2012

An Assessment of Student Perceptions on the Use of Multiple Engineering Textbook Editions to Reduce Cost to Students

Frank G. Jacobitz
University of San Diego, jacobitz@sandiego.edu

Thomas F. Schubert
University of San Diego

Ernest M. Kim
University of San Diego

An Assessment of Student Perceptions on the Use of Multiple Engineering Textbook Editions to Reduce Cost to Students

Keywords
textbook editions, textbook cost, student perceptions assessment, engineering education

Disciplines
Engineering | Engineering Education

Journal of Applications and Practices in Engineering Education, 3(1), 13-18, 2012.

AN ASSESSMENT OF STUDENT PERCEPTIONS ON THE USE OF MULTIPLE ENGINEERING TEXTBOOK EDITIONS TO REDUCE COST TO STUDENTS

Frank G. Jacobitz[1], Thomas F. Schubert[2] and Ernest M. Kim[2]
[1] Mechanical Engineering, [2] Electrical Engineering, University of San Diego

The concurrent use of multiple textbook editions was studied in three undergraduate engineering courses at the sophomore and junior level. The main motivation was a potential reduction in cost to students. In addition, the student-learning environment was assessed and evaluated for a potential negative impact. Students were asked to complete a three part survey assessing various aspects of using multiple textbook editions as well as their textbook purchasing and return habits. Overall the choice of multiple textbook editions was welcomed by the students. The average cost of textbooks was almost cut in half. A majority of students reported no negative impact of their learning, thought that instruction was edition-neutral, and generally appreciated the choice between textbook editions.

Keywords: *textbook editions, textbook cost, student perceptions assessment*

Introduction:

The high cost of college textbooks is an ongoing cause for concern among students and faculty. This troublesome development has also been recognized by publishers and legislators. In 2008, the United States House of Representatives' education committee proposed legislation to both decrease cost of textbooks and to increase transparency in the textbook market (Lipka 2008). Measures to decrease cost have included the promotion of custom textbooks and unbundling supplemental materials. Increased transparency was to be achieved by requiring publishers to publish wholesale prices, edition dates, and alternative version information and by requiring universities to publish lists of required and recommended materials in course catalogs.

Students have reacted to the high cost of textbooks in a variety of ways. As overseas prices for textbooks are often considerably lower than prices for identical books in the US (Lewin 2003), students increasingly order books from sources abroad. US retailers are even re-importing books from abroad. With support of their academic institutions, some students chose electronic versions of textbooks, which are often offered by publishers at a considerable discount over their printed books (Young 2009). Other students share textbooks. A worrisome trend is the download of scanned textbook copies, often including solutions manuals, from file sharing services.

The textbook market is often used as an example for planned obsolescence, a term that refers to the introduction of new products by durable goods producers with the intention to kill off used products (e.g. Miller 1974). Iizuka (2007) performed an empirical examination of college bookstore data for economics courses collected from 1996 to 2000. He found that "publishers revise editions more frequently when competition from used textbooks increases," but also concludes that "publishers' frequent revision cannot be attributed to planned obsolescence alone."

An examination of different editions of widely-used textbooks for undergraduate engineering courses regularly taught by the authors of this study showed only very minor differences between editions. Older editions of these textbooks are easily found at a fraction of the cost of the current edition. It was therefore hypothesized that previous editions are suitable as course materials, providing substantial cost-savings without a negative impact on student learning. In order to confirm this hypothesis, students were surveyed in three engineering courses in which students were given the opportunity to select among a range of editions of the same textbook. Note that this hypothesis was applied to mature topical subject areas. Certain topics with considerable ongoing development might not be suitable for this approach to textbook use.

Assessment Procedure:

In the spring 2009 semester, three engineering courses at the University of San Diego (USD) were chosen for this study: a sophomore-level electrical circuits course for electrical engineering majors, a sophomore-level electrical engineering principles course for non-majors, and a junior-level fluid mechanics course for mechanical engineering majors. Those courses were chosen due to the availability of multiple suitable previous editions of the chosen textbook and the teaching assignments of the faculty members involved in this study. Approval for this study was obtained from USD's Institutional Review Board.

The University of San Diego is a private, Catholic, liberal arts university that offers nine-semester engineering undergraduate programs with a course of study of approximately 150 semester units. Upon successful completion of broad-based course requirements, engineering graduates from the programs receive dual BS/BA degrees. The BA degree is granted in recognition of 14 liberal arts courses traditionally required in a liberal arts university and the BS degree is based on the technical component of the curriculum. The University offers ABET accredited degrees in Electrical Engineering, Industrial and Systems Engineering, and Mechanical Engineering. Tuition and fees for the 2011-2012 academic year are $1,315 per semester unit or $38,582 per year.

The students were informed about the use of previous textbook editions and a list of suitable editions was provided by the instructors during the fall 2008 semester and again at the beginning of classes in the spring 2009 semester. The instructors also informed the university bookstore about this program and the bookstore provided both current and previous editions. While it was typical to assign homework from the course textbook by their numbers in previously taught classes, assignment sheets with complete homework problem statements were provided by the instructors for classes with multiple textbook editions in order to minimize the opportunity for confusion. No further changes were made to course organization or content. At the end of the semester, students were asked to complete a three-part survey. The first part collected general information about textbook purchases. The second part assessed the students' perceptions about the use of multiple textbook editions in the three classes. The final part allowed students to provide any further comments.

Results and Discussion:

The first section of the end-of-semester survey collected general information about textbook purchases. Note that not all students answered all questions and that the percentages are based on the total number of 57 surveys returned to the instructors. Students were also allowed to give more than one answer. In the survey, 50.9% of the students indicated that the course was an essential part of their major and 49.1% indicated that the course fulfilled the breadth requirement of the engineering degree.

A vast majority of the students, 94.7%, indicated that they generally purchase used textbooks, while a minority, 1.8%, generally buy new textbooks. For this course, a somewhat smaller majority, 68.4%, purchased a used textbook, and a small fraction, 8.8%, bought a new textbook.

The question about the particular edition purchased resulted in a smaller response rate. Only 1.8% of the students purchased the current edition of the textbooks. The largest group, 36.8%, purchased the previous edition. The previous textbook edition was typically the easiest past edition to find and was also stocked by the university bookstore. It was found that 19.3% of the students purchased even older textbook editions, while 42.1% did not answer this question.

Students were also asked to indicate where they generally buy their textbooks and where they bought the textbooks for the classes in this study. In general, it was found that students typically purchase textbooks at the university bookstore (57.9%), other bookstores (0.0%), and online (50.9%). Students also indicated that they borrow (10.5%) or share (3.5%) their textbooks.

For the classes surveyed in this study, students purchased textbooks at the university bookstore (12.3%), other bookstores (5.3%), and online (43.9%). A few students indicated that the book was borrowed (1.8%) or shared (1.8%).

Students were asked to estimate textbook prices for general courses and for the courses in this study. The distribution of textbook prices is shown in figure 1. The average textbook price for general courses is estimated to be $97.56. This price is reduced for the courses in this study to $51.39 – a reduction of almost half.

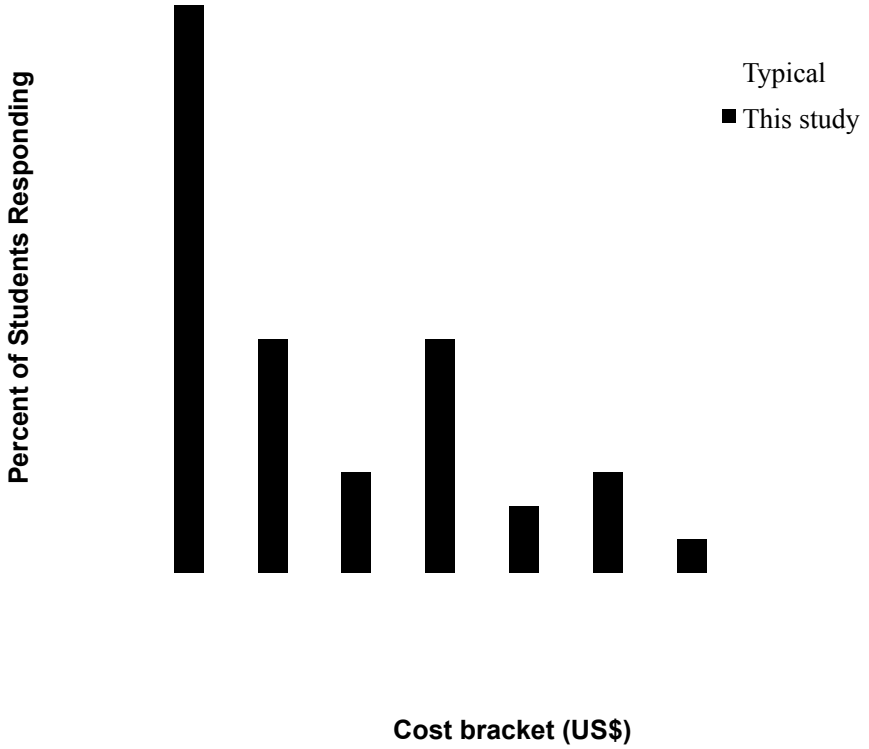


Figure 1: Student-reported textbook cost for the courses included in this study and typically.

Finally, students were asked about the fate of their textbooks after the completion of a course. For general courses, students keep (31.6%), sell (75.4%), return (5.3%), or give away (1.8%) their textbooks. For courses in this study, students intend to keep (28.1%), sell (26.3%), or return (1.8%) their textbooks.

The second section of the survey collected data to test the hypothesis on the concurrent usability of previous textbook editions. The assessment results of this study are shown in table 1. In addition to the full distribution of student answers, the two positive responses are tabulated together in the column ‘generally agree’ and the two negative responses are reported together in the column ‘generally disagree’ to facilitate an easier discussion of the results.

Question\Responses (%)	Support Hypothesis	Generally Agree	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Generally Disagree
I'm pleased that I was given a choice of which textbook edition to use	+	58.2	43.6	14.5	27.3	9.1	5.5	14.5
Students using the newest textbook edition had an advantage	-	23.6	7.3	16.4	21.8	32.7	21.8	54.5
The course instructor was edition-neutral.	+	80.0	38.2	41.8	16.4	3.6	0.0	3.6
The newest edition of the textbook is better than the older versions	-	14.5	7.3	7.3	40.0	27.3	18.2	45.5
Using multiple editions had a negative impact on my learning experience	-	12.7	3.6	9.1	30.9	34.5	21.8	56.4
There was confusion about what homework was assigned.	-	9.1	7.3	1.8	20.0	36.4	34.5	70.9
Different editions made it hard to work with my fellow students	-	11.3	0.0	11.3	18.9	43.4	26.4	68.8
I would like to see this program expanded to include other courses	+	49.1	29.1	20.0	36.4	12.7	1.8	14.5
I would like to use an on-line edition of the textbook	N	32.7	12.7	20.0	32.7	20.0	14.5	34.5

Table 1: Assessment results on student perceptions on the use of multiple textbook editions.

Overall the choice of multiple textbook editions was welcomed by the students. The survey showed that 58.2% of the students were pleased to have the option to choose an older textbook edition while only 14.5% disagreed. Of the students surveyed, 49.1% would like to see the program expanded to include other courses and 14.5% disagreed.

The student responses also indicate that the program was handled well by the instructors. 80.0% of the students agreed that instructors were edition-neutral. Only 12.7% of the students indicated a negative impact on their learning experience due to multiple textbook editions in use in the class. Similarly, only 9.1% said that there was confusion with homework assignments and only 11.3% felt that the multiple editions hindered working with others in the class. Only 14.5% of the students indicated that the newest edition of the textbook was better than older editions and 23.6% felt that those students with the newest edition had an advantage in the course.

Publishers have offered online editions of their textbooks at a reduced price to students. This study, however, indicates that students are neutral about such an offer with 32.7% generally in favor, 32.7% neutral, and 34.5% generally in opposition. More recently e books and e-readers have become more popular and affordable. A study including such a delivery method would be a good topic for future study.

Overall, the assessment data strongly supports the hypothesis that the concurrent use of multiple textbook editions is a suitable approach to decrease the cost of textbooks without a substantial negative impact on the student learning environment. The authors of the study also did not observe a change in student performance.

In the last section of the survey, students were asked to provide any further written comments. Only a minority provided comments. Examples of student comments are:

- "Being able to multiple editions helped financially."
- "Textbooks are too expensive and typically useless because they differ from the teacher's teaching."
- "Thank you … it is getting more difficult for me to stay at USD because of the cost. The older versions are much cheaper and will help me save a significant amount of money."

Conclusions:

A study was conducted to determine if the concurrent use of multiple editions of textbooks affected student learning. By allowing use of multiple textbook editions, the out-of-pocket cost for students was reduced by about half. Student responses showed that 80.0% of the students agreed that instructors were edition-neutral and only 12.7% of the students indicated a negative impact on their learning experience due to multiple textbook editions in use in the class. Assessment also showed 58.2% of the students were pleased to have the option to choose an older textbook edition while only 14.5% would have preferred not to have the choice. No change in student performance was observed by the authors of this study.

Acknowledgements:

The authors would like to thank the reviewers for their constructive commentary and the USD Torero Store for providing both current and previous editions of the textbooks used in this study.

References:

Iizuka, T. (2007) An empirical analysis of planned obsolescence. *Journal of Economics & Management Strategy*. **16** (1), 191-226.

Lewin , T. (2003) Students find $100 textbooks cost $50, purchased overseas. *New York Times*. October 21, 2003. Available from http://www.nytimes.com/2003/10/21/us/students-find-100-textbooks-cost-50-purchased-overseas.html [accessed September 23, 2011].

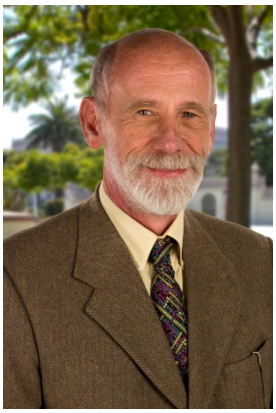
Lipka, S. (2008) House bill proposes disclosure rules to control textbook prices. *Chronicle of Higher Education*. February 8, 2008. Available from http://chronicle.com/article/House-Bill-Proposes-Disclosure/33995 [accessed September 23, 2011].

Miller, L.H. (1974) On killing off the market for used textbooks and the relationship between markets for new and secondhand goods. *Journal of Political Economy*. **82** (3), 612-619.

Young, J. R. (2009) 6 lessons one campus learned about e-textbooks. *Chronicle of Higher Education*. June 12, 2009. Available from http://chronicle.com/article/6-Lessons-One-Campus-Learne/44440/ [accessed September 23, 2011].

BIOSKETCH

Frank G. Jacobitz received the Diploma in physics from Georg-August Universität, Göttingen, Germany, in 1993, and the M.S. and Ph.D. degrees in mechanical engineering from the University of California, San Diego, La Jolla, in 1995 and 1998, respectively. He has been with the University of San Diego, San Diego, CA, since 2003, where he is currently a Professor of mechanical engineering. From 1998 to 2003, he was an Assistant Professor of mechanical engineering with the University of California, Riverside. He has also been a visitor with the Centre National de la Recherche Scientifique, Université de Provence, Aix-Marseille I, France. His research interests include direct numerical simulations of turbulent flows with shear, rotation, and stratification, as well as bio-fluid mechanical problems at the microscale. Prof. Jacobitz is a member of the American Society of Mechanical Engineers (ASME), the American Association for the Advancement of Science (AAAS), the American Physical Society (APS), the American Geophysical Union (AGU), and the Deutsche Physikalische Gesellschaft (DPG). He currently serves as the faculty advisor to the student section of the ASME at the University of San Diego and on the Council and Executive Committee of the Pacific Division of the AAAS.



Thomas F. Schubert, Jr. received the B.S., M.S., and Ph.D. degrees in electrical engineering from the University of California, Irvine, in 1968, 1969, and 1972, respectively. He is currently a Professor of electrical engineering with the University of San Diego, San Diego, CA, and came there as a founding member of the engineering faculty in 1987. He previously served on the electrical engineering faculty of the University of Portland and Portland State University, both in Portland, OR, and on the engineering staff of Hughes Aircraft Company, Los Angeles, CA. Prof. Schubert is a Member of the American Society of Engineering Educators (ASEE) and is a registered professional engineer in Oregon. He currently serves as the faculty advisor for the Kappa Eta chapter of Eta Kappa Nu at the University of San Diego.

Ernest M. Kim received the B.S. degree in electrical engineering from the University of Hawaii at Manoa, Honolulu, in 1977, and the M.S. and Ph.D. degrees in electrical engineering from NewMexico State University, Las Cruces, in 1980 and 1987, respectively. His dissertation was on precision near-field exit radiation measurements from optical fibers. He worked as an Electrical Engineer for the University of Hawaii at the Naval Ocean Systems Center, Hawaii Labs at Kaneohe Marine Corps Air Station, after graduating with the B.S.E.E. degree. Upon completing the M.S.E.E. degree, he was an Electrical Engineer with the National Bureau of Standards, Boulder, CO, designing hardware for precision fiber optic measurements. He then entered the commercial sector as a Staff Engineer with Burroughs Corporation, San Diego, CA, developing fiber optic LAN systems. He was then with Tacan/IPITEK Corporation, Carlsbad, CA, as Manager of Electro-Optic Systems, developing fiber optic CATV hardware and systems. In 1990, he joined the faculty of the University of San Diego, San Diego, CA. He remains an active consultant in radio frequency and analog circuit design and teaches review courses for the engineering Fundamentals Examination. Dr. Kim is a Member of the ASEE and CSPE. He is a licensed professional electrical engineer in California.