent interval estimates for the two quantities. Enter Fry's readability graph (calibrated in grade level) to find the mean, or point estimate, and the 99 percent interval estimate for the readability grade level.

These procedures were also applied to the test bank with the minor modification that each multiple choice question selected randomly was considered to be a sample. Only test bank questions in multiple choice form qualified as sample questions since the instructors did not use other question forms.

In the study, the lower end of the 99 percent interval estimate of readability grade level for the textbook and test bank was used. By doing this, the probability would be greater than 99 percent that actual readability of the materials is higher than the values used in the study. If it can be shown that students do not have the ability to effectively use these materials at the level used in the study, then there is greater than a 99 percent probability that, whatever the true readability level, the conclusions of the study will be valid. Using the lower end of the 99 percent interval estimate increases the validity of the technique. This measure of readability, translated into frustration level, was designated B9 for the textbook and T9 for the test bank.

These instruments, textbook and test bank, were used in the normal class routine by the students as directed by the instructors. Separate from class activity, the Nelson-Denny Reading Test (2) was used to measure the reading level of the students. The readability measures were taken and the Nelson-Denny Reading Tests were administered to the students in the ten Principles of Economics sections during the spring semester of 1986.

Variables

The following demographic and institutional information was collected at the same time the Nelson-Denny Reading Test

was administered: instructor (INSTR), sex (SEX, 0=female, 1=male), English as a second language (ESL, 0=primary, 1=secondary), class standing (CLASS, 1=freshman, 2=sophomore, 3=junior, 4=senior, 5=other), and ethnic group claimed (ETHNIC, 1=white, 2=black, 3=Hispanic, 4=Asian, 5=Middle East). Two additional dichotomous variables were formed: from CLASS, freshman-nonfreshman, and from ETHNIC, white-nonwhite. For those students who took the Scholastic Aptitude Test, the score they made on the verbal portion (VSAT) was added to the data. Identity information used to track students during data collection was deleted from the data prior to the analysis in order to preserve individual privacy.

Three outcome measurements were obtained: the raw scores (EX1 and EX2) of two multiple choice examinations, given approximately one-third and two-thirds of the way through the course, and the final course grade in letter form (GRADE).

Research Design

This study explored causal relationships among variables that cannot be manipulated experimentally (3, p. 533). Students were naturally, and unknown to them, divided into two groups based on their reading level scores (RDLVL) and the readability level of the textbook (B9) or the test bank (T9). The group of interest had

RDLVL - B9 < 0 or RDLVL - T9 < 0.

The <u>comparison group</u> had

RDLVL - B9 > 0 or RDLVL - T9 > 0.

The design of this study is a static group comparison based on Design 3 of Campbell and Stanley (4, pp. 8, 12). This is a schematic of the design.

X EX1 EX2 GRADE

EX1 EX2 GRADE

This design controls for the main effects of history, testing, instrumentation, and regression. It does not control for selection, maturation and experimental mortality. Selection main effects and interactions were controlled by use of a covariate analysis (3, pp. 541, 552). Maturation and experimental mortality are changes expected to occur. Although the time period is short, one semester in length, some students will mature and become more adept at dealing with the requirements imposed upon them and with the frustration that builds while they attempt to use the written course materials. Alternatively, some students who experience frustration repeatedly while attempting to use course materials will reach a point where their perceptions of the probability of failure will exceed that for the probability of success and they will withdraw. Experimental mortality, the differential loss of members from the two groups, is one indicator of this withdrawal.

The treatment (X) represents the necessity of the group of interest to use written course materials that have readability levels (B9, T9) above their reading level (RDLVL). The comparison group used the same materials. Since the reading level of the comparison group is above the readability levels of the course materials, the comparison group did not undergo the treatment defined above.

The instructor specified which sections of the textbook were to be read, selected the examination questions from the common test bank, and acquired the outcome measures (EX1, EX2, and GRADE). Neither the instructors nor the students had access to the RDLVL, T9 and B9 measurements during the conduct of the course or of this study.

This study does not propose to measure effects due to differences in instructors. The effects due to the instructor variable were removed by converting the outcome measures that were collected by each instructor to standard score form with identical means and standard deviations, thereby removing the variance that could be attributed to differences in instructors.

Data Collection

After obtaining approval of the Chairman of the Department of Economics at North Texas State University, the author administered the Nelson-Denny Reading Test and the accompanying demographic survey to consenting students in

ten selected sections of Principles of Economics (ECON 1100 and ECON 1110) during the first two weeks of classes in Spring Semester 1986. There was strict compliance with the prescribed procedures of the Nelson-Denny Reading Test (2). The author calculated the readability levels B9 and T9 using the procedures outlined above. Instructors developed, administered and graded examinations and recorded the results. Also, they assigned end-of-course letter grades.

Statistical Procedures

Academic achievement was measured by the outcome variables EX1, EX2, and GRADE. Regression techniques were used to explore relationships between dependent and outcome variables in order to test sub-hypotheses two and four (1; 5). Reading ability relationships were examined using a Chi-square test for degree of homogeniety. Reading ability was related to examination scores using Pearson product-moment correlation and with final course grade using Spearman rank-difference correlation in order to test the general hypothesis (3, p. 586). A Chi-square test for independence was used to test the significance of the differences posed in sub-hypothesis one (3, p. 559; 5, p. 207).

Indicators of frustration, of lowered perceptions by students of their probability of success, were defined to be one or more of the following: receiving a failing score on

the first examination, making a substantially lower score on the second examination than on the first, formal withdrawal from the course, and receipt of a failing grade in the course. An artificial dichotomy (INDC, indicators present or absent) was related to reading level using correlation and a test for degree of homogeniety in order to test sub-hypothesis three (3, p. 589).

CHAPTER BIBLIOGRAPHY

1. Afifi, A. A., and Virginia Clark, Computer-Aided Multivariate Analysis, Belmont, CA, Lifetime Publications, 1984.

2. Brown, James I., J. Michael Bennett, and Gerald Hanna, Examiner's Manual, the Nelson-Denny Reading Test, Chicago, Riverside Press, 1981.

3. Borg, Walter R., and Meredith D. Gall, Educational Research, An Introduction, 4th Ed., New York, Longman, Inc., 1983.

4. Campbell, Donald T., and Julian C. Stanley, Experimental and Quasi-Experimental Designs for Research, Chicago, Rand-McNalley and Co., 1966.

5. Ferguson, George A., Statistical Analysis in Psychology and Education, 5th Ed., New York, McGraw Hill, Inc., 1981.

6. Fry, Edward, "A Readability Formula that Saves Time," Journal of Reading, XI (April, 1968), 574-578.

7. McConnell, Campbell, Economics, Ninth Ed., New York, McGraw-Hill, New York, 1984.

CHAPTER IV

ANALYSIS OF THE DATA AND DISCUSSION

Analysis of the Data

A level of significance of p = 0.01 was selected for this study. A p score is the probability of obtaining a value of the test statistic as extreme or more extreme than actually obtained, given that the null version of the tested hypothesis is true. If p = 0.01, the odds are no less than one in 100 that the null is true (4, p. 206). In the tables, a significant p value is indicated by an asterisk.

The results of the Nelson-Denny Reading Test (3) are shown in Table I as a frequency distribution for whole grade intervals. It can be seen in the cumulative percentage that over 25 percent of the sample read below the ninth grade level and over 50 percent read below the 12th grade level.

Examination of the data in Table II shows the results of the readability measurements for the textbook, McConnell, Economics, 9th Ed. (7), and for the accompanying test bank. The two variables of the measurement--sentences per 100 words and syllables per 100 words--were entered into the Fry readability graph (6) to obtain a readability level expressed as a U. S. grade level. For this study, the lower limit of the interval estimate having a 99 percent

TABLE I

NELSON-DENNY READING TEST RESULTS

	Frequency Distribution		
U. S. Grade	Frequency	Cumulative Frequency	Cumulative Percentage
3.0 to < 4.0	18	18	4.7
4.0 to < 5.0	9	27	7.1
5.0 to < 6.0	18	45	11.8
6.0 to < 7.0	15	60	15.7
7.0 to < 8.0	24	84	22.0
8.0 to < 9.0	20	104	27.2
9.0 to < 10.0	39	143	37.4
10.0 to < 11.0	37	180	47.1
11.0 to < 12.0	36	216	56.5
12.0 to < 13.0	33	249	65.2
13.0 to < 14.0	51	300	78.5
14.0 to < 15.0	38	338	88.5
15.0 to < 16.0	15	353	92.4
16.0 to < 17.0	14	367	96.1
17.0	15	382	100

N = 382 Mean = 10.94 Median = 11.2
Standard Deviation = 3.56 Range = 3.0 to 17.0

confidence level was used. As indicated in Table II, this measure was 13.6 for the textbook and 11.1 for the test bank. The test bank multiple-choice questions were somewhat easier to use than the prose in the textbook. Since the textbook and the examinations based on the test bank were the principal reading materials in the course, data using both measures are analyzed in the study.

When compared to the reading test data in Table I, the textbook readability of 13.6 was higher than the reading level of about 70 percent of the students. The test bank

TABLE II

READABILITY MEASUREMENTS FOR McCONNELL, ECONOMICS, 9th Ed., AND ITS TEST BANK

	Text Book		Test Bank	
	Sentences per 100 Words	Syllables per 100 Words	Sentences per 100 Words	Syllables per 100 Words
Mean	4.98	176.14	4.95	171.80
Std. Deviation	0.95	14.89	1.50	26.58
Std. Error of the Mean	0.17	2.72	0.27	4.85
Lower Limit of 99% Interval	5.43	169.12	5.65	159.28
	U.S. Grade		U.S. Grade	
Readability:				
Mean	15.8		14.6	
Lower Limit of 99% Interval	13.6		11.1	
Frustration Level:				
Mean	14.3		13.1	
Lower Limit of 99% Interval	12.1		9.6	

readability of 11.1 was higher than the reading level of about 56 percent of the students.

The readability levels associated with frustration, as discussed by Flesch (5), are presented in Table II. Based on the lower limit of the interval estimate of readability, the textbook frustration level, B9, was 12.1 which placed it above the reading level of about 66 percent of the students. The test bank frustration level, T9, was 9.6 which was above the reading level of about 40 percent of the students.

The research variables are reviewed in Table III. The variable BOOKGP identifies the two groups formed by separating the sample based on the comparison of RDLVL to B9. Those members who had RDLVL less than B9 formed the group BOOKGP=0 and became the group of interest, those who underwent the treatment of reading materials having a readability level above their frustration level. Those members who had RDLVL greater than B9 formed the group BOOKGP=1 and became the comparison group, those who did not undergo the treatment. The variable TESTGP identifies the two groups formed by separating the sample based on the comparison of RDLVL to T9. Those members who had RDLVL less

TABLE III

DESCRIPTION OF RESEARCH VARIABLES

EX1	Test 1 Score - Normalized
EX2	Test 2 Score - Normalized
GRADE	Final Grade (1=A, 2=B, 3=C, 4=D, 5=F)
RDLVL	Nelson-Denny Reading Level Score (U.S. Grade)
ETHNIC	Ethnic (0=White, 1=Nonwhite)
CLASS	Class (0=Non-Freshman, 1=Freshman)
ESL	English as Second Language (0=Primary Language, 1=Second Language)
SEX	Sex (0=Female, 1=Male)
INDC	Indication of Frustration (0=No, 1=Yes)
VSAT	Score made on the Verbal portion of the SAT
BOOKGP	Groups based on B9 - Textbook Readability (0=Read below Frustration Level, 1=Read above Frustration Level)
TESTGP	Groups based on T9 - Test Bank Readability (0=Read below Frustration Level, 1=Read above Frustration Level)

than T9 formed the group TESTGP=0 and became the group of interest, those who underwent the treatment of reading materials having a readability level above their frustration level. Those members who had RDLVL greater than T9 formed the group TESTGP=1 and became the comparison group, those who did not undergo the treatment.

The descriptive statistics for the research variables are listed in Table IV. The means and standard deviations

TABLE IV

RESEARCH VARIABLES - ENTIRE SAMPLE

Variable	Mean	Standard Deviation
EX1	72.40	15.30
EX2	72.40	15.30
GRADE	2.575	1.149
RDLVL	10.94	3.564
ETHNIC	0.225	0.418
CLASS	0.382	0.487
ESL	0.071	0.257
SEX	0.539	0.499
VSAT	409.52	91.29
INDC	0.366	0.482
BOOKGP	0.424	0.495
TESTGP	0.678	0.468

of the two examinations--EX1 and EX2--were identical due to the normalization procedure used to remove the instructor variable.

The data in Table V are the descriptive statistics for the variables after the sample was divided into the two

groups BOOKGP=0 and BOOKGP=1. The descriptive statistics for the variables after the sample was divided into the groups TESTGP=0 and TESTGP=1 are in Table VI. Table V

TABLE V

RESEARCH VARIABLES - BY BOOKGP

	BOOKGP=0		BOOKGP=1	
	Mean	Std. Dev.	Mean	Std. Dev.
EX1	67.29	14.28	79.49	13.79
EX2	68.31	14.58	78.07	14.46
GRADE	2.815	1.071	2.256	1.174
RDLVL	8.495	2.532	14.255	1.450
ETHNIC	0.359	0.481	0.043	0.204
CLASS	0.482	0.501	0.247	0.433
ESL	0.123	0.329	0.000	0.000
SEX	0.559	0.498	0.512	0.501
VSAT	372.76	76.40	495.95	59.93
INDC	0.464	0.500	0.234	0.425

contains data showing differences in demographic makeup of the groups BOOKGP=0 and BOOKGP=1. Group BOOKGP=0 was composed of 35.9 percent nonwhites, 48.2 percent freshmen, and 12.3 percent speakers of English as a second language. Group BOOKGP=1 was composed of 4.3 percent nonwhites, 24.7 percent freshmen, and no speakers of English as a second language. Similarly, the difference in demographic makeup of the groups TESTGP=0 and TESTGP=1 are shown in Table VI. Group TESTGP=0 was composed of 47.2 percent nonwhites, 46.3

percent freshmen, and 18.7 percent speakers of English as a second language. Group TESTGP=1 was made up of 10.8 percent nonwhites, 34.4 percent freshmen, and 1.5 percent speakers of English as a second language.

TABLE VI

RESEARCH VARIABLES - BY TESTGP

	TESTGP=0		TESTGP=1	
	Mean	Std. Dev.	Mean	Std. Dev.
EX1	65.12	14.90	75.91	14.23
EX2	67.40	14.63	74.89	15.02
GRADE	2.885	1.132	2.434	1.131
RDLVL	6.724	1.982	12.938	2.101
ETHNIC	0.472	0.501	0.108	0.311
CLASS	0.463	0.501	0.344	0.476
ESL	0.187	0.391	0.015	0.124
SEX	0.545	0.500	0.537	0.500
VSAT	323.00	65.01	450.71	70.29
INDC	0.504	0.502	0.301	0.460

Frequency distributions of group members by BOOKGP for the outcome variables GRADE, EX1, and EX2 are listed in Table VII. In Table VIII are listed the frequency distributions of group members by TESTGP for the outcome variables. In each case, the group of interest and the comparison group had letter grade and examination score distributions that were significantly different.

TABLE VII

FREQUENCY DISTRIBUTIONS OF OUTCOME VARIABLES
BY BOOKGP

GRADE	BOOKGP = 0		BOOKGP = 1	
	Freq.	Pct.	Freq.	Pct.
A	20	9.7	52	33.3
B	64	31.1	44	28.2
C	72	34.9	36	23.1
D	34	16.5	16	10.3
F	16	7.8	8	5.1

Correlation = -0.253 Chi-Square = 32.792 p = 0.000*

EX1	BOOKGP = 0		BOOKGP = 1	
	Freq.	Pct.	Freq.	Pct.
90 and higher	9	4.1	42	26.8
80 and < 90	32	14.7	41	26.1
70 and < 80	63	28.9	35	22.3
60 and < 70	45	20.6	26	16.6
50 and < 60	38	17.4	8	5.1
40 and < 50	25	11.5	5	3.2
30 and < 40	4	1.8	0	0.0
20 and < 30	1	0.5	0	0.0
10 and < 20	1	0.5	0	0.0

Correlation = 0.395 Chi-Square = 64.790 p = 0.000*

EX2	BOOKGP = 0		BOOKGP = 1	
	Freq.	Pct.	Freq.	Pct.
90 and higher	11	5.5	33	22.8
80 and < 90	32	15.9	33	22.8
70 and < 80	56	27.9	38	26.2
60 and < 70	49	24.4	20	13.8
50 and < 60	29	14.4	18	12.4
40 and < 50	16	8.0	3	2.1
30 and < 40	7	3.5	0	0.0
20 and < 30	1	0.5	0	0.0
10 and < 20	0	0.0	0	0.0

Correlation = 0.291 Chi-Square = 38.186 p = 0.000*

TABLE VIII

FREQUENCY DISTRIBUTIONS OF OUTCOME VARIABLES
BY TESTGP

GRADE	TESTGP = 0		TESTGP = 1	
	Freq.	Pct.	Freq.	Pct.
A	11	9.7	61	24.5
B	34	30.1	74	29.7
C	37	32.8	71	28.5
D	19	16.8	31	12.5
F	12	10.6	12	4.8

Correlation = -0.179 Chi-Square = 14.003 p = 0.007*

EX1	TESTGP = 0		TESTGP = 1	
	Freq.	Pct.	Freq.	Pct.
90 and higher	3	2.5	48	19.0
80 and < 90	15	12.3	58	22.9
70 and < 80	32	26.2	66	26.1
60 and < 70	27	22.1	46	18.2
50 and < 60	26	21.3	20	7.9
40 and < 50	15	12.3	15	5.9
30 and < 40	4	3.3	0	0.0
20 and < 30	1	0.8	0	0.0
10 and < 20	1	0.8	0	0.0

Correlation = 0.335 Chi-Square = 50.336 p = 0.000*

EX2	TESTGP = 0		TESTGP = 1	
	Freq.	Pct.	Freq.	Pct.
90 and higher	3	2.6	41	17.8
80 and < 90	22	19.1	43	18.6
70 and < 80	30	26.1	64	27.7
60 and < 70	26	22.6	43	18.6
50 and < 60	19	16.5	28	12.1
40 and < 50	10	8.7	9	3.9
30 and < 40	4	3.5	3	1.3
20 and < 30	1	0.9	0	0.0
10 and < 20	0	0.0	0	0.0

Correlation = 0.209 Chi-Square = 22.936 p = 0.003*

The data in Table IX are a comparison of the means of the variables as divided by BOOKGP. The same information for TESTGP is provided in Table X. In each instance, the means of the outcome variables, GRADE, EX1, and EX2, were significantly different. For BOOKGP, the difference in means of the variables ETHNIC, CLASS, and ESL were

TABLE IX

COMPARISON OF MEANS BY BOOKGP

Variable	F Value	p Score
EX1	59.158	0.000*
EX2	31.261	0.000*
GRADE	21.026	0.000*
ETHNIC	53.225	0.000*
CLASS	31.165	0.000*
ESL	21.338	0.000*
SEX	0.818	0.366
INDC	21.031	0.000*
VSAT	74.487	0.000*

statistically significant, while that of SEX was not. For TESTGP, the difference in means of ETHNIC and ESL were significant while those of CLASS and SEX were not. The difference in means for INDC and VSAT were significant for both group divisions.

The results of examining the relationships of RDLVL with the other variables are presented in Table XI. In

TABLE X

COMPARISON OF MEANS BY TESTGP

Variable	F Value	p Score
EX1	44.870	0.000*
EX2	17.588	0.000*
GRADE	11.990	0.001*
ETHNIC	62.979	0.000*
CLASS	9.107	0.058
ESL	37.266	0.000*
SEX	0.022	0.833
INDC	14.750	0.000*
VSAT	70.533	0.001*

addition to correlation, the degree of homogeneity for a categorized data matrix was computed for each pairing. The test statistic is Chi-square. A significant p value indicates that the RDLVL distribution for each category of

TABLE XI

RELATIONSHIP OF READING LEVEL
WITH OTHER VARIABLES

Pairing	Correlation Coefficient	Chi-Square	p Score
RDLVL by GRADE	-0.243	57.231	0.000*
RDLVL by EX1	0.430	121.718	0.000*
RDLVL by EX2	0.271	72.298	0.001*
RDLVL by ETHNIC	-0.444	125.125	0.000*
RDLVL by CLASS	-0.239	49.561	0.000*
RDLVL by ESL	-0.340	73.662	0.000*
RDLVL by SEX	0.012	6.465	0.264
RDLVL by INDC	-0.239	24.963	0.000*
RDLVL by VSAT	0.771	282.921	0.000*

the paired variable is significantly different. For hierarchical categories, a significant p score indicates that the distribution of RDLVL from one category to another is significantly different and the change in distribution is in the direction indicated by the sign of the correlation coefficient (2, pp. 477-491). The results show that RDLVL

TABLE XII

RELATIONSHIP OF INDICATIONS OF FRUSTRATION WITH OTHER VARIABLES

Pairing	Correlation Coefficient	Chi-Square	P Score
INDC by GRADE	0.570	133.931	0.000*
INDC by EX1	-0.628	202.779	0.000*
INDC by EX2	-0.548	137.695	0.000*
INDC by ETHNIC	0.108	16.222	0.003*
INDC by CLASS	-0.080	4.686	0.321
INDC by ESL	-0.083	2.605	0.107
INDC by SEX	-0.012	0.056	0.813
INDC by BOOKGP	-0.235	21.086	0.000*
INDC by TESTGP	-0.197	14.788	0.000*

was significantly related to each of the outcome variables. RDLVL was significantly related to the demographic variables CLASS, ETHNIC, and ESL but not to SEX. RDLVL was also significantly related to INDC and VSAT.

The relationships of the categorical variable INDC with the other variables are shown in Table XII. INDC had a

significant relationship with each of the outcome variables and with the demographic ETHNIC, but not with CLASS, ESL, or SEX. Also, INDC had a significant relationship with each of the two group divisions, BOOKGP and TESTGP.

In Table XIII, the relationships between VSAT and the other variables are examined. The data for VSAT was incomplete and not representative of the sample. Therefore, it was unlikely to be representative of the population. Of

TABLE XIII

RELATIONSHIP OF VSAT SCORE
WITH OTHER VARIABLES

Pairing	Correlation Coefficient	Chi-Square	p Score
VSAT by GRADE	-0.084	152.132	0.228
VSAT by EX1	0.395	366.839	0.000*
VSAT by EX2	0.280	293.460	0.018
VSAT by ETHNIC	-0.459	136.892	0.032
VSAT by CLASS	-0.054	40.398	0.282
VSAT by ESL	-0.142	124.000	0.000*
VSAT by SEX	0.040	38.294	0.339
VSAT by BOOKGP	0.630	75.093	0.000*
VSAT by TESTGP	0.663	71.107	0.000*

the sample of 382, only 124 had VSAT scores recorded. Of those, 105 were freshmen and 19 were sophomores (no upperclassmen had VSAT scores); 95 were white, 25 were black, one was Hispanic, and three were Asian. Only one speaker of English as a second language had a VSAT score.

For the data available, VSAT had a significant relationship with BOOKGP, TESTGP, ESL, and EX1.

The relationships between the demographic variables CLASS, ETHNIC, and ESL and the outcome variables GRADE, EX1, and EX2 are shown in Table XIV. No significant relationship existed for any demographic variable with GRADE or EX2. There was no significant relationship between CLASS and EX1, however both ETHNIC and ESL had a significant relationship with EX1.

A covariate analysis is presented in Table XV. The demographic variable SEX was eliminated. The question concerned the contribution of the demographic variables CLASS, ETHNIC, and ESL to the determination of individual

TABLE XIV

RELATIONSHIPS BETWEEN DEMOGRAPHIC VARIABLES AND OUTCOME VARIABLES

Pairing	Correlation Coefficient	Chi-Square	p Score
CLASS by GRADE	0.079	2.557	0.634
CLASS by EX1	-0.201	20.515	0.015
CLASS by EX2	-0.088	7.629	0.470
ETHNIC by GRADE	0.011	6.567	0.161
ETHNIC by EX1	-0.231	25.385	0.003*
ETHNIC by EX2	-0.142	14.662	0.066
ESL by GRADE	-0.103	9.222	0.056
ESL by EX1	0.032	35.659	0.000*
ESL by EX2	0.040	1.146	0.997

TABLE XV

COVARIATE ANALYSIS

BOOKGP:		Unadjusted for Covariates		Adjusted for Covariates	
Variable	Estimate	F Value	p Score	F Value	p Score
RDLVL	0.11052	699.12	0.0001*	494.98	0.0001*
CLASS	-0.10362	13.19	0.0003*	10.72	0.0012*
ETHNIC	-0.02754	0.03	0.8529	0.43	0.5110
ESL	0.11991	3.28	0.0708	3.28	0.0708

Intercept = -0.74739 R-Square = 0.6550
Standard Error = 0.2922

TESTGP:		Unadjusted for Covariates		Adjusted for Covariates	
Variable	Estimate	F Value	p Score	F Value	p Score
RDLVL	0.10544	753.36	0.0001*	522.20	0.0001*
CLASS	0.01820	0.37	0.5420	0.38	0.5361
ETHNIC	-0.04338	1.23	0.2679	1.24	0.2653
ESL	0.01062	0.03	0.8630	0.03	0.8630

Intercept = -0.47319 R-Square = 0.6670
Standard Error = 0.2714

INDC:		Unadjusted for Covariates		Adjusted for Covariates	
Variable	Estimate	F Value	p Score	F Value	p Score
RDLVL	-0.03583	20.68	0.0001*	20.69	0.0001*
CLASS	0.00435	0.55	0.4576	0.01	0.9310
ETHNIC	0.09711	0.22	0.6427	2.14	0.1443
ESL	-0.40303	14.75	0.0001*	14.75	0.0001*

Intercept = 0.76330 R-Square = 0.0876
Standard Error = 0.4633

membership in the groups of BOOKGP, TESTGP, and INDC. The table records the multiple regression coefficients used for prediction of group membership. An analysis of covariance yielded an F ratio and a p score, first unadjusted for covariates, that is, assuming a Y = a + bX relationship; and then adjusted for covariates, that is, with the covariates included in the regression equation. A decrease in the F ratio for the principal variable indicates that the covariates are contributing to the relationship. The seriousness of this contribution is measured by the change in p score, particularly if significance is lost (8, pp. 486, 494).

For BOOKGP and TESTGP, the contribution of RDLVL was by far the strongest and it remained significant after adjusting for the covariates. BOOKGP retained a significant contribution for the variable CLASS, however this contribution was not significant for TESTGP. For INDC, the contribution of RDLVL was the strongest and it remained significant after adjusting for the covariates. ESL also made a strong contribution and remained significant for INDC.

Table XVI contains the results of multiple linear regression of RDLVL and the demographic variables CLASS, ETHNIC, and ESL on the outcome variables GRADE, EX1, and EX2. In each case, RDLVL and ESL were the significant components of the regression. The use of a stepwise

TABLE XVI

MULTIPLE LINEAR REGRESSION

GRADE:	Estimate	F Value	p Score
RDLVL	-0.10983	33.06	0.0001*
CLASS	0.03863	0.10	0.7530
ETHNIC	-0.20532	1.64	0.2015
ESL	-0.81294	9.80	0.0019*

Intercept = 3.86685 R-Square = 0.0970
Standard Error = 1.0978

EX1:	Estimate	F Value	p Score
RDLVL	1.82963	63.77	0.0001*
CLASS	-3.99790	7.54	0.0063
ETHNIC	-4.79125	6.26	0.0128
ESL	11.25318	13.83	0.0002*

Intercept = 54.30123 R-Square = 0.2467
Standard Error = 13.3477

EX2:	Estimate	F Value	p Score
RDLVL	1.44511	32.68	0.0001*
CLASS	-0.08180	0.00	0.9599
ETHNIC	3.02977	2.12	0.1461
ESL	13.45446	15.85	0.0001*

Intercept = 56.54385 R-Square = 0.1306
Standard Error = 14.3381

backward elimination procedure confirmed this finding as CLASS and ETHNIC were removed using a p value of 0.01.

With BOOKGP as a surrogate for reading ability, an analysis of the indications of frustration observed in the data was made using the theoretical model of Atkinson (1) that was outlined in Chapter II. The analysis is shown in

TABLE XVII

ANALYSIS OF INDICATIONS OF FRUSTRATION
USING ATKINSON'S MODEL

Indications				Atkinson's Model	BOOKGP	
Fail EX1	EX2 Sig. Lower	With-draw	Grade = F		=0	=1
				I. INDC=0		
				A. Motive to Achieve > Motive to Avoid Failure:		
No	No	No	No	1. No failure	111	115
No	Yes	No	No	2. "Failure" increased incentive	7	9
				II. INDC=1		
				A. Motive to Achieve > Motive to Avoid Failure:		
No	No	No	Yes	1. Success too easy-ceased effort	3	0
				2. Failure increased incentive:		
Yes	No	No	Yes	a. Failure recurred-quit	5	2
Yes	No	Yes	-		6	1
Yes	Yes	No	No	b. Failure recurred-did not quit	3	1
Yes	No	No	No	c. Failure increased incentive again	47	11
No	Yes	No	No		22	12
				B. Motive to Achieve < Motive to Avoid Failure:		
No	Yes	Yes	-	1. Success increased fear of failure-withdrew	1	4
				2. Failure continued:		
Yes	Yes	Yes	-	a. Formally withdrew	7	1
Yes	Yes	No	Yes	b. Passively failed course	3	2
No	Yes	No	Yes		5	4

Table XVII. The following were chosen as indicators of frustration, of lowered perceptions by students of their probability of success: failing EX1, making a significantly lower score on EX2 than what was made on EX1 (a 15 point drop was arbitrarily selected to be significant; if the score on EX2 was still greater than 70, it was not considered to be an indication of frustration), formal withdrawal from the course, and receiving a failing grade in the course. These events were considered to be in a time sequence, representing data collected as a student had repeat encounters with the assigned course materials.

Table XVII is divided vertically into two parts. The first, INDC=0, lists the behavior of the students who displayed no indication of frustration. The second, INDC=1, lists the behavior of those who displayed one or more indications of frustration. These indications are listed in the first four columns of Table XVII. Each sequence was matched to the model described by Atkinson (1). According to the model, two further subdivisions were made depending on which of the two motives, to achieve or to avoid failure, appeared to be dominant. In the last two columns, the frequency of occurrence for BOOKGP=0 and BOOKGP=1 is listed.

For those who had no indication of frustration, only sequences related to the dominance of the motive to achieve were found. This group was evenly divided between BOOKGP=0 and BOOKGP=1, indicating that a student with a strong motive

to achieve can do so despite the handicap of being required to use course materials written at a level well above their reading ability.

For those who had one or more indications of frustration, sequences were found that related to both alternatives, the dominance of the motive to achieve and the dominance of the motive to avoid failure. The majority of those who demonstrated indications of frustration followed sequences related to the dominance of the motive to achieve. This group has a distribution biased toward BOOKGP=0; 86 to 27. Those that followed sequences related to the dominance of the motive to avoid failure had a distribution only slightly biased toward BOOKGP=0; 16 to 11. These data reinforced the statement made above, that a student with a strong motive to achieve can do so despite a reading ability much below the readability of required course materials. If ultimate academic achievement were defined as passing the course, of the 86 students with a dominant motive to achieve and included in INDC=1 and BOOKGP=0, only eight received a failing grade and only six formally withdrew. In contrast, the sequences that indicated a dominant motive to avoid failure all led to formal withdrawal or failure of the course. This analysis indicated that the relative strengths of the motive to achieve and the motive to avoid failure played a strong role in determining the outcome of

encountering frustration. RDLVL played a significant role in identifying those who may have encountered frustration.

Discussion

The general hypothesis of this study proposed that the reading ability of students is positively correlated with their academic achievement. There is a direct and significant relationship between (1) reading ability and higher examination scores and (2) between reading ability and the final grade in the course. For each comparison shown in Table XI, the distribution of RDLVL from one category of examination score or final grade to another was significantly different, upholding the general hypothesis.

The first sub-hypothesis proposed that the group of interest (BOOKGP=0 or TESTGP=0) will have significantly lower academic achievement than the comparison group (BOOKGP=1 or TESTGP=1). For each division method, the frequency distributions for final grades in the course and for the two examinations, shown in Tables VII and VIII, indicate that the group of interest had significantly lower achievement than the comparison group, upholding the first sub-hypothesis.

The second sub-hypothesis proposed that reading ability is a significant factor in forecasting academic achievement. The results of multiple linear regression of RDLVL and the demographic variables CLASS, ETHNIC, and ESL on the outcome variables GRADE, EX1, and EX2, shown in Table

XVI, confirm that, for each regression, RDLVL was a significant component of the regression. It was found that ESL was also a significant component. The prediction equations that come from these regressions are not very useful in that their coefficients of determination (R-Square) are low, implying that a large amount of variance is unexplained by the regression (4, p. 318). Using only RDLVL and the demographic variables, one cannot forecast academic achievement with any reliability. Adding interaction components to the regression yielded no further explanation of variance. Some other untested variable or group of variables must be included to develop a useful predictive model. Thus, although RDLVL was a significant component of each regression, sub-hypothesis two is not upheld since the regression models formed are not good forecasters of academic achievement.

The third sub-hypothesis proposed that reading ability is negatively related to indications of frustration, to the lowered perceptions by students of their probability of success. This negative relationship was demonstrated using correlation and the significance of the difference in distribution of RDLVL between the two categories of INDC as shown by the use of a Chi-square test for homogeniety. These results, shown in Table XI, uphold the third sub-hypothesis. Further analysis of the indications of frustration observed in the data revealed that the relative

strengths of the motive to achieve and the motive to avoid failure play a strong role in determining the outcome of the encounter with a frustrating barrier.

The fourth sub-hypothesis proposed that freshmen, nonwhite ethnics, and those using English as a second language have, as separate groups, significantly lower reading ability and significantly lower academic achievement than their opposites. RDLVL is negatively and significantly correlated with ETHNIC, CLASS, and ESL, as shown by the data in Table XI, thereby upholding the first part of this sub-hypothesis. The second part of this sub-hypothesis, however, is not upheld. This study produced no conclusive evidence that freshmen, nonwhite ethnics and those using English as a second language have significantly lower academic achievement than their opposites, as documented in Table XIV.

CHAPTER BIBLIOGRAPHY

1. Atkinson, John W., "Motivational Determinants of Risk-Taking Behavior," Psychological Review, LXIV (November, 1957), 359-372.

2. Berenson, Mark L., David M. Levine, and Matthew Goldstein, Intermediate Statistical Methods and Applications, Englewood Cliffs, NJ, Prentice-Hall, 1983.

3. Brown, James I., J. Michael Bennett, and Gerald Hanna, Examiner's Manual, the Nelson-Denny Reading Test, Chicago, Riverside Press, 1981.

4. Daniel, Wayne W., and James C.Terrell, Business Statistics, Basic Concepts and Methodology, 3rd Ed., Boston, Houghton Mifflin Company, 1983.

5. Flesch, Rudolf, The Art of Readable Writing, New York, Harper, 1949.

6. Fry, Edward, "A Readability Formula that Saves Time," Journal of Reading, XI (April, 1968), 574-578.

7. McConnell, Campbell, Economics, 9th Ed., New York, McGraw-Hill, 1984.

8. SAS Institute Inc., SAS User's Guide: Statistics, Version 5 Edition, Cary NC, SAS Institute Inc., 1985.

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Summary of Findings

The general hypothesis that reading ability is positively correlated with academic achievement was verified. The first sub-hypothesis was a refinement of the general hypothesis, stating that the group of interest--those who had to undergo the treatment of using required course materials written at levels above their frustration level--will have significantly lower academic achievement than the comparison group, who, since they read at levels above the frustration level, did not undergo the treatment. This sub-hypothesis was also verified. The data showed that test score distribution for the comparison group was displaced about ten points upward from that of the group of interest of EX1 and EX2.

The second sub-hypothesis that reading ability is a significant factor in forecasting academic achievement was not verified in that no usable forecasting method could be developed from the measured variables. That RDLVL, and also ESL, was found to be a significant component of the regression formed in the analysis indicates that any reliable model to predict academic achievement that might be

developed should strongly consider RDLVL as one of the predictors.

The third sub-hypothesis that reading ability is negatively related to indications of frustration was upheld. Further analysis of the indications of frustration using the theoretical model of Atkinson showed that the relative strengths of the motive to achieve and the motive to avoid failure become important to the final resolution of the encounters with frustration. Of those who had a dominant motive to achieve and had one or more indications of frustration, three out of four were members of the group of interest.

The fourth sub-hypothesis that freshmen, nonwhite ethnics, and users of English as a second language have, as separate groups, significantly lower reading ability and significantly lower academic achievement than their opposites was partially verified. The analysis affirmed the first part concerning reading ability but did not affirm with any conclusiveness the second part concerning academic achievement.

Conclusions

The progression of individuals from event to event and their encounters with barriers to their locomotion, as theorized by Lewin and Atkinson, became manifest in the reality of the data collected and analyzed in this study.

The act of selecting written course materials in itself develops a demarcation that separates the student clientele into two groups, one group who will use those materials without perceiving them to be barriers to their locomotion toward goal attainment and another group who will so perceive and who will, in response, alter their behavior in subsequent efforts to cope with course requirements.

This demarcation point is jointly determined by two variables:

1. The reading ability of the students, a function of the admission policies of the institution, and

2. the readability of the written course materials selected, a function of the course materials selection policies established within an academic department.

This joint determination of the demarcation point becomes a determinant of the probability of success of each individual in the course, tempered somewhat by the strength of the individuals's motive to achieve.

Recommendations

The implication of the results of this study is that members of materials selection committees, in order to insure they do not negate or otherwise contradict the admissions policies of their institution, have an obligation to identify the capabilities of their potential student clientele as a prerequisite to materials selection. Since

there is a vast assortment of acceptable curricular materials on the market, it is not necessary to cater to a student body having lesser capabilities by "watering down" the courses. Clarity of presentation and comprehensibility of written works are not synonymous with a lack of scholarly presentation. Once committee members can identify the capabilities of those whom they are to educate, they can proceed to select materials that will lead to the achievement of communication in education: to insure the maximum possible receipt and comprehension of the course content.

Since the passage of the Morrill Act in 1862 that led to the establishment of the land grant colleges, America's institutions of higher learning have been progressing toward more and more open admission policies. If a university sets a more open admissions policy, the policies of academic departments at the institution should support this concept of admission; otherwise, they may negate it. Knowing the capabilities of the students admitted is the first step. Tailoring the means and materials of instruction to meet the needs of these students is the second. Proper execution of these two fundamental steps can optimize the collective probabilities of success for the students.

It is suggested that further research explore the following areas.

1. This study should be expanded to include other academic disciplines and to include other academic institutions, including those having an admissions policy and, consequently, a student clientele with different capabilities in reading ability. The sample in this study was not randomly selected, thus external validity is threatened and generalization of the findings severely restricted. While the statistical results may not be generalized beyond the universe of Economics classes at North Texas State University in the semester of data collection, the methods used in the study can be translated to any venue and the implications derived from this study can be tested in that venue.

2. The study can be made more comprehensive by adding an instrument to further define the relative strengths of the motive to achieve and the motive to avoid failure. Also, such an instrument should explore in depth the roles these two motives play during successive encounters with barriers in the path toward goal attainment.

3. In order to assist course materials selection committees, a substitute source of data should be found for the Nelson-Denny Reading Test that is easy to acquire and use. An academic institution usually records the total score and the component scores of the Scholastic Aptitude Test (SAT) or its equivalent. This study attempted to incorporate the verbal component of the SAT, the VSAT, into

the analysis as a candidate substitute for RDLVL. Since the VSAT data were incomplete and demographically biased, no statement was made as to the utility of VSAT as a measure of student ability.

4. In order to develop a reliable predictive model of academic achievement, variables other than RDLVL and the demographic variables discussed in this study must be incorporated into the study. Two potential candidates not included in this study are method of instruction and proficiency of the instructor.

BIBLIOGRAPHY

Books

Afifi, A. A., and Virginia Clark, Computer-Aided Multivariate Analysis, Belmont, CA, Lifetime Publications, 1984.

Berenson, Mark L., David M. Levine, and Matthew Goldstein, Intermediate Statistical Methods and Applications, Englewood Cliffs NJ, Prentice-Hall, 1983.

Brown, James I., J. Michael Bennett, and Gerald Hanna, Examiner's Manual, the Nelson-Denny Reading Test, Chicago, Riverside Press, 1981.

Borg, Walter R., and Meredith D. Gall, Educational Research, An Introduction, 4th Ed., New York, Longman, Inc., 1983.

Campbell, Donald T., and Julian C. Stanley, Experimental and Quasi-Experimental Designs for Research, Chicago, Rand-McNalley and Co., 1966.

Daines, Delva, Reading in the Content Areas, Glenview, IL, Scott, Foresman, 1982.

Daniel, Wayne W., and James C.Terrell, Business Statistics, Basic Concepts and Methodology, 3rd Ed., Boston, Houghton Mifflin Company, 1983.

Deutsch, Morton and Robert M. Krauss, Theories in Social Psychology, New York, Schenkman, 1965.

Ferguson, George A., Statistical Analysis in Psychology and Education, 5th Ed., New York, McGraw Hill, Inc., 1981.

Flesch, Rudolf, The Art of Readable Writing, New York, Harper, 1949.

Howe, Michael J., A Teacher's Guide to the Psychology of Learning, New York, Basil Blackwell, 1984.

Klingelhofer, E., and L. Hollander, Educational Characteristics and Needs of New Students, Berkeley, CA, Center for Research and Development in Higher Education, 1973.

Maxwell, Martha, Improving Student Learning Skills, San Francisco, Jossey-Bass, 1979.

McConnell, Campbell, Economics, 7th Ed., New York, McGraw-Hill, 1978.

_____, Economics, 9th Ed., New York, McGraw-Hill, 1984.

Picher, R. and B. Blaushild, Why College Students Fail, New York, Funk & Wagnalls, 1970.

(Professor X), This Beats Working for a Living, New York, Manor Books, 1974.

SAS Institute Inc., SAS User's Guide: Statistics, Version 5 Edition, Cary NC, SAS Institute Inc., 1985.

Articles

Atkinson, John W., "Motivational Determinants of Risk-Taking Behavior," Psychological Review, LXIV (November, 1957), 359-372.

Covington, M. L. and C. L. Omelich, "As Failures Mount: Affective and Cognitive Consequences of Ability Demotion in the Classroom," Journal of Educational Psychology, LXXIII (December, 1981), 796-808.

Duffy, Thomas M., "Readability Formulas: What's the Use?," Designing Usable Texts, edited by Thomas M. Duffy and Robert Waller, Orlando, FL, Academic Press, 1985, pp. 113-143.

Fry, Edward, "A Readability Formula that Saves Time," Journal of Reading, XI (April, 1968), 574-578.

Gallagher, D. J., and G. P. Thompson, "A Readability Analysis of Selected Economics Textbooks," Journal of Economic Education, XII (Summer, 1981), 60-63.

Levy, Stanley, and Melinda Dixon, "Student Reading Ability vs. Textbook Readability at a Community College." Educational Research Quarterly, IX (Autumn, 1984), 43-47.

Orna, Elizabeth, "Writing to Inform," Designing Usable Texts, edited by Thomas M. Duffy and Robert Waller, Orlando, FL, Academic Press, 1983, pp. 20-22.

Roth, R. and A. Meyersburg, "The Nonachievement Syndrome, Personnel & Guidance Journal, XLI (February, 1963), 535-539.

Rubin, Andee, "How Useful are Readability Formulas?," Reading Education: Foundations for a Literate America, edited by J. Osborn, P. Willson, and R. Anderson, Lexington, MA, Lexington Books, 1985, pp. 61-77.