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Do We Need Larger Text-Books?

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Abstract. Current problems in the use of text-books arise from: The continuous production of new knowledge, some basic in concepts or conceptual schemes and some extensions in exciting developments of new devices and applications; but all of them immediately embraced by text-book writers and teachers.

Text-books have not become proportionately larger probably because of an irrational belief of most students, parents and even teachers that books should be a relatively small item in the student's budget and text-books look too big and formidable to the student who thinks of a text-book as a mass of material he must learn, memorizing if necessary, and he is not able to abstract the main or central ideas from what he reads and hears, as will be further documented.

An analysis of the current use of text-books indicates that they are being used in two ways: one is to serve as a survey and overview of a field of knowledge and another as a reference for discussion and study. It is suggested that two different books be used for the two different purposes; one to be more brief and in syllabus form and the other to be larger and a more extensive reference than the present text-books. In fact it might be well to taboo the use of the term "text-book."

The author has been using such a system for a large lecture-laboratory course for about the past 10 years and believes that it has been very satisfactory. The system has also been well received by his assisting staff and also by the students. He recommends that others try it and suggests that it can be started easily with the teacher preparing his own outline for his course and using such hard-bound and paperback books as are now available.

Thirty years ago a general chemistry textbook, many of us used, contained about 500 pages and 120,000 words. Today general chemistry books have up to 1,000 pages and contain 350,000 to 400,000 words. The time allotted to the student in his college program to cover the material is the same in both cases.

It should be emphasized that the number of words in the present thousand-page book is not too great or unreasonable. In fact, if one were to use an average of 200 words per minute for college freshman, one would calculate that the student should easily be able to read the current chemistry books in one hour per week during the school year; or to re-read and study the material in two to three hours a week. Certainly the number of words in a chemistry book is small compared to social science books, one of which, currently popular, contains over 2,000,000 words.

However, the fact that the number of words in the chemistry book now is more than three times the number in books of 30 years ago does imply that the amount of material we are trying to present now may be three times as much as then. An analysis and comparison of

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the books 30 years ago and now shows that the material added is of three kinds. Most noticeable in the new materials is the addition of new discoveries and new concepts, particularly those relating to the structure of atoms and molecules. A second type of new material is that which is more conceptual and more rigorous and 30 years ago was deferred entirely to more advanced courses. The third is an expansion of the regular descriptive materials about the various elements and compounds. As one reads the modern texts he finds very little material that seems extraneous or that could easily be omitted. It is all needed to present an integrated survey of the present field of chemistry and to serve as a thorough text for the student being introduced to chemistry.

The above has been written about chemistry merely because the writer is more familiar with that field, but the same thing has happened in all scholastic disciplines. My opinion is that this has been particularly true of the new high school books, but some of the newer college books present the same problem. However, man is continuously acquiring more knowledge in all areas and more needs to be said or written in order to give a survey of the field covered by any discipline, or to give a more comprehensive treatment in the smaller segments of our advanced courses. As a consequence of this growth of knowledge, it may be desirable to make the text-books still larger.

Possibly they would be much larger now if there were not some opposing factors to making them larger. One of these is the cost of larger books. Actually the part of a student's yearly budget spent in books is disproportionately small in comparison to the part books play in his educational experience. But to date the cost of books has been rated as a small item in the student's expense budget and there is a strong opposition to making it larger on the part of students and frequently on the part of parents and even faculty. As a consequence text-book writers and publishers often have to reduce the size of their books in order to meet the market demand. Possibly, we need to require a greater number of books in all our courses and to encourage students to acquire more references and to build personal libraries rather than to dispose of their books as soon as they are through with their courses. The development of low cost paper-backs can assist us here and some further comments about them will be made later.

Another objection to the larger text-books is that they look too big and too formidable. Three reasons might be given for this reaction on the part of the average student. One of these is that he thinks of a text-book as a mass of material which he must learn, memorizing it if necessary, but he must master it completely if he is to get the maximum from the course. Obviously the larger the book the more impossible this seems. A second reason for his frustration over a large text is that the average student has not developed good reading ability.

He reads too slowly and he does not quickly comprehend what he reads. To put it another way, he finds it difficult to abstract the main or central ideas from what he read and hears. He consciously or unconsciously knows this and because of it a large book looks more difficult and gives him a negative reaction.

I want to document and give some further support to the conclusions that students have difficulty in abstracting ideas and basic concepts from a maze of words because it is essential to what I now believe about the use of books.

My favorite English teacher used to say that any book can be reduced to a chapter, to a paragraph, or to a sentence and conversely any idea can be expressed in a sentence, in a chapter, or in a book. I still believe that he is right, but my experience has taught me that very few people, after reading a book, can give the controlling purpose of the book nor can they give even a brief outline showing how the author developed his core idea. They have become so engrossed in the details and frequently so impressed by a story or an illustration, which may be fine and of inestimable value to the reader, that they miss the main point of the book.

Some years ago I had the opportunity and responsibility to study students' notebooks. An examination of about a thousand students' lecture notebooks likewise indicates a tremendous lack in the ability to recognize the major points in their courses. Their notebooks frequently have the 1's, 2's, 3's, and other outline devices given by the professor, but almost never could any indication be found that the students knew the purpose of the course or the half dozen general topics usually found in most courses.

My analysis of the present book situation is that we are trying to use text-books for two different purposes. One of these is to present the basic principles which the student must learn in his first introductory course. The other purpose of the book is to serve as a reference which must, consequently, include much more in the way of details, technical information, and applications than might be necessary for a basic principles text. I am suggesting that these two purposes should be taken care of by different books or in different ways. One would be small and contain only the fundamental and more general principles. The other would be large, probably even larger than most current textbooks and would serve as a more comprehensive reference book.

For about 10 years we have been using in one of our courses a small book of companion format to the laboratory manual which we have called a study guide. This study guide developed out of an original outline and expanded into a syllabus and further expanded into the present book. The present study guide still shows the original outline. It has a series of numerical headings, but each topic heading is

explained in from two to 10 sentences; thus the bare essential ideas are given in the study guide.

At the bottom of the pages, specific references to comprehensive books are given with coding to correspond to the numerical outline. In the introductory explanation, it is suggested that these references be used if needed for further clarification or because of interest in the particular topic. The reference books are to be found in the college library, although students would be required to have them, if it were not for the present attitude toward costs.

The first reaction is that this plan will require too many duplicate references or textbooks in the library; however, our experience has been otherwise. We have found that for the two main reference books used, one copy for 40 students is sufficient, and that for the five secondary references used, one copy per 100 students is sufficient. One might suspicion that this means we are not requiring much of our students, but comparative tests shows that they are making average and above progress in the course's work, and we believe they are mastering the essentials and more important principles better than if they had a 1,000-page book to study.

There is another very important aspect of this method of instruction. It requires the student to use the library more and to search for material in books rather than to just read the next 20 pages. One of the justified complaints of our present educational system is that students do not learn how to use a library, and, consequently, do not enter it after graduating from college. In view of this criticism, any procedure which would assist an individual in acquiring library habits would be worthwhile. It is not to be implied that students in a single course obtain a mastery of library usage, but it does require them to go to the library in their freshman year and reduces a little of the tendency for them to think everything they need is contained in one textbook.

The answer to the question posed in the title of this discussion then is both yes and no. We need smaller books with the essential ideas presented more succinctly and outlined in such a way that the students can more clearly see the major ideas and the inter-relationships of the topics. We also need comprehensive references, possibly more comprehensive than we now have available in broad areas to which they can turn for more thorough treatments. With current student attitudes about books, the references might be stocked mainly in libraries, but should be of such character that an individual majoring in a particular discipline would find them desirable for his own personal library.

I would close only by suggesting that others try this system. One can start with a simple topical outline which one prepares himself. This will take some work, but probably not a lot more than many teachers do in producing their handout sheets. The students deserve an over-all outline or summary of what we are trying to do in our

courses, particularly since they cannot abstract an outline of the basic ideas from the book. My experience is that the outline will grow into a syllabus very quickly.

Secondly, look for a bigger, more comprehensive book and refer to it as a reference, not a textbook. I think we might well taboo the word textbook, and build-up the importance of reference books rather than textbooks.

We have a great assist in references with the current development of paper-backs. I have been using some of them, but I have just recently realized that I must examine them more carefully. I did not know how big the production had become. The 1968, Bowker, *Paperbound Book Guide for Colleges,* which was issued a few weeks ago, is "a selective guide for approximately 15,000 inexpensive reprints and originals chosen especially for college classroom by 168 cooperating publishers." There are over 1,000 in the science section. The editor points out that the listing is not complete since not all the publishers participated in its production; also that the Bowker Co. publishes a more complete periodical each year, which contains over 45,000 titles covering all listings indexed by author, title and selectively by subject.

It is doubtful if paperbacks will take the place of comprehensive well written reference books, but they can supplement them and may also engender some enthusiasm in students for particular topics and encourage them to buy more books for their own personal libraries.