



Part One — OER Adoption in an American History Course: Impact on Student Outcomes and Behaviors and Relation to Institutional Metrics*

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This 2019 ACRL proceeding consists of two parts. The first describes a collaboration between librarians and instructional designers to promote affordable textbooks and includes results of a study investigating the impact of an open textbook adoption on student academic outcomes and behaviors. The second part consists of a case study describing how one librarian has both successfully promoted and supported adoption of affordable course materials with faculty in an academic department.

Data compiled by economist Barry Ritholz show that textbook costs have almost doubled over the past twenty years, even when controlling for a 55% inflation rate.¹ Some commercial publishers have effectively priced textbooks out of the market for many college students. In 2016, the Florida Virtual Campus (FLVC) administered a statewide survey to Florida higher education students to examine how the cost of textbooks impacted their education, purchasing behaviors, and academic success.² The authors were able to obtain survey responses specific to their home institution, the University of Central Florida (UCF). Of the 1,975 UCF students who responded to the FLVC survey, 53% indicated that they “frequently” or “occasionally” had not purchased a textbook due to cost, and 19% attributed obtaining a poor course grade to not having the textbook. Other large-scale research reports suggest that students’ lack of access to course materials from day one may place them at an academic disadvantage.³

Escalating textbook costs, and their impact on student behaviors and academic outcomes, has sparked a response from legislators, administrators, and on the teaching frontlines, instructors and campus academic support units. For example, the 2008 *Higher Education Opportunity Act*, contains a section that requires institutions to communicate the price of course materials to students at the time of registration for the purpose of ensuring “that students have access to affordable course materials by decreasing costs to students and enhancing transparency and disclosure with respect to the selection, purchase, sale, and use of course materials.”⁴ In 2015, the *Affordable College Textbook Act* (S.2176) acknowledged that the high cost of college textbooks was a barrier for many students in achieving a higher education and specifically called for expansion in the use of open textbooks in order to achieve savings for students.⁵

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Complementing federal activity, over half of all US states have legislation that contains provisions for activity to reduce the cost of course materials for students.⁶ Within Florida, Statute 1004.085, *Textbook and Instructional Materials Affordability*,⁷ explicitly authorizes institutional boards of trustees to adopt policies for the use of innovative pricing techniques and payment options for textbooks and instructional materials. A requirement of the legislation includes an annual report submitted by boards of trustees to the respective chancellors of the college and university systems, highlighting cost variances and institutional initiatives designed to reduce the cost of textbooks.

Accompanying Florida textbook affordability legislation is performance funding for state system universities. With the national trend moving away from funding institutions based solely on FTE student enrollments to aligning funding models with state goals and priorities, many of these incentives are based on performance indicators such as completion rates, time to degree, and number of degrees awarded in high-need areas, among others. In 2015, 32 states had been identified that had transitioned to performance funding with an additional five states in transition.⁸ Both the Florida college and university systems have performance metrics, with university funding allocations based on performance on ten metrics.⁹

Of the ten metrics for Florida system universities, the one most pertinent to textbook affordability efforts is Metric 3: Net tuition and fees per 120 credit hours. A sub-metric of Metric 3 is access to affordable course materials. In 2014, UCF scored well on this metric compared to other FL system institutions, with the cost of attaining a college degree at a reported \$21,060.¹⁰ By 2016, this cost had increased to \$24,190.¹¹ Although still relatively low in comparison to other state system universities, the needle is moving up, which may result in a less favorable rating and a drop in the funding allocation, and this funding comprises a significant portion of the university operating budget.

Further, faculty acknowledge that many students don't purchase course materials and have pursued a variety of creative ways to lower cost. This environment served as an impetus for librarians and instructional designers to form a small working group to promote and facilitate adoption of affordable textbooks. Beginning in Summer 2016, and in collaboration with other campus partners, this grassroots effort has advocated for adoption of affordable course materials and helped faculty transition from commercially produced textbooks to no/low-cost alternatives.

One option promoted by the working group is the adoption of course materials that are freely available to students through an open license. Often called Open Educational Resources (OER), these openly licensed course materials can include videos, web sites, or textbooks, among other types of artifacts.¹² Faculty adoption of existing OER has been most successful at the GEP level, and OpenStax texts (<http://openstax.org>) are by far the most adopted. Our work with the faculty development center has been especially fruitful in reaching GEP-level instructors, resulting in several successful faculty adoptions of no/low-cost course materials. Among those adoptions is an American History instructor who was intrigued enough to transition from using a commercial course textbook to an OpenStax *U.S. History* textbook.

The remainder of this paper describes the research framework, summarizes the literature, and reports findings of a study investigating the impact of the adoption of an open textbook on student behaviors and academic outcomes.

Research Framework

The research on the impact of open textbook adoption in higher education environments has dramatically increased in the last two years, and many researchers rely upon the COUP Framework to explore this impact. The COUP Framework, offered by the Open Education Group, consists of four strands: Cost, Outcomes, Usage, and

Perceptions.¹³ The Cost strand explores the magnitude and direction of the financial impacts of OER adoption on students and institutions, and can range from student savings to changes in tuition revenue due to changes in enrollment intensity, drop rates, and persistence.¹⁴

The Outcomes strand measures the magnitude and direction of the learning impacts of OER adoption and provides evidence of changes learning proxies, such as the percentage of students receiving a “C” or better, rates of completion, persistence, and graduation rates.¹⁵ As a perception may still linger that “you get what you pay for,” in this study we explore average end-of-semester GPA of students using OER compared to those using commercial textbooks. The Usage strand is often employed to explore how students use OER in novel ways and instructors engage in new pedagogical practices, while Perceptions provides a framework to investigate what faculty and students think about OER.¹⁶

Review of Literature

This review is structured around the four strands that make up the COUP Framework.

Cost

Student savings can be a persuasive factor to encourage faculty to adopt open textbooks. The most common way to track savings is by comparing the cost of previously assigned textbooks to the newly adopted open textbooks and calculating savings based on number of student enrollments. Depending on level of involvement, savings can range significantly. For example, a statewide initiative in Georgia reports student savings of over \$31 million since its inception in 2014-2015,¹⁷ while individual faculty who have transitioned to open textbooks can save students thousands to hundreds of thousands of dollars over time for one course.¹⁸

Outcomes

A majority of the research in open textbooks focuses on student academic outcomes. This could be a change in grade percentages or rates of completion and withdrawals, among other performance indicators. In a meta-analysis of 22 studies about open textbook adoption that had been published in the last three years, Hilton concluded that 95% of the studies cited same or better academic outcomes for students who used open textbooks versus commercial course materials.¹⁹

No study is perfect, and it’s difficult to investigate the true effectiveness of OER adoption without considering the many nuanced factors that are involved. For instance, if two course sections are being studied, and the teacher is not the same, “teacher effect” could influence student performance in a course.²⁰ In an analysis of 37 course sections in several General Education courses, Winitzky-Stephens and Pickavance found that when controlling for certain factors such as the teacher, students who were new to college experienced a small positive impact on their course grade when using open textbooks.²¹ As such, they suggest controlling for instructor-, course-, and student-level variables to more accurately gauge the impact of OER adoption on student outcomes.²²

Usage

In the COUP Framework, usage is often measured by how faculty edit, supplement, and/or delete material in open course materials, but can also include an in-depth look at how students actually use the open textbook. In our search of the literature, there were limited studies that explored student usage, specifically access and usability of open textbooks. However, the few studies that were found looked at frequency of use compared to traditional textbooks, how students accessed and tended to use the open textbook, and how they rated readability of the text.

Perceptions

Gauging student perceptions of open textbooks is usually accomplished by asking students to rate the effectiveness of the text on factors such as credibility, quality, and alignment with the course. In his meta-analysis, Hilton reported that students (and faculty) are generally positive about OER.²³ For example, one of the included studies reported that 90% of student respondents indicated that OER were the same or better quality as commercial textbooks.²⁴ Others also have reported on the quality of open textbooks, with open textbooks typically perceived by students to be the same or better than commercial textbooks.²⁵

Research on History Open Textbooks in the Literature

While open textbooks exist in the history discipline (for example, OpenStax), most of the existing research reports that have investigated open textbooks in higher education settings tend to explore adoptions in the disciplines of math and science. A small body of work was found regarding adoption of open textbooks in history. One study, which compared five sections of an introductory History course using an open textbook with five sections that used a commercial textbook found a moderately positive relationship between the use of the open textbook and student academic achievement. This study was the only one specific to adoption of an open textbook in an introductory American History course.

The research described herein adds to the scant literature found on the impact of open textbook adoption on student academic behaviors and performance in an introductory American History course. It also controls for teacher effect by analyzing outcomes of students enrolled in the course taught by the same instructor and compares outcomes of students both prior to and after adoption of the open textbook.

Context

The study took place at a large, public university located in the southeastern United States. The institution boasts approximately 66,000 student enrollments, with 72% receiving financial aid assistance.²⁶ At this institution, Introduction to American History is taught as two separate courses: U.S. History 1492 to 1877 and U.S. History 1877 to Present. This study focused on the U.S. History 1877 to Present course.

After reviewing the OpenStax *U.S. American History* text²⁷ the course instructor decided to adopt the open text, which in electronic format is freely available to students. The digital version of the textbook was offered through the institution's learning management system as Adobe Portable Document Files (PDF).

Questions

To investigate the impact of this open textbook adoption, the investigators relied on research questions from the COUP Framework. Questions by COUP strand included:

- Cost: How much money did students save due to the adoption of the open textbook? How does the cost of traditional textbooks impact student academic behaviors?
- Outcomes: How did the adoption of the open textbook impact student academic performance, defined as course GPA, pass rate, and drop/fail/withdrawal rate?
- Usage: How did students report using the open textbook?
- Perceptions: How did students perceive the quality of the open textbook compared to traditional textbooks in other courses? Did students perceive the open textbook as credible, relevant to the course, and supportive of their performance in the course?

Results

Cost

Since adoption of the open textbook, the instructor has taught fourteen sections of the introductory history course, U.S. History 1877 to Present. Course enrollments over this time period have ranged from 23 to 150 students, with an average of 98 students in each section. The new cost of the traditional textbook was \$80 with the open textbook freely available online or available for purchase in print at the campus bookstore. Since adoption of the open text, the bookstore has sold one copy in print. Potential savings was calculated based on total number of students enrolled in all sections after adoption ($n=1,370$) by new cost of traditional textbook (\$80), less cost of one print open textbook (\$52), for total potential savings of \$109,548. Although not every student would purchase a new textbook—or purchase the textbook at all—the calculation does indicate significant student savings.

As noted earlier, a local survey was administered to students who used the open textbook in the History course. Students were asked how textbook costs have influenced their behaviors throughout their academic career, and respondents ($n=278$) indicated that they frequently or occasionally had delayed purchasing a textbook due to cost ($n=228$, 82%), not purchased a textbook due to cost ($n=169$, 60.8%), or taken fewer courses due to textbook cost ($n=70$, 25.2%). These results were comparable to findings reported from the 2016 FLVC statewide survey (Figure 1).

FIGURE 1				
Impact of textbook costs on student academic behaviors; statewide and local surveys				
	2016 FLVC survey (n=20,557)		Locally administered survey (n=278)	
	<i>n</i>	%	<i>n</i>	%
Delayed purchasing a required textbook	Not asked	Not asked	228	82.0
Did not purchase a required textbook	13,670	66.5	139	60.8
Taken fewer courses due to textbook cost	9,785	47.6	70	25.2

Outcomes

This section reports on an analysis of student academic outcomes by comparing course retention and grades of students enrolled in the American History course prior to and after adoption of the open textbook. Student data from fall 2015 and spring 2016, the two major semesters prior to adoption of the open textbook, were aggregated and compared to aggregated fall 2016 and spring 2017 (post-adoption) student data. This pre- and post-adoption comparison controls for pedagogical differences by exploring patterns among the same instructor.

A total of 517 students enrolled in this instructor's course during the two major terms prior to implementation of the open textbook, fall 2015 and spring 2016. Among them, 54 (10.4%) students withdrew during the Add/Drop period, leaving 463 who are included in the Pass/DFW analysis. Pass rate is the number of students who receive a course grade of A, B, C, or D, while DFW is the number of students who drop after the Add/Drop window, receive a failing grade of F, or withdraw for other reasons. A total of 471 students were enrolled in the course during the two major terms after implementation, fall 2016 and spring 2017. Of them, 53 (11.3%) students using the open textbook withdrew during the Add/Drop period, leaving 418 who are included in the Pass rate/DFW analysis.

As an indicator of course persistence, the number of students who dropped or withdrew from the course *after* the Add/Drop window were compared to those who completed it. No statistically significant difference was found between the proportion of students who completed ($p=0.700$), dropped ($p=0.714$), or withdrew ($p=0.904$) from

FIGURE 2
Drop, pass, and DFW rates; pre- and post-OER adoption comparison

	Pre-OER adoption		Post-OER adoption	
	N	%	N	%
Dropped during Drop/Add period	54	10.4	53	11.3
Pass rate	440	85.1	382	81.1
Drop/fail/withdrawal rate*	23	4.5	36	7.6
	517	100.0	471	100.0

*Includes drops, fails, and withdrawals after the Drop/Add deadline

open textbook adoption classes with students using the open textbook (Figure 3). In sum, no changes in student academic performance were found. Students who used the open textbook performed equally well as students using the traditional textbook.

Usage

The third area of investigation explored how students reported using the open textbook. The survey asked students whether they used the textbook primarily in digital format or if they printed or obtained a print version. Of the 293 students who responded to this question, 271 (92.5%) preferred to use the digital format and 22 (7.5%) preferred to use the textbook in print. Upon adoption of the open textbook in Summer 2016, the campus bookstore placed two OpenStax *U.S. History* texts in stock. Only one of those copies has been sold, leaving the authors to surmise that students who preferred print simply printed the chapters. The Student Government Association (SGA) at the institution subsidizes 50 single-sided or 100 double-sided pages of prints per week, thus students who prefer print were able to do so with little out of pocket expense.

Students were asked to rate aspects of how “easy” the open text book was to acquire, use, read, or study from. Of the 283 students who responded to the question, 90.1% (n=255) strongly agreed or agreed with the statement that the open textbook was easy to acquire; 85.9% (n=243) strongly agreed or agreed that the open textbook was easy to use; 83.4% (n=236) that the open textbook was easy to read; and 71.7% (n=203) that it was easy to study from (Figure 4).

FIGURE 4
Survey responses to question of ease of use of the open textbook

	Strongly agree/agree		Disagree/strongly disagree	
	n	%	n	%
Easy to acquire	255	90.1	28	9.9
Easy to use	243	85.9	40	14.1
Easy to read from	236	83.4	47	16.6
Easy to study from	203	71.7	80	28.3

the course prior to or during the terms where open textbooks were used by this instructor. Further, no statistically significant difference was found between the number of students receiving DFW grades in the open textbook class compared to students using the traditional publisher course textbook. (Figure 2).

Likewise, no statistically significant difference was found with average course GPA when comparing students enrolled in the pre-

FIGURE 3
Average course GPA; pre- and post-OER adoption comparison

Pre-OER adoption			Post-OER adoption		
N	Mean	SD	N	Mean	SD
494	2.85	1.1	418	2.82	1.2

Perceptions

Finally, we explored how students perceived the quality of open textbooks, as well as its credibility, relevance to the course, and support of their performance in the course. First, students were asked how they would rate the quality of free educational materials, in general, as compared to traditional materials (defined as printed or digital materials for purchase). Results were positive, with 73.7% (n=205) of 278 respondents indicating that the quality of OERs are about the same or better. Exploring their perceptions specific to the open history textbook, 85.8% (n=253) strongly agreed or agreed that the textbook was high in quality.

Students also were asked the degree to which they agreed or disagreed with the value statement that the open textbook was credible, relevant to the course, and supported their performance in the course. Of the 283 responses, 83.7% (n=237) strongly agreed or agreed that the textbook was credible, 79.2% (n=224) strongly agreed or agreed that it was relevant to the course, and 66.4% (n=186) strongly agreed or agreed that it supported their performance in the course (**Figure 5**). When asked to elaborate on their answers, students cited convenience, portability, and accessibility as other positive aspects of the digital textbook.

FIGURE 5				
Survey responses to dimensions of open textbook				
	Strongly agree/agree		Disagree/strongly disagree	
	n	%	n	%
Credible	237	83.7	46	16.3
Relevant	224	79.9	59	20.1
Supported performance	186	66.4	97	33.6

Discussion

The primary motivations for the faculty member to adopt the open textbook pertained to course material costs, textbook quality, declining student enrollments, and student evaluation ratings. First, the cost of textbooks does appear to be a barrier to student success. Survey responses suggest that over 50% of students report frequently or occasionally not purchasing a textbook due to cost. Regarding the quality of commercial textbooks as compared to open textbooks, we found that significant savings was realized with no decline in academic performance when using the open textbook. There also has been an uptick in the student ratings of instruction since the open textbook adoption and course enrollments have continued to increase.

And of course, results of the study—along with cost savings of all textbook affordability metrics that we track—were sent to university administrators and campus stakeholders. Initially, savings were reported to pertinent Vice Provosts and Vice Presidents, as well as heads of various academic success units. It wasn't until a Vice Provost forwarded our email to the institutional effectiveness unit that we were invited to report savings for performance funding. Now, several meetings later, we have refined the process to collect additional needed data points and report metrics in support of the “cost of books and supplies,” for Metric 3: Net tuition and fees per 120 credit hours.

Interest continues to grow at the broader institutional level and we have been asked to expand this study to other courses to more fully gauge impact of open textbook adoption on student learning. Ostensibly, this is for the purposes of reporting outcomes for performance funding and legislative reports. And while that is an excellent reason unto itself, an even greater motivator is to more fully understand the role that open textbooks play in student success.