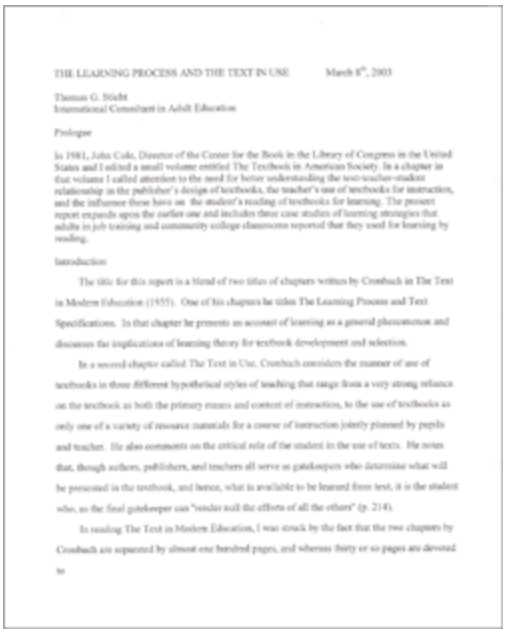

THE LEARNING PROCESS AND THE TEXT IN USE March 8th, 2003

Thomas G. Sticht
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Prologue

In 1981, John Cole, Director of the Center for the Book in the Library of Congress in the United States and I edited a small volume entitled The Textbook in American Society. In a chapter in that volume I called attention to the need for better understanding the text-teacher-student relationship in the publisher's design of textbooks, the teacher's use of textbooks for instruction, and the influence these have on the student's reading of textbooks for learning. The present report expands upon the earlier one and includes three case studies of learning strategies that adults in job training and community college classrooms reported that they used for learning by reading.

Introduction

The title for this report is a blend of two titles of chapters written by Cronbach in The Text in Modern Education (1955). One of his chapters he titles The Learning Process and Text Specifications. In that chapter he presents an account of learning as a general phenomenon and discusses the implications of learning theory for textbook development and selection.

In a second chapter called The Text in Use, Cronbach considers the manner of use of textbooks in three different hypothetical styles of teaching that range from a very strong reliance on the textbook as both the primary means and content of instruction, to the use of textbooks as only one of a variety of resource materials for a course of instruction jointly planned by pupils and teacher. He also comments on the critical role of the student in the use of texts. He notes that, though authors, publishers, and teachers all serve as gatekeepers who determine what will be presented in the textbook, and hence, what is available to be learned from text, it is the student who, as the final gatekeeper can "render null the efforts of all the others" (p. 214).

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In reading The Text in Modern Education, I was struck by the fact that the two chapters by Cronbach are separated by almost one hundred pages, and whereas thirty or so pages are devoted to a discussion of the learning process in general, only two pages are devoted to a discussion of the students' use of textbooks. Yet it is the manner in which students use textbooks that determines what and how much they will learn from the text. It seems to me, therefore, that we need to bring the discussion of the learning process and the use of texts together to understand how students use textbooks to bring about learning.

THE TEXT-TEACHER-STUDENTS SYSTEM

Inquiry into the student's use of texts may provide important information about how to improve not only the student's use of texts, but also the teacher's use of text and the publisher's design of texts to make them more useable. This is so because the text-teacher-student trilogy that we are concerned with forms an ecological system that has evolved over

many centuries, with a major spurt in development resulting from the advent of printing (Eisenstein, 1978).

From this evolutionary, ecological perspective we can anticipate that the student's use of texts will be conditioned by the teacher's use of texts. For instance, the teacher may assign certain segments of a text for reading. This provides an implicit instruction to students that certain segments of texts may be studied and that parts of texts may be omitted. Furthermore, this mode of teaching may be reflected in the design of textbooks in which each chapter may be developed to stand alone, so that the teacher may select and omit chapters as desired.

These types of text-teacher-student interactions take place in the context of both long term cultural evolution, and in the course of each child's developmental experiences - at least they do in our highly literate society. The cultural environment affects the text-teacher-student system in ways not yet fully understood. But clearly the content that teachers are permitted to cover, and that is therefore included in textbooks, can be seen to have changed drastically in this country in just the last twenty-five years. We can also surmise that changes in teaching methods, such as from an emphasis upon strict memorization of texts with public recitation as a means of demonstrating learning, to the assignment of chapters for reading with multiple choice tests administered to sample learning, has had an effect on the student's use of texts and, indeed, on the very design of textbooks themselves.

In studying the student's use of texts, then, we are studying only one part of a system that has a long evolutionary history. Teachers are first students who learn from textbooks, then they are teachers who use textbooks, and then they are authors who write textbooks and so on and so on and so on. Each new generation of teachers will help to shape a new generation of students into learners from texts. Each new generation of textbook authors write with a set of, largely implicit, understandings of who the teachers and students are for whom they write, and with expectations of how teachers will teach and how students will learn using their textbook.

Studies of this text-teacher-student system are practically nonexistent, or so my literature search suggests. Yet such study seems of the utmost importance if we are to advance the system beyond its present state. Patricia Wright, the British ergonomist, has expressed, I believe, the sentiments of many researchers who have attempted to bring about improvements in the design of textbooks, and other documents, without understanding this eco-system. She states:

> "Why is it that after many years of research, so little progress has been made in the development of specifications for designing written communications so that they are easily understood?" (1978, p. 254)

It seems to me that one of the reasons for this perceived lack of progress is that many of the most significant "specifications" may already have been used not only in the design of textbooks but also in an implicit manner in the "design" of student's minds as they progress through the K-12 curriculum. By this I mean that, in teaching people to read and to apply reading skills to various bodies of knowledge represented in a wide variety of formats and organizations, teachers cause readers to develop various strategies for processing the information in written communications for many different purposes, including learning. Because of this extensive instruction, readers become adept at processing a variety of text

formats, organizations, etc., and hence, we are less able to show the importance of various features of texts.

Another reason it may be difficult to identify specifications for designing texts that seem to add much to design technology is that publishers, writers, and editors already use "specifications," or perhaps better put, rules of thumb, and their own native language intuitions to produce textbooks. Writers, for instance may follow a certain simple set of design "specs" such as asking themselves, "Does this read the way you would say it?" Or a publisher might ask, "Have you first told them what you are going to say (give a preview), then said it simply (i.e., according to your own internal standards of simplicity), and then told them what it is you said (provide a summary)?" Such design "specs" exist in certain fields, such as journalism, wherein reporters are told to get the who, what, when, where, and why of an event. They are then to write in an inverted pyramid, with the most important general facts first and detailed expansions later, so the editor can cut the article from the bottom-up to fit space requirements.

Another reason why it may be difficult to come up with specifications to improve the understanding of certain textbooks or other documents is that many times the problems are not lack of know-how, but rather certain production system problems such as inadequate time schedules, incorrect information, accidental loss of information, failure to incorporate last minute changes, and the like. The solutions to these types of production system problems lie in system management, not in the development of specifications for the design of written communication of make them easier to understand.

Briefly, the point I am trying to make is that the modern textbook is a highly evolved tool that is, for the most part, easily used by teachers and satisfactorily understood by the majority of students for whom the text is designed. This means that many implicit and some explicit "specifications" have been developed for the design of textbooks as used in a given text-teacher-student system, such as that found in the elementary, middle, secondary, or post-secondary school. In part then, an immediate order of business should be for research to reveal the nature of the text-student-teacher system, in specified situations, such as a given schooling level, and to make explicit the rules of thumb (specifications) used by text designers as well as the rules of thumb or strategies or activities followed by teachers in using texts as teaching tools and by students in using textbooks as tools for learning and for guiding performance (as in laboratory exercises). Though such study may produce explicit knowledge about how to design textbooks, and may thus make it more efficient to teach people how to produce effective texts, it will likely not lead to "specifications" that can be mechanically applied to guarantee an easily understood written communication. The latter effect will always depend upon the availability of a reader who has been "designed" to understand the communication, and there must be a teacher "designed" to know how to bring text and student together.

Three Views of the Text-in-Use by Students

At this time I want to turn from the introductory discussion of the general concept of the text-teacher-student eco-system, to the discussion of some empirical research on the student's use of texts. My aim here is to prevent information from three rather cursory studies in which students were asked to describe how they learn from texts. These studies, though of a very limited nature, suggest a close parallel between how students learn from texts, how teachers teach using texts, and how texts are designed to make viable the learning techniques that students use. Thus, these brief studies, though focused upon the

student's use of texts, are analyzed to reveal information about the text-teacher-student system.

The settings for the three studies of the student's use of texts include two adult job training situations and one view of the use of texts by community college students in a freshman psychology class. The first case of adult job training involves the use of correspondence course materials. In this instance the text is the teacher. The second case of adult job training involves the use of texts in technical courses where the teachers follow a detailed curriculum guide and textbooks and workbooks are followed precisely to cover the course content. In Cronbach's (1955, p. 190) classification of levels of teacher responsibility, this is level III teaching, in which the text is the master and teachers and students interact to understand and learn what is presented in the texts. Finally, the third view of the text in use involves the use of a textbook with certain chapters prescribed by the college, but with teacher and student latitude in selecting content to emphasize and to add to that covered in the text. This appears to correspond, at least roughly, to Cronbach's (1955, p. 190) Level II teaching.

The Student's Use of Texts - Case 1

This study took place within the U.S. Air Force as a part of a research project to develop a job-related literacy program for Air Force personnel who were having difficulty with their career development correspondence courses (Huff, et al, 1977). These courses are used to provide continued job training for personnel to qualify them for higher levels of pay. All personnel are required to complete the correspondence courses in order to be promoted to the next skill and pay level.

Typically, a correspondence course consists of three or four textbooks. Each volume contains a series of chapters composed of specific objectives, followed by narrative text and then a series of questions, Chapter Review Exercises, to guide the student's study. At the end of each textbook, the student completes a Volume Review Exercise, which is an open-book, multiple choice exercise on the information in the volume.

When the Volume Review Exercise answer sheet is completed, it is forwarded to the correspondence course headquarters for grading, and the student proceeds to the next Volume. Volume Review Exercises are returned to the student indicating which objectives in the volume need further study. Upon satisfactory completion of all the Volume Review Exercises, the student is then scheduled to take the course examination at the testing office. This examination is closed-book, and serves to determine whether or not a trainee has satisfactorily completed the course.

Air Force data (Mockovak, 1974) indicates that, of a sample of over 5,000 personnel in reading programs, over 50% were cited as having difficulty reading, comprehending, and passing their correspondence courses. To understand the nature of these problems, a small-scale study was conducted to determine if there were differences among successful and unsuccessful personnel in their use of the correspondence course materials.

In this study, eighteen successful and nineteen unsuccessful personnel were interviewed. These personnel were similar in terms of their Air Force histories and types of job assignments. It was found, however, that four of the unsuccessful personnel had less than twelve years of education while all of the successful students had twelve or more years of education.

Table 1

Study Techniques of Air Force Personnel who were Successful or Unsuccessful in Passing Correspondence Courses

Study Technique	Frequency of Use by Personnel	
	Successful (n=18)	Unsuccessful (n=19)
Make outline	2	1
Underline important parts	14	15
Draw pictures & diagrams	1	1
Look up words in Dictionary	7	9
Look over section before study	9	5
Ask yourself questions	8	4
Take notes	4	2
Try to memorize	8	8

Source: Huff, Sticht (1977)

Both successful and unsuccessful groups reported spending about two and a half hours in study, for an average of three days a week when studying their correspondence courses, though neither group followed a regular study schedule. Both groups also reported using the same kinds of study techniques (see Table 1) when they were given a checklist of techniques and were asked to indicate which ones they use whenever they study. Clearly, in terms of general learning strategies, the two groups do not differ.

To further specify the possible causes of success or lack of success in these groups, personnel were asked to describe their actual use of the correspondence course textbooks by responding to a set of questions designed to identify the sequence of study activities engaged in by the reader. Six sequences are given in Table 2, along with the responses of the personnel. The first sequence represents the prescribed method of study for the correspondence courses. Here the student first previews the particular volume being studied. Then the text is read, word for word, each Chapter Review Exercise is completed, and then each Volume Review Exercise is completed.

Table 2

Study Sequences used by Air Force Personnel who were Successful or Unsuccessful in Passing Correspondence Courses

Study Technique	Frequency of Use by Personnel	
	Successful	Unsuccessful
1. Preview volume, then read word-for-word, complete CRE's & VRE's (prescribed approach).	6	6
2. Preview volume, read word-for-word, complete VRE's	2	2
3. Read only parts of volumes necessary to answer CRE's & VRE's.	2	3
4. Skim-read through volume, then read only parts necessary to answer VRE's.	1	2
5. Read only parts of volume necessary to answer.	7	2
6. Did not study or did not read.	0	4

CRE: Chapter Review Exercises; VRE: Volume Review Exercises

In the succeeding sequences, different parts of the prescribed sequence are dropped. For instance, in the second sequence, Chapter Review Exercises are skipped. In the third sequence previewing and word-for-word reading are dropped, and instead the person reads only the parts of the textbook needed to complete the Chapter and Volume Review Exercises. In sequence four the Chapter Review Exercises are skipped, previewing is dropped, and word-for-word reading is replaced by skimming of the volume with word-for-word reading only of material needed to answer the Volume Review Exercises. In sequence five, skimming of the volume is dropped and the student reads only that part of the material needed to answer the Volume Review Exercises. Finally, then, the last sequence drops everything.

The results presented in Table 2 reveal a considerable variation in the student's use of the textbooks in their correspondence courses. Furthermore, there are some telling hints as to differences between some of the successful and some of the unsuccessful personnel. For one thing, four unsuccessful personnel did not read their materials at all. Not surprisingly then, they failed their final course examinations.

Though the numbers are small, and therefore render observations highly tentative, the reported differences in the use of sequence five for successful and unsuccessful students is of interest. The data suggest that successful students were slightly more likely to use a study strategy that is highly efficient for completing the correspondence course. This strategy is: read only what is needed to complete the open book Volume Review Exercise so it can be mailed out and logged in the official record as one more step completed. But this strategy is only effective if, in fact, the final course examination calls for information that overlaps considerably with that needed to answer the Volume Review Exercises. As it turns out, in one correspondence course, this overlap is 100%, while in the second examined in the study, there is 70-90% overlap. Interviews with the personnel indicated that two-thirds of the successful but only one-third of the unsuccessful students estimated that course and volume exercises would overlap by as much as 90%. Given the actual overlap, and the fact that only 60% correct on the final course examinations is needed to be successful, the use of sequence number five is a highly efficient manner of completing the course requirements. Successful students were more perceptive of the overlap on volume and course examinations, and they made somewhat greater use of sequence five than did unsuccessful students. This perceptiveness on the part of the more successful students presumably results from some adaptive learning that some students achieve as a consequence of dealing with texts and teacher's testing strategies in our school system.

Table 3

Problems with Correspondence Course Materials Reported By Successful and Unsuccessful Air Force Personnel

	Frequency of Problem	
Problem	Successful	Unsuccessful
Material not related to job	5	4
Reading Problems (vocabulary, comprehension, questions)	-	7
Materials were boring	5	1
Not enough time allowed to complete study	-	1
Could not remember information	-	1

In a final effort to determine differences among these successful and unsuccessful personnel, they were asked to report what, if anything, gave them problems with the correspondence courses. As indicated in Table 3, the major difference between the two groups was reading problems; fifty percent of the unsuccessful students who responded to these questions reported that they had problems with the course vocabulary, they had difficulty comprehending the material, and they had difficulty in answering the chapter and volume review questions.

Interestingly, the successful students who responded to these questions were successful despite the fact that they perceived the correspondence course materials as boring and not relevant to their job. Apparently, then, the only incentive for them was to complete the course as an irrelevant barrier to rank and pay advancement. This may account for their frequent use of study strategies aimed more at completing the task than at acquiring the full range of information provided in the texts.

In summary, Case 1 of the students' use of texts illustrates what Cronbach (1955, p. 214) refers to when he points out that given the best that publishers and teachers can produce, the student is the final gatekeeper who determines by his use of the text just what will or will not be learned. In the case of the Air Force correspondence courses, they represent state-of-the-art in self-study materials. They provide objectives, illustrations, review questions as progress checks, feedback on Volume Review Exercises, and guidance on how to study the course. Yet, for all this sophisticated design technology, many students fail the courses one or more times, and many successful students utilize methods of expedience to acquire the course credential rather than the course content.

Possible reasons for these problems are discussed by Cronbach (1955, chapter IV) in his treatment of the general nature of the learning process. His discussion suggests that the manner in which a person will use a textbook will be determined by the situation the person is in, by the particular goals which motivate the person, and by the person's readiness, in terms, say, of reading ability, to comprehend the text material. Apparently, the situation in the Air Force is such that in many cases the correspondence courses are viewed as irrelevant hurdles; so often the goal becomes one of merely clearing the hurdle rather than learning the material. Additionally, a sizeable number of personnel are apparently not ready, due to inadequate vocabulary and prior knowledge to easily comprehend the correspondence courses. An adequate approach to remedying the correspondence course problem would take into consideration the total situation in which texts and students interact.

The Students' Use of Texts-Case II

This study was conducted for the U.S. Navy as part of a program of research to develop techniques for improving personnel skills in learning from text materials (Sticht, Fox, Hauke, and Zapf, 1976). This research was aimed at balancing the Navy's activities in instructional system development in which the overriding goal had been to adapt the instruction to the students. For example, in self-paced instruction, the learning rate of an individual was accepted as a given and a person was allowed to proceed at that pace. Or, in another example, to permit less apt readers to comprehend their technical course materials, the materials were rewritten to a less advanced level.

In the present research, the ultimate use of the information gathered was to permit the Navy to modify the learner in addition to modifying the instruction. Thus, in the context of the text-teacher-student system of concern in this paper, the Navy work aimed at modifying the student.

As a first step in the study, an effort was made to determine just what kinds of tasks Navy personnel perform using textual materials and what kinds of strategies people use to learn from textual materials. Preliminary analysis of reading in work settings had suggested that two general purposes for reading could be identified. One of these was called reading-to-do something, and was used to refer to tasks in which a person consulted a reading source to look up some information that could be applied and then be forgotten. A familiar example of a reading-to-do task is the annual completion of the income tax forms. The forms and accompanying instructions are read to complete the tax forms, and there is no need to recall all of the instructions, so they can be forgotten as soon as the task is completed.

The second general category of reading tasks identified was labeled reading-to-learn. In this type of task, the person must read some information, learn it, and recall it (or a close resemblance) at a later time. In this type of reading, one can imagine that people will develop certain learning strategies or study skills for learning text materials. The information cannot simply be forgotten after reading, it must be made a part of the person's long term fund of knowledge. A familiar reading-to-learn task occurs in the school setting when students are assigned chapters to read in preparation for a test at a later date.

A sample of 178 personnel were interviewed, including 68 students in Navy training courses, 32 of their instructors, and 78 current job performers. Among other items of information gathered in structured interviews conducted at their school or work site, personnel were asked to provide one example of a reading-to-do task and one example of a reading-to-learn task that they had performed on the last working day prior to the interview. As it turned out, however, as the interviewee moved further from the role of student, to that of instructor, and finally to that of active job performer, it was less likely that they had performed reading-to-learn tasks. Hence it was not possible to obtain half reading-to-do and half reading-to-learn tasks from each of these subgroups. Instead, the proportion of reading-to-learn tasks decreased from 55% to 35%, to 27% for students, instructors, and job performers, respectively. Consistent with common sense, the students thus reported performing the largest number of reading-to-learn tasks.

When asked about their reasons for performing the reading-to-learn tasks, 47 percent were reported to have been performed to prepare for a test or because it was required. This was primarily due to students and job performers. Many of the latter must take correspondence courses and pass final exams, as in the Air Force, to get promoted. About 80% of the instructor's responses were that they read to learn the material so they could teach it. Thus, as in the Air Force study, and as is largely true of the civilian world, reading-to-learn tasks are motivated by system requirements for learning or for certification that is needed to qualify for advancement to some next job, rank or position.

Interviewees who reported performing reading-to-learn tasks were asked whether they used any special study techniques to learn the material. Responses were obtained for 107 (83%) of the learning tasks. Of this total, personnel reported that, overall, learning had been accomplished by special techniques for 77 percent (82) of these tasks and that learning occurred simply by reading the material for 23 percent (25). For students, these percentages changed to approximately 90 and 10 percent, respectively. Thus, in this study,

students enrolled in courses of study were more likely to report the use of special learning techniques than persons involved in learning outside of the school setting.

In open-ended questions, personnel were asked to describe the learning strategies in which they had engaged. Altogether, more than 140 responses were obtained for the 82 tasks in which an active learning strategy was pursued, indicating that some tasks involved multiple learning strategies. Table 4 displays the responses within a classification scheme that includes four categories of learning strategies.

1. Reread/Rehearse (R/R): Involves repeating the processing of information taken from the text, with minimal elaboration or transformation.
2. Problem Solve/Question (P/Q): Involves answering text questions, solving problems in texts, and performing tasks that stimulate a search through materials to obtain specific answers.
3. Relate/Associate (R/A): Involves use of mnemonics, discussions of materials, association of new information with other information, and elaborations.
4. Focus Attention (F/A): Involves activities that reduce the amount of information in some manner, e.g., underlining points, outlining, taking notes.

As indicated in Table 4, a large variety of activities were reported to have been used by Navy personnel to learn what was read. Some of the activities involved the use of resources in addition to the text materials, including listening to lectures and watching demonstrations by a teacher and interacting with others in discussing the information to be learned. Such activities clearly indicate that learning from texts does not always involve only the texts. Hence, to restrict the study of "book learning" to texts only is to artificially limit the resources students draw upon to learn information presented in texts.

Table 4

Learning Strategies Reported by Navy Personnel

RE-READ/REHEARSE (R/R)

	# Responses
Re-read/repeat	34
Memorize by repetition	7
Preview then read	4
Copy verbatim in writing	2
Record on tape, listen to tape	1
Teach to someone	1
No. of Responses:	49
Percent of Total:	34%

PROBLEM SOLVE/QUESTIONS (P/Q)

Practice problems	21
Check problems against book	8
Take test/answer questions	7
Review questions/answers in text	6
Use study guides	1
No. of Responses:	43
Percent of Total:	30%

Table 4 (cont.)

Learning Strategies Reported by Navy Personnel

RELATE/ASSOCIATE (R/A)	# Responses
Use pictures/diagrams & relate to text	15
Discuss with someone	4
Associate to other information	3
Listen to lecture	3
Use mnemonic device	2
Make drawings	2
Use other reference materials	1
Watch demonstration	1
Relate notes and book	1
Relate to previous work	1
No. of Responses:	33
Percent of Total:	23%

FOCUS ATTENTION (F/A)	
Take notes/study notes	12
Pick out key points	3
Use outline	1
Underline	1
Use study guides	1
No. of Responses:	18
Percent of Total:	13%
TOTAL NO. OF RESPONSES	143

Of the 143 learning strategies cited in Table 4, 94% involve the solitary learner interacting with the text or associated written materials (e.g., study guides). The four major categories of learning strategies encompass different types of information processing activities used in addition to the general activity of reading the material. The Focus Attention activities require the learner to process the text with the goal of selecting important information, based upon some little understood criteria that students use for determining what is important.

Both the Reread/Rehearse and Relate/Associate learning activities are aimed directly at causing the textual information to be retained in memory. In the Reread/Rehearse activities, the attempt is to learn the information just as it is given, while in the Relate/Associate activities, the information is merged with other information. Presumably the Reread/Rehearse activities bring about what is referred to as rote learning, while the Relate/Associate activities promote understanding and meaningful learning.

The Problem Solve/Question activities were used in association with reading-to-learn tasks that involved materials with accompanying problems and questions. It seems likely that the solving of the problems and answering of the questions required the learner to reread certain segments of the text and to associate and relate segments of the text to information in the questions or problem. By means of this repetition and elaboration of text information learning was achieved - or so we may suppose.

In his chapter on the learning process, Cronbach (1955, chapter IV) follows his discussion of the importance of situations, goals, and readiness for learning by a discussion of interpretation and provisional trial. Interpretation is required in comprehending any textual message. The learner interprets and thereby learns the text material by relating it to previously held knowledge. Hence, the learning strategies of Table 4 may be viewed as aiding this process of interpretation and association of the text material to prior knowledge. Of the four categories of learning strategies, the Problem Solve/Question grouping provides the most direct opportunity for provisional trials in applying the information being learned so the person can check on the correctness of his or her interpretations.

To briefly summarize the Case II findings, the study is consistent with Case I in showing that reading-to-learn takes place within situations leading to certification and/or skill and knowledge development, and the situational context affects the types of learning strategies that students use. In the Air Force study, certification was the major perceived goal for studying the correspondence courses, and so learning strategies that expedited progress through the courses were frequently followed.

In the Case II study, data were obtained that indicated that more than half of the reading-to-learn tasks provided information that people thought would be used within 24 hours while 90 percent of task-derived information was expected to be used within 30 days. Further, for 76 reading-to-learn tasks, over half resulted in information that personnel estimated they would be using daily, with 75 percent of the tasks presenting information that personnel anticipated they would use one or more times every month. These data indicate that, unlike the situation in Case I, in Case II the reading-to-learn tasks were perceived as being performed for a functional purpose and that the information learned would be used relatively soon and repeatedly. Consistent with this perceived functional utility of the content of the reading-to-learn tasks, personnel described a variety of active information-processing activities to promote learning of textual materials.

The Student's Use of Texts - Case III

The Case III study was conducted within the context of a nighttime community college course in Introductory Psychology. The author served as instructor for the course. It is thus possible in the Case III study to gain a more complete view of the text-teacher-student triology in operation, though the student's use of texts is the primary focus for the study.

First, some observations on the modus operandi of the college. The evening college offers courses when sufficient numbers of students indicate they want to take the course. This leads to the situation in which an adjunct instructor may be called on the day before the first class meets to see if she or he can teach the course.

At the particular community college involved in the present study, the Psychology Department had selected a textbook that all instructors were to use at each of the five campuses of the college. This was to make it possible for students to change campuses for different quarters of the academic year and retain the same textbook, thus saving students the expense of purchasing up to three psychology texts for the three academic quarters.

In addition to selecting the textbook for the three academic quarters, the Department had further assigned certain chapters to be "covered" in each ten weeks quarter. Thus, in this system, the teacher does not decide 1) when to teach, 2) who (quantity/ quality) to teach, 3) amount of time to teach, 4) which text to use, and 5) which chapters will be assigned during the quarter.

Within the foregoing constraints, the teacher is free to assign the sequence in which the designated chapters are to be read and to select a chapter or segments of a chapter for special emphasis. The teacher can elaborate upon the information presented in the textbook or supplement the textbook information to any desired extent. The teacher can require students to engage in special projects, such as writing one or more term papers, preparing book reports on reading assignments outside of the textbook, conducting research projects and writing about them, and so forth. These activities may be planned with or without student participation in selecting the activities.

In the case under consideration, the teacher was called the night before the class began to see if his schedule would permit him to teach the course. It did, and he agreed to teach the course.

On the next night the teacher distributed a course outline that indicated which chapters would be studied, as designated by the Department. Students were told that there would be three tests during the quarter and which chapters each test would cover. The tests were all objective tests, including multiple choice, filling-in-the-blanks recall, true or false, and matching items in different lists. Students stated they preferred such tests to essay exams.

Tests occurred about every three weeks and were based on both the material presented in the weekly lectures and on the assigned chapters. The lectures attempted to extend some of the information only cursorily mentioned in the text. The lectures also reviewed some of the text information and attempted to show interrelationships among some of the concepts presented. Additionally, demonstrations were performed to illustrate some of the phenomena discussed in the text.

Near the beginning of the last four weeks of the course, students were assigned a special project called "An Analysis of the Use of Textbooks." In this project each student was asked to:

1. Read the preface of three textbooks, including the text for their class and report what was said, if anything, about how the textbooks had been designed to facilitate teaching and learning.
2. Write a description of how they used their text for the present course, to include:
    a. When they read the text.
    b. The conditions under which they used it.
    c. The study techniques they used.
3. Make recommendations for the design of textbooks to improve them as learning aids.
4. Tell what they thought defines a textbook (as contrasted with other books, such as novels, etc.).

In reporting the student's papers, I will start with the fourth item in the above list, i.e., the student's concept of a textbook. I will then report on items 1, 2, and 3.

Student's Define a Textbook: Five of the sixteen students who wrote reports gave definitions taken directly from dictionaries, nine were the student's own definitions, and two students gave a dictionary definition with elaborations of their own. For example:

> "The American Heritage Dictionary of the English Language; the noun textbook is 'a book used as a standard work for the formal study of a particular subject.' Sounds good, clear and to the point but isn't a textbook something more?
>
> When someone says 'textbook,' what are your first thoughts? Dull? Boring? School? Homework? Why not, textbooks are used in schools, homework assignments are usually taken from them. The books are usually dry and not very exciting, hence dull and boring. Text- books, however, are necessary. They are the basis for all of man's current knowledge. So I guess that we must take the bad with the good."

The majority of students gave definitions very much like The American Heritage Dictionary definition that emphasizes the act of study (instruction, learning) of a subject matter (facts, information, topics, body of knowledge). However, the student's elaborations given above go well beyond the aseptic dictionary definitions to capture feelings that are just as much a part of the complex concept of textbooks as are "study" and "subject matter." Textbooks are part of the work of going to school. Many, if not most students are reluctant to pick them up and eager to put them down. This fact is evidenced in the text-student- teacher system by the design of texts in which the preface or forward may attempt to entice both teacher and student to use the text; by the student whose habits of use and study frequently reflect attempts to overcome the reluctance to and boredom of study; and by the teacher whose classroom antics and stories, and the ultimate motivator, the grade, aim to create both the desire and the will in the student to study the text.

The Design of Textbooks for Teaching and Learning: Something can be learned of the ways in which textbook authors view the text-teacher-student system by examining the prefaces of various texts. Many prefaces provide direct statements to teachers and students about how the textbook is designed to facilitate teaching and learning.

Following this line of thought, the first question directed to the community college students in the textbook study asked them to report what the preface of the textbook for the Psychology class in which they were enrolled had to say about how it was designed to facilitate teaching and learning. Additionally, the students were asked to report similar observations for two other textbooks of any subject matter they chose. These guidelines resulted in student reports for thirty-three different textbooks representing the fifteen disciplines given in Table 5.

Table 5

Textbooks-Sampled in the Study of Design Features

for Teaching and Learning

Discipline	Number of Textbooks Sampled
Psychology	5
Business	4
Mathematics	3
Engineering	3
Sociology	3
Corrections	3
History	2
Botany	2
Counseling	2
Economics	1
English	1
Education	1
Biology	1
Accounting	1
Political Science	1
Total: 15	33

The student's reports revealed a wide variation in the extent and nature of the comments in the textbook prefaces regarding teaching and learning. Despite this variability, however, three topics were widely represented in the examined prefaces: content, organization and sequencing of content, and aids to facilitate learning. Each of these topics will be discussed in turn.

Content. Some prefaces addressed teacher and students in separate sections, whereas others appeared to address both teachers and students with the same message. The latter approach predominated when comments focused on the contents of the textbook. Altogether, 28 of the 33 textbook prefaces were reported to have commented on the content of the book. These 28 prefaces produced 33 comments about the book content, of these, 73 percent were addressed to teachers and students altogether, while twelve percent were addressed only to teachers, nine percent to students, and six percent to teachers and students separately.

Comments about the content varied from those that explained why the textbook contained what it did, to those that were primarily motivational in nature, with the latter far outstripping the former (94% to 96%)? Comments aimed at teachers emphasized the inclusiveness of the content, the permanent value of selected readings, optional case studies, and suggestions to teachers for discussing separate chapters. Comments aimed primarily at students emphasized the relevance of materials to students' lives, and the usefulness of the content for good citizenship.

Organization and sequencing. While the bulk of the prefatory comments about content were aimed at a mixed audience of teachers and students, comments regarding the organization and sequencing of content were aimed primarily at teachers. Twenty-one books produced 31 comments about organization and sequencing, and some 85% of these comments were aimed at teachers.

Analysis of the statements about organization and sequencing revealed what appears to be a major conflict among textbook authors and teachers, and their theories of learning and teaching. This is the conflict between the belief that information should be presented in a logical, meaningful sequence to facilitate learning (10 of the 31 prefatory comments about organization and sequencing stated that the chapters were organized in a logical sequence), while at the same time there is the belief, perhaps related to the concept of academic freedom, that teachers should be free to sequence information the way they wish. This conflict showed itself explicitly in four instances in which it was stated that, while the textbook was sequenced in a logical order, the chapters could be taught in any order the teacher desired.

Another indication of conflict between textbook authors, teachers, and their theories of learning and teaching was revealed by the presence of statements regarding the use of extensive cross-references to help integrate learning across "loosely interrelated" or "stand alone" chapters. Six instances of this type of concern for integration across chapters were reported, with textbooks in English, Economics, Psychology, Sociology, and Business Mathematics. For only one textbook, Finite Mathematics was the sequence of information presentation considered inviolable. Indeed, the latter textbook specified the required knowledge the student should have prior to using the textbook, and prescribed the sequence of topics and the amount of time that the teacher should devote to teaching each topic in the sequence.

For the most part, textbook prefaces appear to make statements about organization and sequencing of content that appeal to beliefs that 1) learning is cumulative and that it is facilitated when information is presented in a logical, meaningful sequence so that, 2) what is learned earlier in a course should prepare one for later learning, and 3) later learning should be integrated with earlier learning.

Yet, the very fact that a textbook must appeal to so many different teachers, appears to lead to designs that work against integrated, meaningful learning. the accomplishment of the latter is left to the teacher, aided by tools such as cross-references, end of section questions that require cross-chapter reading to answer, and additional "workbooks" that students can use to improve learning.

Just how successfully teachers can accomplish such integration is unknown to me. However, as the teacher of the Psychology course in which the present study was conducted, and where the text was designed for teacher integration across "stand alone" chapters, I found it very difficult to accomplish such integration. One approach I used was to try to get students to develop matrices that would draw information from various chapters to fill in the cells formed by the rows and columns of the matrices. This task was aversive to most students. They were, for the most part, unprepared for such detailed analytic work. Many had difficulty forming higher order category labels for matrix column headings under which they could sort information from various chapters.

My conversations with the students revealed that they had very little past experience with integrating learning across textbook chapters at any level of their previous schooling. They did not well understand the use of any analytic tools such as matrices, tree structures, flow charts, and for some, even outlining was not a well practiced analytical tool. For the most part, they had simply assigned chapters and taken an "objective" test (multiple-choice; fill-in-the-blank; true-false; matching) that covered the original material. For the most part, that is what we ended up doing in my class, too.

Aids to Learning. Aids to learning, sometimes referred to as "study aids," were frequently described in the prefaces of the thirty-three textbooks. One business textbook was reported to have included a section called "to the student" in which the author gave hints on how to prepare for an examination, how to take efficient notes, and how to use the text most effectively.

For the most part, however, no direct advice was provided in the various textbook prefaces about how to go about learning in class or from the textbook. Rather, certain design features were mentioned in the prefaces with the implicit understanding that students would know how to utilize the design features and perhaps even be inclined to use them for study and learning.

Although great variability was found in the textbook prefaces regarding the discussion of design features for aiding learning, ranging from no comment to an extended discussion of such features and the study units mentioned above, there were sufficient comments and common features to permit the production of a hypothetical composite of the textbook optimally designed to aid learning.

First, the Preface motivates through the discussion of the content as mentioned above. The Preface indicates that the textbook deals with a particular subject matter, says Business. It then tells the reader that that vast topic is broken down into manageable chunks in the form of sections, which are themselves further broken down into chapters with sub-topics.

The Preface goes on to provide a brief summary of each chapter, so that the reader can begin to integrate the knowledge in the text with his or her own background of knowledge. The Preface may then give hints on how to study.

In the body of the text itself, numerous design features exist to help the student easily locate information and form an idea of what "chunk" of the subject matter is being talked about.

Within a chapter the reader will find:

- chapter outline
- chapter overview and objectives
- sub-topic title and subtitles
- key terms in bold face type or italics
- photographs, illustrations
- graphs, charts, tables, etc.
- examples related to "real-life," common experience
- boxed inserts with mini-essays for adding depths of understanding
- suggestions for further readings
- cross-references to other chapters
- glossary
- chapter summary
- questions or problems

In addition to these design features, the reader will find today's textbook using language that is "simple but yet concise" and "simple and concrete for today's TV oriented students" so that learning can proceed in an effortless manner. And if the textbook itself is insufficient for learning, accompanying workbooks are available.

Though, in fact, none of the textbooks studied contained all of the design features of our hypothetical composite textbook, sufficient numbers of prefaces mentioned enough design features for aiding learning to conclude that publishers and authors are operating according to some, perhaps mostly implicit, understanding of how students use textbooks for learning. To obtain a more explicit understanding of how students use textbooks, and to see if what the textbook publishers and authors think is informed by what students do, the question was directly posed to the community college students in the present study.

Student's Use of Textbooks: To learn how these college students use textbooks, they were asked to write a description of how they used their text for their Psychology course, including when they read the text, the conditions under which they read it, and any study techniques they used.

When the Text is Read. In his chapter on The Text in Use, Cronbach (1955) asks: "How can texts be made so as to extend the learning experience beyond the years of daily assignments, quizzes, and recitations?" (p. 216). In this question, Cronbach groups the intricate interrelationships between the student's sue of texts and the coursework: the schedule of classes, assignments, and tests, that was revealed by the student's descriptions of when they read the text. The basic organizer of time of study was the class meeting day and time. For the 14 students who responded to the question about time of text use, there were 15 statements that the text was read before the class to prepare for the class. One person said she read the text during class "to follow instructor and see major points," and

three reported reading the text the same night after class to rehearse or reinforce or clarify what was said in the class lecture.

In addition to the time of the class as a major organizer of reading time, the test influenced reading time. If a test was scheduled for a given evening that would cover multiple chapters, several students made special reference to reading for the test. Altogether, 19 statements of reading time were referenced to the class meetings, and seven mentioned preparation for tests in addition to classes. Four of the latter said that reading started several days before the test, and three said that reading for the test was done the day or night before the test. Interestingly, those students who reported starting reading for the test several days before test day received higher course grades (3A's, 1B) than those who studied the day or night before the test (2C's, 1C+). Though with such small numbers these findings are unreliable, they are consistent with the well known principle from psychology that distributed study is generally more effective than massed ("cramming") study.

Conditions for reading the text. The major conditions of use that students chose to report referred to the ambient sound. Eight references were made to the need for absolute quiet, while three referred to the need for music or TV sounds, and one preferred the sound of conversations in the background. Eight references were made to the desire to be alone during reading, and four statements noted the need for no interruptions or distractions.

The general impression formed from reading the student's statements of the conditions under which they read the text is that textbook reading is a highly ritualized activity. One student's description illustrates this point well:

> "I have to have complete silence in order to concentrate at all and prefer to be alone (with someone in the room, it's difficult to fight the urge to talk). I make sure I have a soda and a snack nearby (within arm's reach) so I don't have an excuse to walk away from my books. The soda and snack also serve as sort of a reward after the completion of a section in the text and give me a chance to take my eyes off the material occasionally."

This student's arrangements for study are similar to the numerous preparatory activities that many of us engage in prior to settling down to work. Such activities appear to help us overcome resistance to work. In his discussion of the learning process, Cronbach states that "All deliberate behaviors can be examined within a framework of seven concepts: situation, goal, readiness, interpretation, provisional trial, consequences, and reaction to blocking." (p. 65). In discussing the Case I and Case II studies of the use of textbooks, we noted how the concepts of goals, readiness, interpretation, and provisional trial were applied to the strategies of text use followed by Air Force and Navy personnel in their particular situations.

In the present case, the ritualistic conditions of use of texts reported by the community college students may illustrate "reaction to blocking" in Cronbach's scheme. Here, if study of the textbook is an aversive activity, a "mental blockage" for study may be formed. The blockage is overcome by creating definite schedules for study, reducing distractions, arranging for reward for work, as in the above example, and the various other techniques that help students concentrate on study of the textbook. In this regard, the schedule of classes, assignments, and tests that comprise going to school may be viewed as a part of the ritualism that helps to overcome resistance to the mental discipline required for studying and learning from textbooks.

Study techniques. Some forty years ago, Robinson (1946) developed a method of study known as SQ3R: survey, question, read, recite, and review. In using this method for study, students were advised to first survey the reading assignment, noting the headings, bold face words, and other typographically marked elements in the material. While doing this, they were supposed to form questions about what they were reading which they would seek to answer when the chapter was read thoroughly following the initial survey. During a careful reading, the student was advised to pause from time to time and to recall and recite to himself the important facts and main ideas from what was just read. Finally, at some later date, and certainly right before an exam, students were instructed to review the material to consolidate learning.

When the present set of students was asked to report the techniques they followed in studying their Psychology textbooks, not one reported following the complete set of steps and the sequence of the SQ3R method, although each of the steps was reported by at least some of the students. As indicated in Table 6, all of the students reported reading assigned text material, and 14 (88 percent) stated that they reviewed the material, generally just before exams. Sixty-nine percent reported "checking their understanding" or "talking over" the material with someone else, which I have classified as some form of "recitation," though not of the type recommended by Robinson in the SQ3R method. Fewer than half of the students reported surveying or questioning as a part of their study strategy.

Table 6

Study Technique Reported by College Students

SQ3R Method		General Processes	
Step	Number Reporting	Read/Reread	Number Reporting
Survey	7	Read	16
Question	6	Reread: Part	16
Read	16	Reread: All	5
Recite	11		
	Problem Solve/Question		
	Form Questions ("check understanding")		8
	Focus Attention		
	Read summary		10
	Underline/highlight		8
	Read bold face words/headings		7

Relate/Associate	
Talk with others	3
Compare to class notes	2
Compare to summary	1
Use dictionary	1
Use glossary	1

Table 6 also shows the student's reported study strategies classified according to the scheme of Table 4 which was used to classify the learning strategies reported by Navy personnel. Like the Navy personnel, the college students reported reading and rereading as their most frequent study technique. The next most frequently reported study activity of the college students was reading the summary, which I have classified as a type of tactic for focusing attention on the more important points in the reading assignment. In all cases, however, reading of the summary was used in association with one or more other learning activities, notably reading and rereading of assigned materials in whole or in part. The dynamic interaction of study techniques is apparent in the following example reported by one student (but abridged and numbered by me):

1. Read through chapter once
2. Underline while reading at home and in class
3. During class jot down important information
4. Reread notes before test
5. Rewrite into notebook
6. Read summary to find out what's important
7. Review right in class before test

Clearly, for this student, the goal of studying is to perform well on the class test. Since the tests called for recall of specific facts in most cases, and not for descriptive or explanatory essays, this student's study strategy emphasized looking for important facts among the class notes and the text material, and then learning these facts simply by reading and reviewing, with some rewriting of notes as an additional aid to learning. That this strategy was at least moderately successful is indicated by the fact that this student received a C+ as a final course grade.

Overall, the major design feature of the textbook that most influenced study strategies was simply the permanence of the text, or, in Rothkopf's (1976) term, the "stability" of the instructional text. Because the text is more or less permanent, it can be read, reread, compared to class notes, underlined and returned to for rapid review of highlighted segments.

Student recommendations for the design of textbooks: Though the relative permanence of the written language makes possible the interpretation of difficult arcane terms and obtuse sentences through intensive study, students prefer simple, direct, understandable language and the use of examples that are interesting and that relate to their everyday lives. This is indicated in Table 7, which summarizes the students' responses to the question requesting them to make suggestions about how textbooks might be better designed to aid learning.

Table 7

Textbook Design Recommendations by College Students

Recommendation	Number
Use simple, direct, understandable language	9
Stimulate interest; relate to student	7
Use supplemental material (workbooks; films)	6
Include chapter summary	5
Include chapter glossary, index	5
Use bold print for key terms and concepts	5
Include relevant graphics; illustrations	5
Comments on chapter size and organization	5
Size chapters to be read in one sitting	
Increase graphics in latter part of chapter	
Spread-out important terms in bold type	
Outline important topics	
Design chapters to stand alone	
Use low glare paper and binder-type books	2
Include learning objectives and practice questions	2

For the most part, the recommendations of Table 7 contain no surprises, and do not go beyond the discussion of our "optimally" designed textbook. However, two of the suggestions regarding chapter size and organization are unique and represent the position of one student presented earlier that textbooks are, for the most part, dull and boring, and their study is hard work. This student's comments also indicate the intimate and idiosyncratic relationships between the conditions of text use and design recommendations. Here are the student's remarks about textbook design:

> "As most of my reading takes place in bed, with an overhead light, rough paper would reduce the reflective glare... characteristic of many textbooks. A wide margin (approximately one-third of the page) makes possible excellent organization of class notes that correspond with the topics in the chapter. Since starting an assignment is the hardest part, the chapters should be sized so that they can be read in one sitting...Pictures, diagrams, and illustrations are necessary to break the monotony of the reading. Since the monotony of the subject increases as the student continues reading, the density of illustrations should increase toward the end of the chapter."

Publishers should take note. Here are innovative suggestions from a harsh critic of textbooks. Use paper that does not produce glare; make texts with wide margins so that

notes can be made right in the book, and so students will not have to purchase separate notebooks; keep chapters small so that an entire assignment can be completed in a brief amount of time; and reduce the demands for reading as the chapter progresses to help overcome the "mental blockage" that Cronbach identified as a factor that affects learning.

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