

How to Increase Adoption Rates and Use of e-Texts in the University Setting

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ABSTRACT

It appears the textbook industry is on the brink of changes in its supply chain that will rival the magnitude of those occurring in the music industry with the introduction of the IPOD, wherein a unique hardware device afforded to users the opportunity to purchase a highly differentiated product (music) electronically and at a customizable level of granularity and cost. Artists, publishers and users were the actors. In the world of textbooks - authors, publishers, professors and student are the actors. Research shows a significant shift toward electronic versus print textbooks is underway, hence the objective of our paper is to identify ways by which relevant actors can facilitate and benefit from this paradigm shift. We conducted a literature search to assess why and how quickly this shift is occurring, spoke with publishers to assess current and future availability of e-texts, surveyed students and faculty to estimate their situation relative to adoption and use of e-texts, and identified specific actions that can be taken to increase adoption rates and use of e-texts in the University setting.

Keywords: E-Books, E-Textbooks, Technology Adoption Model (TAM), Task Technology Fit Model (TTF), Media Richness, Digital Learning, Instructional Technology, Textbook Supply Chain

INTRODUCTION

It appears the textbook industry is on the brink of changes in its supply chain that will rival the magnitude of those that occurred in the music industry upon introduction of the IPOD, wherein a unique hardware device afforded users the opportunity to purchase a highly differentiated product (music) electronically and at a customizable level of granularity and cost. Artists, music studios and user audiences were participants. In the world of textbooks - authors, textbook publishers, professors and students are the participants. Research shows that a significant shift toward electronic versus print textbooks is underway [4] [16], hence the objective of our paper is to identify ways by which relevant participants can facilitate and benefit from this paradigm shift.

As might be expected, the supply chain of e-textbooks is different from that of digital or e-Music because professors mediate between publishers (sellers) and their target market of students, whereas in the e-Music business the recording companies (sellers) interface directly with buyers of music. This places professors in the unique position of being able to either facilitate or delay the adoption of e-texts [4] as they define required readings for their courses, and as such set the stage for disintermediation of bookstores and publishers in the textbook supply chain [2]. It is our view that given significant advantages of e-Texts over print (p-Texts) the goal should be to facilitate and expedite the use of e-texts. In order to determine if this is feasible and to find ways to do this, we identified six research questions which are:

- Q1 - Are appropriate e-Texts readily available to faculty and students?
- Q2 - What is the general attitude toward technology and digital reading?
- Q3 - What are feature preferences between students and faculty?
- Q4 - What are perception and satisfaction between students and faculty?
- Q5 - Who is "leading the charge" into e-Texts?
- Q6 - Is e-Text use likely to increase?

LITERATURE REVIEW

Why e-Textbooks?

Advantages of e-texts from a student perspective include: easy search and reference, costs less than print, easy to carry around, can be obtained more quickly, more convenient, allows interaction with content, can integrate with other content, can try out before buying, and is environmentally friendly [12]. Advantages from a faculty perspective include: available 24/7, searching capabilities, extra Features – annotations, links, and highlighting, save space, save trees, and other – low cost, immediate access, not a bulky heavy textbook [1]. Although derived from different studies, it is interesting to note the similarity of perceived advantages between student users and faculty “prescribers”. Furthermore the speed of acceptance and the rate of migration from print to electronic sources within the various business disciplines outpaces the acceptance rates in the humanities and other social sciences [14].

To add a parent’s perspective, one author having put 4 children through college, and having paid textbook costs averaging \$750 per semester, the total four year cost of books can be \$6,000 per student, and in our case a grand total of \$24,000. This is net because somehow we never did see any proceeds for used books sold back to the bookstore. That said, e-Textbooks are not as inexpensive as one might think because it is still necessary for publishing houses to “recover costs for their products including acquiring, editing, and marketing a book [2].” “E-Books cost about 70% of the printed version [2].” Intuitively, given the nature of e-text production and distribution, this seems high and it may be reasonable to expect a further gradual reduction as volume increases, perhaps to as low as 50% of printed textbooks.

e-Text Business Models

Colleges and Universities support varying business models for getting books to students, some operate on-campus bookstores themselves, others contract with external firms that manage on-campus bookstores, some contract with nearby retail bookstore firms, and some contract directly with book publishers and distributors such as Chegg [3] that provide for-rent textbooks. Digital textbooks can optionally be rented for a period of time, or purchased as a digital file that may or may not be printed by the user. Unlike p-texts, e-texts are generally not sold back at the end of a semester, and hence their price needs to be lower at the outset than the net cost of traditional p-texts.

In the e-Text world, on-campus “brick and mortar” bookstores are facing a reduction of sales and handling of p-texts, and are likely be looking at downsizing and perhaps changing their product mix to make use of facilities previously occupied by printed books.

Beyond cost and supply chain issues, it is important to understand that e-Texts offer an opportunity to deploy a considerably improved teaching tool. As an electronic communication, e-Texts can communicate more information, more effectively, and more quickly than traditional print because they can be comprised of multimedia elements including images, sounds, animations, video, web links, and interactivity that can connect simultaneously with multiple human receptors/senses [13].

e-Text Technology

“An electronic book (variously: e-book, eBook, e-Book, digital book, or even e-edition) is a book-length publication in digital form, consisting of text, images, or both, readable on computers or other electronic devices. Although sometimes defined as “an electronic version of a printed book,” many e-books exist without any printed equivalent. Commercially produced and sold e-books are usually intended to be read on dedicated e-readers, however, almost any sophisticated electronic device that features a controllable viewing screen, including computers, tablet computers, and smartphones can also be used to read e-books [9].”

There are two human-technology interfaces in e-Texts. The first relates to the interface between a user and the hardware device that he or she owns [11]. These include dedicated e-Book readers, such as Amazon’s Kindle and the Nook from Barnes & Noble [7], desktop computers, laptop and tablet computers and smartphones. The second is between e-Text producer(s)/digital content creator(s) and their physical distribution alternatives which are the “Cloud” or a device such as a CD/DVD or flash drive. Since CD/DVD’s are on the way out (most new mobile computers are now shipped without these electro-mechanical devices), flash drives are currently the only remaining viable option. Hence, looking forward, the cloud is likely to be the primary distribution vehicle and the physical e-Text will be a computer file.

As e-Text design, production and use have increased, technical hurdles posed by these different development platforms and tools have been overcome, and platform independence is becoming the norm [10]. Programs

developed for larger screens can be adapted for the micro screens found on smartphones as the size and resolution of these screens have increased. In addition to e-Text production by firms, self-publishing services and tools are becoming available, such as “Kindle Direct Publishing EDU” from Amazon [6]. These will allow teachers to create their own texts and with permissions, edit those created by others.

Resistance to Change

As with nearly all new technologies there is resistance to change. A 2014 study by Hewlett Packard of 527 students at San Jose State University found that “of the 527 respondents, two-thirds of which have used both e-textbooks and printed version, 57% said they prefer print. Also 62% of those in the 18-35 year old bracket, which account for 75% of the respondents preferred print texts. This is “contrary to what most would expect, the younger and supposedly tech-savvy students are not all that into e-textbooks [15].” Although done five years earlier, a 2009 study conducted at The Brigham Young University Marriott School of Management having 51 faculty respond found that 61% of Business faculty at that time preferred print texts [1]. Hence, there exists a strikingly similar view of e-texts between students and faculty.

Application of Technology Adoption Models to e-Texts

The Technology Acceptance Model (TAM) advanced by Davis in 1989 defines Perceived Usefulness and Perceived Ease of Use as two factors driving adoption of a technology [5]. Subsequent studies have shown that the TAM does apply to the adoption of e-books., and hence usefulness and ease of use are factors in the adoption and use of e-books [2, 12] .

Likewise the Task-Technology Fit (TTF) Model advanced by Goodhue in 1995 [8] was used “to explore the interrelationships of e-books, the affordances offered by smart readers, the information needs of academics, and the “fit” of technology to tasks as well as performance,” and was found to be a useful construct in understanding the adoption of e-books [4].

Adaptive Learning

As a corollary to e-texts, book publishers are creating electronic learning tools such as Pearson’s My MIS and My ITLab, and McGraw Hill’s Connect. These tools are a blend of content normally found in e-books, in software application labs such as Excel and Access, various software project assignments, and web links. Such tools enable students to iteratively adapt and improve their understanding based on trial and error, and can be used in conjunction with e-texts. Two authors of this article have considerable experience using adaptive learning features of My ITLab.

METHODOLOGY

In order to find ways to increase adoption rates and use of e-Texts in the University setting, and to answer the research questions identified earlier in this paper, we designed a pair of Qualtrics–based surveys, one for students and one for faculty.

The student survey was distributed largely to sophomore students at a small private northeastern university with 254 responders. The faculty survey was distributed to both the College of Business and the College of Arts and Sciences faculty in the same university with 47 responders. Table 1 shows demographic Information about surveyed students and faculty. Results in Table 1 below are shown in actual numbers of survey responses and the % of that response to total respondents.

Table 1. Demographic Information about Surveyed Students and Faculty

Surveyed Students			Surveyed Faculty		
		Percent (Number)			Percent (Number)
Age	18	3.5% (10)	Number of Years Teaching	1-5	19.1% (9)
	19	35.0% (94)		6-10	17.0% (8)
	20	41.6% (106)		11-15	12.8% (6)

	21	10.3% (25)		16-20	17.0% (8)
	22	4.7% (11)		21-25	10.6% (5)
	>22	4.5% (9)		>25	23.4% (11)
Gender	Male	56.7% (144)	Gender	Male	55.3% (26)
	Female	43.3% (110)		Female	44.7 (21)
Academic Year	Freshman	7.1% (18)	Position	Professor	29.8% (14)
	Sophomore	72.9% (186)		Associate Professor	25.5% (12)
	Junior	16.1% (41)		Assistant Professor	2.1% (1)
	Senior	3.9% (10)		Instructor	12.8% (6)
				Adjunct	27.7% (13)

Students are primarily sophomores between the ages of 19 and 21, 57 % are male and 43% female. Faculty have been teaching anywhere from 1 to more than 25 years with a significant number (23.4%) more than 25 years, 55% are male and 45% female, which is remarkably similar to the gender mix of students. In terms of respondent's rank, nearly 30% are full professors, 25% associate professors, only 2% assistant and about 40% are not tenure-track. The faculty were 38% from College of Business and 62% from the College of Arts & Sciences.

RESULTS

Table 2 compares responders' general attitude toward technology and digital reading by looking at hardware devices owned, relative amount of book reading done digitally, personal preferences and propensity to adopt technology. The results shown in Table 2 below are shown in actual numbers of survey responses and the percent of that response to total respondents.

Table 2. General Attitude Toward Technology and Digital Reading

	Students	Faculty
Devices I Own	Percent (Number)	Percent (number)
Laptop/Computer	100% (255)	100% (47)
E-Reader (Kinder Fire, Nook, etc.)	14.5% (37)	34.0% (16)
Tablet (iPad, Samsung Note, etc.)	32.9% (84)	59.6 % (28)
Smart Phone	94.9% (242)	76.6 % (36)
Percent of Book Reading Done Digitally		
<20%	37.4% (95)	52.2% (24)
20%-40%	22.8% (58)	15.2% (7)
41%-60%	19.3% (49)	8.7% (4)
61%-80%	10.6% (27)	15.2% (7)
>80%	9.8% (25)	8.7% (4)
I prefer e-texts over printed texts		
Yes	20.5% (52)	19.6% (9)
No	79.5% (202)	80.4% (37)
I am always among the first to adopt new technology and gadgets		

Strongly Agree (Eagle Beaver)	8.3% (21)	6.5% (3)
Agree (Early Adopter)	27.6% (70)	30.4% (14)
Neither Agree nor Disagree (Early Majority)	38.6% (98)	34.8% (16)
Disagree (Late Majority)	21.7% (55)	21.7% (10)
Strongly Disagree (Technically Adverse)	3.9% (10)	6.5% (3)

Hardware Devices Owned

As might be expected the university environment is “hardware rich” in terms of number and variety of devices owned by students and faculty. The study university provides laptop computers to all students and faculty, hence the 100% availability of these devices. Dedicated E-Readers have a presence of about 15% with students and a surprising 34% with faculty, which may be indicative of a greater ability to pay on the part of faculty. Tablets demonstrate a surprising presence on campus with about 33% of students and 60% of faculty, here again ability to pay may be a factor. With smartphones the user majority switches from faculty to students with about 77% of faculty and 95% of students having them. In summary laptops are equally distributed between faculty and students, faculty have more E-Readers and tablet devices and students have more smart phones.

Relative Amount of Book Reading Done Digitally

Table 2 divides the percentage of book reading done digitally into 5 ranges and compares how students and faculty are distributed across these ranges. It is interesting to note the absolute levels of reading done digitally and also the differences between students and faculty at each level. At the lowest level of less than 20% of reading done digitally, there are about 38% of students and 52% of faculty. Hence one third of students and one half of faculty are doing little or no reading digitally. In this instance students are ahead of faculty in the amount of digital reading they do. At the second and third levels students continue to do more digital reading than faculty, but at the fourth level of 61%-80% of reading done digitally, the pendulum swings to faculty. This would indicate that there are a few faculty who are intense users, but for the most part students are more inclined than faculty to be digital readers. Another factor bearing on this may be the mix of pleasure reading versus that done for “work”, and faculty may be using their dedicated e-reader devices for pleasure reading.

Personal Preferences

Students and faculty share nearly identical stated preferences for printed texts over e-texts. Only about 20% state a preference for e-texts. This is counter to their stated use of digital reading where nearly 65% of students and 48% of faculty do more than 20% of their reading digitally, the implications being that digital reading is on the increase even though they do not particularly like it, and that there is considerable room for growth in digital reading, perhaps due to its lower cost and convenience.

Propensity to Adopt Technology

Table 2 shows very similar technology adoption tendencies between students and faculty with a classic bell curve distribution wherein 88% of students and 87% percent of faculty are within the center of the curve. This suggests that both students and faculty are neither particularly early nor particularly late adopters of technology.

Table 3 looks at e-Text features and compares preferences between students and faculty thereby providing insight into which features play a significant role in the adoption of e-texts. As shown by T-test results important features are bookmarking, annotating, instructor annotating available to students, highlighting, browsing, and the ability to copy text. Of these students are keener on seeing annotations by their instructor and copying text. Of lesser importance are using clickable links, search across the full text, have an audio/listening option, electronically translate to other languages, and printing. It may be that underlining, hi-lighting, etc. are easiest with paper, or at least more familiar, and it will take time for people to become used to the new media. It is these features along with cost savings, convenience of physical size, convenience of immediate availability, convenience of being able to run

on various hardware devices, and environmental factors...kill no trees and burn fewer hydrocarbons, that are forces pushing reluctant users into the world of e-texts.

To facilitate the movement, faculty could invest more of their own time in learning and using e-texts, in annotating and highlighting texts in order to emphasize to students with what they think is important in assigned readings, and encouraging students to highlight readings and use clickable links where appropriate.

Table 3. T-tests of E-Texts Feature Preferences between Students and Faculty

With an e-text, I would like to be able to...		Mean	t value	Significant Level
Bookmark	Students (254)	4.16	-2.39	0.02
	Faculty (46)	4.50		
Annotate	Students (254)	4.02	-3.30	0.00
	Faculty (46)	4.50		
See annotations made by my instructor	Students (254)	4.22	2.43	0.02
	Faculty (46)	3.87		
Highlight	Students (254)	4.27	-2.84	0.00
	Faculty (46)	4.65		
Browse, including table of contents	Students (254)	4.31	-3.65	0.00
	Faculty (46)	4.76		
Use clickable links	Students (254)	4.19	-1.06	0.29
	Faculty (46)	4.33		
Search across full text	Students (254)	4.41	-1.09	0.28
	Faculty (46)	4.54		
Copy text	Students (254)	4.35	2.22	0.03
	Faculty (46)	4.04		
Have an audio/listening option	Students (254)	3.77	0.82	0.41
	Faculty (46)	3.63		
Electronically translate to other languages	Students (254)	3.39	-0.49	0.63
	Faculty (46)	3.48		
Print	Students (254)	4.29	1.62	0.11
	Faculty (46)	4.04		

Table 4 below compares overall student and faculty perception and satisfaction with e-Texts and indicates that e-Text satisfaction and faculty involvement with e-Texts are the most significant factors. The compatibility of e-texts with student needs, the relative advantage versus print texts, the ease of use and overall usefulness are not viewed by either students or faculty as determinate. In fact based on a one to five scale used in the survey, the mean values showed in Table 4 indicate a 50/50 or at best lukewarm level of satisfaction with e-Texts. This implies that there is work to be done on the part of authors and publishers to make their e-Text products more satisfying to both students and faculty.

Table 4. T-tests of E-Texts Perception and Satisfaction between Students and Faculty

		Mean	t value	Significant Level
e-Text Satisfaction	Students (251)	3.01	-2.06	0.04

	Faculty (45)	3.31		
Faculty Involvement	Students (251)	2.85	3.15	0.00
	Faculty (45)	2.47		
Compatibility	Students (251)	2.64	0.05	.96
	Faculty (45)	2.63		
Relative Advantage	Students (251)	2.78	-0.79	.43
	Faculty (45)	2.89		
Ease of Use	Students (251)	3.28	1.59	.11
	Faculty (45)	3.10		
Usefulness	Students (251)	3.00	-0.19	.85
	Faculty (45)	3.03		

RESULTS

Combined results of the student and faculty surveys provided the following answers to our research questions:

Q1 - Are appropriate e-Texts readily available to faculty and students? Yes, based on discussions with publishers, on-line searches for texts for sale and for rent, and the numbers of survey respondents who do digital reading there exists a substantial availability of e-texts.

Q2 - What is the general attitude toward technology and digital reading? The lion's share (about 88%) of University students and faculty are neither early nor late adopters of new technology. Students and faculty share nearly identical stated preferences for printed texts over e-texts. (Only about 20% state a preference for e-texts.) This is counter to their stated use of digital reading where nearly 65% of students and 48% of faculty do more than 20% of their reading digitally, the implications being that digital reading is on the increase even though they do not particularly like it, and that there is considerable room for growth in digital reading.

Q3 - What are feature preferences between students and faculty? Important features are bookmarking, annotating, instructor annotating available to students, highlighting, browsing, and the ability to copy text. Of these students are most keen on seeing annotations by their instructor and copying text. Of lesser importance are using clickable links, search across the full text, have an audio/listening option, electronically translate to other languages, and printing.

Q4 - What are perception and satisfaction between students and faculty? Both students and faculty indicate a 50/50 or at best lukewarm level of satisfaction with e-Texts. This implies that there is work to be done on the part of authors and publishers to make their e-Text products more satisfying to both students and faculty.

Q5 - Who is "leading the charge" into e-Texts? It appears that in spite of stated low preferences, both students and faculty are making significant use of e-texts and at this time students are more comfortable with the paradigm shift than are faculty, even though faculty are in a position to require, or at least offer e-texts as an option in their courses.

Q6 - Is e-Text use likely to increase? Given current rates of digital reading; the ready availability of multiple end user reader devices including laptops, tablets, dedicated e-book readers, and smartphones; the ready availability of e-texts, cost savings, convenience of physical size, convenience of immediate availability, and environmental factors it is likely that e-text usage will increase.

IMPLICATIONS

In order to facilitate and expedite the paradigm shift from p-texts to e-texts participants in the textbook supply chain could do the following: publishers and authors could make better e-texts and work on lowering costs to students; Universities could eliminate traditional brick and mortar bookstores in favor of on-line stores; faculty could spend more time learning and using e-texts, use e-text annotation for students, engage students in use of multimedia components of e-texts in class, routinely make e-texts available as an option or required for classes; and students could practice using e-texts whenever possible, take advantage of e-text features including highlighting, search, printing, clickable links, and annotation, and save money for their parents.

CONCLUSIONS AND FUTURE RESEARCH

Implementation of the above recommendations could result in a substantial lowering of the cost of textbooks and hence a college education; it could accelerate the evolution of textbooks into 21st century teaching vehicles that go well beyond what is expected of a printed book; it could provide a significant boost to the environment; it could make currency of textbook content into real-time rather than a new edition every three or so years.

It appears that the current status of the paradigm shift from p-texts to e-texts is well documented and the need for future research is in the area of re-inventing what a textbook is and what it can be. Textbook authors, publishers and faculty should research assessment of learning goals within e-text courses to help identify and refine ways to make them more useful and effective with a focus more on learning than on teaching.

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