Free Information in Expensive Books

A Research Paper submitted to the Department of Engineering and Society

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

Joshua Max Holtzman

Spring 2020

On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Advisor

Sean M. Ferguson, Department of Engineering and Society

Introduction

Where do we get knowledge, and what technologies control what knowledge is available? For most people to tap into human knowledge, the process of finding information will use a forum, a journal, an encyclopedia, or a textbook. Each of these tiers of human knowledge storage takes a unique stance in the debate between dynamism (the ability for a source to incorporate new knowledge) and credibility. The more dynamic a source, the more likely the source is to have information that will later be disproved. Textbooks, chiefly among these, are among the best reviewed and most accurate repositories for knowledge. As such, textbooks are the standard for academia and education. Each knowledge repository has, since the advent of the internet, experienced a major change: forums from bulletins to websites, journals from printed publications to research paper repositories, encyclopedias from semi regularly updated books to dynamically modified resources. What happened to textbooks?

The shift happened more gradually in textbooks than in other repositories of knowledge. This can be attributed to the nature of the textbook model. Due to high expense and limited printing or updates, there is very little market drive for the textbook industry to improve; it is recommended that people using textbooks to teach replace them one to two times per decade (Lowe). Without the market drive to improve as it exists with other knowledge repositories, the industry was allowed to stagnate until another market force came along to drive progress. This force came in the form of value replacement; publishers saw sales decrease in a market subset, specifically, college textbooks (Robelo, 2015). In younger education, many professors maintain a class set where in college, each student is expected to obtain their own books each semester, as online options became available (thanks mostly to the diligent scanning work of other students),

fewer and fewer students were buying books. The decrease in demand forced the textbook industry to either improve their product or lose access to one of their primary markets (Millot, 2016).

Conventional economics suggests that the industry would improve its product, and some would argue that it has; there are other ways of trapping a market. This paper will attempt to analyze the driving forces behind that radical innovations in the textbook market that have arisen between the early 2000s and late 2010s. By using Multi-Level Perspective (Geels, 2006) we can assess how technological novelty propagated through niches and became a part of the socio-technical regime of this industry.

Literature Review

For years, students have been expecting a repeat of 'the Wikipedia phenomenon' in textbooks. Andrew Lih describes the formation of Wikipedia in his book, The Wikipedia Revolution. "In less than a decade, Wikipedia has single handedly invigorated and disrupted the world of encyclopedias." (Lih, 2009, p.3) The book discusses the process by which a few forward thinkers were able to create a website that now exists as one of the largest repositories for human knowledge in the world. He describes how open-sourced information broke through a stifling economy thanks to the labor of thousands. These words are echoes across the internet and it seems almost inevitable that something similar must happen to textbooks. Why hasn't the change occurred?

A look at how an industry has changed should respect not only the changes that were made, but also the changes that were not made. In 2009, Jeffrey Young wrote a speculative paper on an industry counter-script, suggesting that Amazon might finally provide the technological

opening to bring the textbook industry into the light of the information age (Young, 2015). The Amazon pilot program didn't produce results, Kindle didn't become the name of digital textbooks, and business more or less continued as normal. Why did this happen? Some might speculate that the feeling of a textbook was important to users, that paper is the only way to do it; but that was also said about novels and the Kindle was built on the idea that people would prefer to have a library at their disposal. While the digital textbook would have been a major improvement in the quality of the product being produced, because the demand for textbooks exists independent from the quality of the book, the benefits of this shift were lost on those in positions to make decisions about the future of the industry. For a technology to breach into the industry, it had to do more than traditional technological changes offered.

So, what did come about in the industry? A WIRED article attempts to depict the transition: digital-first, open source, subscription (Barett, 2019). The article hits many of the key points, that companies like Pearson have moved to online models, are changing the way the books can be edited, and are shifting to subscription models for sales, but miss a critical detail. That detail is pivotal when trying to answer the question: why is this different? The key detail for the manufacturers is whether or not they have a product that can be shared by users.

Fundamentally, any textbook can be simplified into a series of pixels and shared as an image, so one might think that the industry might collapse and be replaced by an open-source product. This might have been true, and may still come to happen, but this technological change is not in the industry but in the product itself. WileyPLUS is an industry leader in a new type of textbook, one where the work-out problems in the book are actually the focus. WileyPLUS supports assignments, autograding, gradebooks, practice problems, study materials, and…

etextbooks. By appealing to the people choosing the course material by simplifying and automating the assignment structure, the industry can regain a hold on the market by selling a new product, the textbook package. With this new technological development, the industry can now hold a students ability to do coursework behind a semesterly subscription paywall that resembles the price of book rentals in years gone by.

Today, there is a new competitor in the industry. As Wikipedia opened the world of encyclopedias to new horizons, open educational resources, particularly open textbooks, hope to harness the power of the internet to usurp the textbook economy. Anne Algers describes, in her paper on the emerging technology, the framework being used, the impacts that it may have on education, and some of the troubles being faced by the technology today (Algers, 2019).

Evidence

The textbook industry reached an inflection point within the past fifteen years. Wiley, one of five companies that makes up over 80% of the textbook market, saw a 31% drop in print sales in 2015, which they offset primarily with corporate learning and online test preparation (Millot, 2016). Among ten of the top sources of textbooks today, half of the publishers were founded between 2005 and 2012 and the other half were founded in the 19th century. Among the preeminent publishing companies, Pearson, Wiley, and McGraw-Hill all have online textbook operations that were started between 2005 and 2012. The others made similar moves during the same timeframe: Houghton-Mifflin-Harcourt and Macmillian have created/acquired online education resources and entered the e-book market, respectively. Three of these publishers are publicly traded; all three of them have lost value since 2012, and only Wiley was able to grow in

the period between 2005 and 2012 (Historical data on companies collected from Wikipedia and Yahoo Finance).

As Wiley has been the most successful amongst the core textbook publishers based on stock evaluation, let's look at the structures that have allowed Wiley to continue to function as a major player during a market shift. Despite a variety of competition in the form of online textbook publishers and repositories cropping up, including OpenStax (a free textbook resource), Wiley has been able to make money in the digital textbook marketplace. Wiley was one of the early-adopters of the new technology in this industry, building its online platform, WileyPlus, in early 2009, less than two years after some of the earliest competition hit the market (Chegg rebranding and CourseSmart being founded). In addition, Wiley had an innovative business model for the time; WileyPlus incorporated online textbook rental with problem sets and training, essentially blending Chegg and WebAssign (two popular student resources today) into one platform. By doing this, WileyPlus was able to position themselves, for a time, as the only one-stop-shop for textbooks and prepared homework materials. This business model looks appealing, but also protects Wiley somewhat from the ever-growing wave of freely accessible textbooks. To see why let's begin by contextualizing this innovation into an MLP framework.

The sociotechnical regime in 2009 was heavily dependent on market preferences and increasing availability to technology. Students at the time, particularly in higher education, held a strong preference for the minimally expensive option and internet access was increasingly normal. The lack of policy surrounding what was and was not an acceptable way to obtain a textbook, along with a culture that normalized textbook piracy, meant that more and more students were obtaining freely available PDFs of textbooks from the internet. The sociotechnical

landscape was just beginning to shift, as new companies like Chegg hit the market, giving students access to not only the books, but to problem set answer sheets and completion guides. At this point, the new technologies had destabilized the regime, as profits for textbook publishing companies were drying up. This destabilization produced a need for a new niche innovation that came in the form of WileyPlus. While nothing it was doing was intrinsically novel, WebAssign had been growing in popularity since its founding in 1998, and Wiley saw a space for educators to have access to the functionality of WebAssign paired with an online textbook resource. This innovation simplified the work of educators and capitalized on the divide between the two major contributors of market forces; the students desire minimally expensive access while the educators desire minimally obstructive access. Previously, these two goals went hand-in-hand, with educators giving students freedom to choose their preferred method of gaining access (minimal effort for educator and the comfortable presumption that the student will use a system that they have used before, thus being minimally obstructive to their education). WileyPlus simplified the number of tools required to run a classroom, making it even easier to use than any pair of tools that the students would otherwise find. In classrooms that used the service, WileyPlus made it impossible for students to gain access to their problem sets without renting their textbook from Wiley. The primary market user preference is usurped here by leveraging educator power to limit the choice of the student. Over time, policy around acceptable ways to obtain textbooks is allowed to reshape around this new business model. The most important element for textbook publishers here is the culture. As students normalize the feeling of paying for rented online textbooks, the market stabilizing force shifts away from students fighting for free educational resources. This seems like exactly what a profit-based publication company would want, reduced

user choice and a sociotechnical regime that enables it even when better options might be available. Why then, in 2012, did this model not continue to stabilize in Wiley's favor?

The failing-point of WileyPlus, here, had to do with a lack of a sociotechnical lock-in. Having upset the technical landscape, a few major reverse salients arose. Competition hindered the sociotechnical lockin, as other companies produced their own niche innovations in an effort to maintain market hold. With more niche innovations arising, an already turbulent technical landscape is less likely to stabilize and lock-in. The primary reverse salient that WileyPlus accounted for was the individual drive of students to find the cheapest option; even as that individual drive compounds into a market force, the niche innovation undercut the student choice and prevented it from driving the market as it had done in the early 2000s. What this new model failed to adequately incorporate, however, is the student-led reverse salient to collaboratively compete with publication companies and produce better free resources than had been accessible previously. Rice University, with funding from the Bill and Melinda Gates Foundation, became the home of a non-profit company that began openly licensing textbooks in 2012. (OpenStax) OpenStax was the first repository for free textbooks that could be publicly endorsed by universities and educators. This seems like a minor innovation, as most textbooks are freely available in pdf form online, but there is one key difference: legality. There was then a policy option, endorsing free textbooks, that did not exist previously. OpenStax quickly became highly discussed and researched. In 2015, a paper was published on open education resources and OpenStax in particular, concluding

> Open textbooks such as OSC [OpenStax College] have a positive impact on both educators and students… In the instance of the OSC users we surveyed, there appears to

> be a potential ‘domino’ effect in terms of successful use; almost all of our survey respondents were more likely to recommend using OSC materials to others as a result of using the books themselves. (Pitt, 2015, p.150)

A paper specifically on OpenStax in the classroom in 2017 concludes with “Though faculty and students identified both positive and negative aspects in the free online format, they found the quality of the OpenStax content to be comparable to that found in traditional textbooks.” (Watson et al. 2017) In 2020, we are still awaiting a market lockin; open-sourced books haven’t hit the critical mass required to become a part of the culture, and the textbook+problem set business model hasn’t become widely accepted enough to be considered a stable part of the landscape.

Discussion

What will a lockin look like and what aspects of our society are important in determining how it will happen? If Pitt is correct it could be a ‘domino’ style effect surrounding OpenStax/ One theory is that the mindset of professors is shifting to more closely align with student mentality as the cost of higher education continues to grow; after adjusting for inflation, the cost of a public four-year degree increased dramatically over the years. As professors are becoming more sensitive to the pressure this puts on students, they are becoming more cautious of textbook costs and how those affect their students. Public outcry has been heard for years regarding prices and the ways in which choice is removed from students; one such example was in 2018 following an incident at the University of Louisiana at Lafayette in which a WileyPlus textbook access code was priced at $999.99 and the business model of WileyPlus prevented students from seeking less expensive options (McKenzie, 2018). To counter this shift in culture, the industry

developed a new niche innovation: automatic textbook billing. Vitez describes this phenomenon in a report published by the US PIRG education fund, saying that more than 700’000 students are affected by contracts signed by their universities to charge them for their textbooks as an automatic addition to their tuition. (Vitez, 2020) In addition to questionable practices regarding these contracts, this fundamentally undercuts market pressure, and, in the subdomain of individual universities, creates a sociotechnical lockin.

Given that market forces are inconsistent with existing infrastructure, there is a driving industry force to undercut market choice. This force has been felt through efforts to minimize online textbooks, counter drops in demand with increases in prices, bypass student choice, and newly to bypass educators choice directly. In our educational system, if the wills of textbook publication companies continue to be imposed on the market, neither the students nor the educators will be involved in the choice of which textbook suppliers are used to provide information and materials in the classroom. It is incumbent upon us to ask what elements of our society created the felicity conditions for such a dynamic to arise. At the most fundamental level, this sociotechnical drive is derived from the disconnect between the for-profit nature of our education system and the non-profit intents of educators and students.

Conclusion

The textbook industry is at a pivotal moment today as a sociotechnical lock-in is on the horizon. Students and educators are attempting to create a freedom of information while producers of textbooks are working to maintain profitability. Economic incentives have created a divide between what was, at one time, a mutually beneficial relationship between publishers and the education industry. Unlike encyclopedias, the textbook industry recognized the significance

of open-sourcing and are actively working to prevent an open-sourced textbook publication to undercut the market. While students and professors are actively working to create the resources and extend the social capital of free education resources like OpenStax, publishers are working to ensure long-term commitment to their products by school administration.

Approximately one in three universities in the United States are considering entering into an automatic billing contract with a publication company (Vitez, 2020). Awareness needs to be spread. Within student communities, knowledge of how to seek out free resources needs to be disseminated. Professors need to work with students and other educators to identify repositories of free and legal information so that more classes can be taught using free textbooks. Most importantly though, as publishing companies are working to bypass both student and educator economic autonomy, students and faculty should put forth a concerted effort to inform school administrations about free resources and the dangers associated with automatic billing programs to preempt efforts to profit off of our education.

References

Algers, A. (2019). Open Textbooks: A Balance Between Empowerment and Disruption. Technology, Knowledge and Learning. https://doi.org/10.1007/s10758-019-09426-5

Barrett, B. (2019). Digital Textbooks Are Forcing a Radical Shift in Higher Ed. Wired. Retrieved February 14, 2020, from https://www.wired.com/story/digital-textbooks-radical-transformation/

Geels, F. (2006). (PDF) Multi-Level Perspective on System Innovation: Relevance for Industrial Transformation. ResearchGate. http://dx.doi.org/10.1007/1-4020-4418-6_9

Lih, A. (2009). The Wikipedia Revolution: How a Bunch of Nobodies Created the World's Greatest Encyclopedia. Hachette Books.

Lowe, K. (n.d.). How Often Should Textbooks Be Changed? | The Classroom. Retrieved March 6, 2020, from https://www.theclassroom.com/should-textbooks-changed-6905196.html

McKenzie, L. (2018). University's $999 online textbook creates confusion and outrage | Inside Higher Ed. Retrieved February 27, 2020, from https://www.insidehighered.com/digital-learning/article/2018/08/28/universitys-999-online-textbook-creates-confusion-and-outrage

Millot, J. (2016). Sales of Print Books Tumble at Wiley. PublishersWeekly.Com. Retrieved February 26, 2020, from https://www.publishersweekly.com/pw/by-topic/industry-news/financial-reporting/article/71407-sales-of-print-books-tumble-at-wiley.html

OpenStax. (2020). In Wikipedia. https://en.wikipedia.org/w/index.php?title=OpenStax&oldid=935013558

Pitt, R. (2015). Mainstreaming Open Textbooks: Educator Perspectives on the Impact of OpenStax College open textbooks - ProQuest. Retrieved February 26, 2020, from https://search.proquest.com/openview/73e4d080658552352aa275cc2ceb5388/1?pq-origsite=gscholar&cbl=28311

Robelo, F. (2015). Understanding Textbook Piracy. Portuguese Economic Journal, 9. http://www.apdr.pt/pej2015/papers/18.pdf

Vitez, K. (2020). Automatic Textbooks Billing. 30.

Watson, C. E., Domizi, D. P., & Clouser, S. A. (2017). Student and Faculty Perceptions of OpenStax in High Enrollment Courses. The International Review of Research in Open and Distributed Learning, 18(5). https://doi.org/10.19173/irrodl.v18i5.2462

Young, J. R. (2009). How Kindle Could Change the Textbook Market. Chronicle of Higher Education, 55(36).