Textbooks: How We Choose Them, How We Use Them, Shall We Lose Them?

Nell B. Dale, Retired
Computer Science Department
University of Texas at Austin
Austin, Texas 78712
ndale@cs.utexas.edu

Abstract
This paper describes the results of a survey designed to explore how computer science educators view textbooks: how they choose them, how they use them, how they view the role of textbooks within the curriculum, and how they view the future of textbooks.

The survey was posted on the Internet, with invitation email messages sent to the mailing list for SIGCSE, the ACM’s Special Interest Group for Computer Science Education, asking them to fill out the survey. Of the 1053 addresses on the mailing list, 188 recipients responded, giving a response rate of almost 18%.

This paper describes the demographics of the respondents, presents the objective responses, and provides a content analysis of the subjective responses.

Keywords: computer textbook survey, curriculum materials.

1 Introduction
As both an educator and a writer, I have been intimately involved with textbooks for almost forty years. I know what I have looked for in a text and what disqualifies one for me. When I was working actively as an instructor, the text was the part of the basis for assigned readings and biweekly quizzes. In my experience, good textbooks both lead and follow curriculum guidelines. Do my views parallel those of my colleagues?

I read a textbook with a highlighter in my hand. I mark interesting passages; I write questions and comments in the margin; and I bookmark special pages—all of which is difficult to do with an electronic version. Do my colleagues feel the same about electronic versions of textbooks? Do their students?

Working with editors over many years of textbook authoring, I know very well what my editor says the “market” requires in terms of ancillaries. Does any editor really know what my colleagues require?

To see if my views did parallel those of my colleagues, I designed a survey to explore how computer science faculty choose and use textbooks. The results did not show anything surprising but did present avenues for future research.

Copyright © 2010, Australian Computer Society, Inc. This paper appeared at the Twelfth Australasian Computing Education Conference (ACE2010), Brisbane, Australia, January 2010. Conferences in Research and Practice in Information Technology, Vol. 103. Tony Clear and John Hamer, Eds. Reproduction for academic, not-for-profit purposes permitted provided this text is included.

2 Methodology
This survey was designed to discover how computer science teaching faculty felt about and used textbooks in their classrooms. As an exploratory study, there were no hypothesis to test, but hopefully future avenues of research would surface. Though not planned as such, an analysis of this data meets the definition of an empirical study: "The empirical method…is generally characterized by the collection of a large amount of data before much speculation as to their significance, or without much idea of what to expect...” [1].

I used the tool SurveySuite [2] to design a survey, consisting of multiple-choice items alone, multiple-choice items with the option of adding comments, and open-ended questions. The SurveySuite tool produces frequency tables of the responses. For objective questions with comments, the results are shown in tabular form, followed by a list of the comments. In processing the results, I have read the through all of the comments and where possible folded them into one of the original options.

For open-ended questions, the tool makes the entire text of each response available for analysis. For concrete questions, I analysed the responses using key words. For opinion questions, I read the responses and allowed categories to emerge from the content. Once I had considered all of the responses, I made second pass and classified each response (or partial response) based on the categories formed in the first pass.

3 Respondent Demographics
There were a total of 188 responses to the survey. Figures 1, 2 and 3 show the type of institution with which the respondents are associated, the level at which they teach, and their years of teaching experience. One respondent filled in the “Other” category, saying that he had been teaching over 40 years.

In order to explore the breadth of the respondents’ backgrounds, one question asked if they had ever taught an interdisciplinary course. The responses were surprising: Fifty-five interdisciplinary courses were represented in the survey. They included courses in the fields of biology, media and gaming, philosophy (ethics), mathematics, music, business, freshmen seminars, and women’s studies.

Because this survey was about textbooks, a relevant part of the demographics of the group was whether or not a respondent had published a textbook. Figure 4 shows the responses to this question.
Sixty-three out of 188 have written or is in the process of writing a textbook. Another 22 have thought about writing a textbook.

4 Choice of Textbooks

Of the respondents, 108 said that each individual instructor chooses textbooks in their department; 3 said that a committee chooses the textbooks; the remainder reported that the way in which the textbook was chosen depended on the course.

4.1 Individual Instructor

There were three questions relating to how each respondent chooses a textbook: One asked how a choice is made, one asked for desirable features, and the third
asked how important certain features were. Figure 5 shows the responses to the first question.

Most of the “Other” responses combined the possibilities already represented in the figure. However, several mentioned that they make choices by looking at books in the Exhibits area at the SIGCSE Technical Symposium.

The second question asked the respondents to state what they looked for when choosing a textbook. Figure 6 summarizes these responses. The first five points in Figure 6 were options in the original question; the last two rows were abstracted from the “Other” category.

Table 1 shows the responses to a table question showing features and ancillaries and measures of importance. Such features as chapter openings with goals and multiple color formats are not important. Clearly clarity is of prime importance to most instructors, but visuals are only mildly important. Stratified exercises are important but most respondents do not particularly care whether exercise answers are provided. PowerPoints, study guides, and testbanks are not important. These results should be of interest to editors.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Couldn't care less</th>
<th>Mildly important</th>
<th>Important</th>
<th>Very Important</th>
<th>Essential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter opener w/goals</td>
<td>24</td>
<td>41</td>
<td>22</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Exercises of various levels</td>
<td>3</td>
<td>11</td>
<td>27</td>
<td>36</td>
<td>24</td>
</tr>
<tr>
<td>Clarity</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>34</td>
<td>60</td>
</tr>
<tr>
<td>Visuals</td>
<td>4</td>
<td>26</td>
<td>42</td>
<td>21</td>
<td>6</td>
</tr>
<tr>
<td>Exercise answers</td>
<td>19</td>
<td>36</td>
<td>26</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>PowerPoints</td>
<td>51</td>
<td>29</td>
<td>8</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Testbanks</td>
<td>55</td>
<td>26</td>
<td>10</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Student study guide</td>
<td>39</td>
<td>43</td>
<td>15</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Two color</td>
<td>53</td>
<td>31</td>
<td>10</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Four color</td>
<td>58</td>
<td>24</td>
<td>11</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 1: Percentage Rating of Features and Ancillaries

When asked if they used CourseSmart.com or other websites that allow an instructor to evaluate HTML versions of a textbook, 56 said yes, 91 said no, and 39 indicated that they didn’t know such sites existed. When asked if they let their students purchase online versions of a textbook, 26 said no, 107 said yes, and 53 said maybe.

4.2 Committee Makes Selection

One respondent’s answer sums up the committee-selection process: “1. Get books. 2. Meet & discuss. 3. Select.” The rigor of the process varies widely across institutions as shown by these quotes:

- “For introductory courses, the relevant faculty review a range of textbooks, map the books to the topics desired, develop tentative day-by-day class schedules, review the problems and reading clarity, and pick the book that seems to fit best.”
- “The process usually has some evaluation forms that each committee member completes ranking various categories about the textbook. Additionally, we must begin the process earlier.”
- “Informal meetings”
- “If someone really champions a book, it is usually chosen.”
- “Consensus building”

5 Textbook Use

Figure 7 summarizes how instructors make use of their textbooks. The final entry in Figure 7, using the textbook as a source for homework assignments and exam and exercise questions, was abstracted from the “Other” category. However, further examination of the raw responses revealed that this question was badly designed. Of the ten respondents who do not use a textbook, six make the textbook optional, seven expect the students to read the appropriate chapters, five assign readings, and four assign readings and quiz over what was read. This apparent contradiction shows that instructors use textbooks differently in different classes.

5.1 Should Textbooks Follow Curriculum Guidelines?

A Google search of “computer curriculum guidelines” returned almost 9 million hits. In the United States, the ACM/IEEE curriculum work is the best known [3, 4]. Other countries have their own curriculum guidelines, thus this question was deliberately left ambiguous. Of the comments that supported having textbooks follow curriculum guidelines, several focused on the consistency they provided, especially at the lower-division level. These respondents indicated that conformity would make it easier for new faculty and would help students as they make the transition from 2-year schools to 4-year schools.

Another group of comments coalesced around the concept that curriculum guidelines are a minimum set. To follow guidelines slavishly stifles innovation and initiative. One respondent pointed out that guidelines are long-term goals, rather than a road map of how to get there. Two respondents commented that some schools still use the course-oriented guidelines of ACM.
Curriculum 1968 [5] and Curriculum 1978 [6] because more recent guidelines use knowledge units rather than well-defined courses. This approach presents small well-defined concepts—knowledge units—involved in a topic but the collection of these knowledge units into a course is not defined.

A number of respondents basically said “what guidelines?”

5.2 Should Textbooks Guide Innovations?
Although the question asked whether textbooks should “… guide innovations in curriculum,” many answered the question in terms of teaching and pedagogy. This group is characterized by the following quotes:
- “Definitely, teachers often get stuck on approaches with which they are comfortable. Textbooks which guide innovations can help us get un-stuck — to the benefit of our students.”
- “I think that would be great. I am always looking for new ideas and new ways to teach.”
- “Yes – a well-written textbook (along with supporting materials) can help an instructor adopt new and more effective instructional methods.”

Another group felt strongly that innovation should guide textbooks, not the other way around. One respondent in this group remarked that textbooks can help disseminate innovations in the curriculum beyond the original innovators.

A third group saw the possibilities of innovative textbooks guiding curriculum but felt that the turnaround time for producing a textbook is too long for that to be practical. Several respondents pointed out that textbook publishers are reluctant to publish anything “different.”

5.3 Availability of Textbooks in Curriculum Revision
Almost all of the respondents felt that the availability of textbooks should be taken into account when revising a curriculum. However, many made the distinction between lower-division courses and other courses, stating that upper-division and graduate courses were not as dependent on a textbook.

One respondent pointed out that appropriate textbooks are a key factor for curriculum revision at the institutional level but not at the national level. Others said that it depended on the people implementing the revision: Were the instructors ready and willing to prepare curriculum materials as they went along?

5.4 Textbooks that Caused Radical Change
Of the 182 respondents who commented on whether or not a textbook had radically changed their teaching or approach to a class, 129 said no, 50 said yes, and 6 were still hoping to find one. Oh! Pascal by Doug Cooper and Mike Clancy [7] was mentioned four times, while How to Design Programs by Matthias Felleison [8] was mentioned five times. Authors such as David Patterson, John Hennessy, David Gries, A. V Aho, J. D. Ullman, and Don Knuth were also cited.

5.5 Will Textbooks Become Obsolete?
Many respondents felt that some form of electronic book would eventually dominate the market place. Others were not so sure, and still others had no idea. Many of the responses were quite emphatic. Here is a sample of the different types of responses:
- “I suspect that printed textbooks will be obsolete within the next 20 years. When I give students the option to use a pdf version of a book or a paper one (both for purchase), the overwhelming majority choose the electronic version already.”
- “I certainly hope not! The ability to highlight parts of a text and leaf through the book to see pages as a whole would be preferable to me, and I hope, to students. I don’t have a Kindle and am only slightly familiar with them, so perhaps I’m not the best judge. But I personally would not want to sit down and read using one.”
- “There are two answers: Should it? I think not. The ability to go back to references, answers, tables, etc. makes the book format very valuable. Will it? I think probably yes because today’s students tend to be skimmers rather than deep readers.”
- “The delivery of electronic materials in general (Kindle or web) seems quite likely to seriously change the textbook market. Obsolete? Newspapers aren’t obsolete but they’re in trouble and making major changes.”
- “Only if an open standard is developed that authors, publishers and customers all embrace. The current models (such as CourseSmart’s 180 day window or Kindle’s deletion backdoor) are inadequate.”
- “No. We will not see a common preferred platform, paper versus electronic, any more than we will see a predominant learning style.”

6 Motivation for Writing a Textbook
The last set of questions on the survey asked about motivation: What did motivate you to write a book (if you have); what would motivate you to write a book; and what should be the motivation for becoming an author.
6.1 Author’s Motivation

Figure 8 shows what motivated authors to write a textbook. Category “Couldn’t find one I liked” came from the “Other” responses. A further analysis of the data shows that most authors have more than one motivation. Money was not the only motivator for any of the respondents. Advancement was the only motivator for two respondents. The majority of all motivations can be classified as “I can do it better and make a difference.”

6.2 Future Motivation

When asking what might motivate the respondents to write a textbook in the future, the results were similar to the answers in the previous question. Figure 9 shows these results. Two “Other” responses stand out: “loss of sanity” and “major financial difficulties.”

6.3 Proper Motivation

The last question about motivation asked what should be the motivation to write a textbook. The answers fell into three categories: personal reasons, better job, and new directions.

The first group was exemplified by such phrases as “desire to communicate,” “advancement,” “money,” “serious belief,” and “love of writing.” The second group included such phrases as “more accessible,” “have a message,” “build a better mousetrap,” and “unique and refreshing.” The third group used such phrases as “different content,” “new perspective,” “provoking thought,” “fill a need,” and “void in current literature.”

The following quotes sum up these respondents’ thoughts on appropriate motivation to write a textbook:

- “passion, creativity, an urge to teach that can’t merely be satisfied in the classroom.”
- “You’ve created something that you feel will significantly improve student learning.”
- “To provide a learning aid to students that is either currently unavailable or surpasses the currently available texts.”
- “To illuminate, shed new light, new synthesis of a subject, to inspire, to motivate.”
- “The belief that one can produce something better than what exists.”

7 Conclusion

This paper describes the results of a survey about the choice and use of textbooks in computer science. Several trends emerged among the 188 respondents. The first is that these instructors who took the time to respond to the survey are passionate about teaching and their students. They are always striving to become better teachers and provide better materials for their students.

Secondly, a number of respondents made it clear that they do not like publishers. This bias showed up on such comments as these:

- “Textbooks should express the soul of the author on the subject (of course the publisher’s editor may weigh in).”
- “Further, textbooks tend to be at least a few years behind the cutting edge, especially since publishers are notoriously focused on sales rather than innovation.”
- “Innovative texts are harder to sell to publishers and don’t seem to do well in the market.”
- “No, individual authors and more importantly publishers should have little influence over curriculum innovations, IMO.”
- “On the other hand, publishers seem very reluctant to take on innovative text projects, as they are considered too risky.”
- “No way in hell. Publishers mindless beaureaucrats [sic].”

Although the respondents share a common passion, they are not of the same mind. They differ on how they use textbooks in the classroom. They differ on their view of the role of textbooks in the curriculum. They differ on their view of the future of textbooks. They have differing views on author motivation.

Did I learn anything new from conducting this survey and analyzing the responses? Yes; I learned that my views parallel those of many colleagues and diverge from those of many others. I learned that the features and ancillaries that some editors consider essential are in fact not very important to many dedicated instructors.

More importantly, did you learn anything new? Please share your thoughts with me.

8 Future Directions

I am not aware of any previous survey on the choice and use of textbooks in any discipline. Thus, there is nothing with which to compare these results. This leads to several interesting questions for future research.

- Do the views concerning textbook choice and use of this sample mirror those of the wider computer science faculty community? This sample was drawn from an organization dedicated to CS education; is the sample biased?
- Do the views of the computer science community mirror the views of other scientific disciplines?
- This survey suggests that a disconnect exists between what instructors want and what publishers think they want. A parallel survey given to publishers might help to clarify this issue.
- Do faculty at institutions with graduate programs have the same views as those who teach at
undergraduate institutions? The results stratified by type of institutions might be very instructive.

- Do inexperienced faculty (say less than six years of teaching experience) have the same views as their more experienced colleagues? The results stratified by years of teaching should be examined.
- The survey itself should be refined based on the results. The objective choices should be rephrased so that most categories are represented. The fewer the "Other" categories, the more concise the results.

I will be glad to make the full results of the survey available to anyone who is interested in looking into any of these questions.

9 References


[2] SurveySuite Software, the University of Virginia: http://intercom.virginia.edu/cgi-bin/cgiwrap/intercom/SurveySuite/ss_index.pl


