Applying the COUP Framework to a Library-Sourced eTextbook Adoption: A Mixed Methods Study

Lily Dubach, Penny Beile, Sara Duff, Rich Gause, and Amanda Walden

A growing number of studies have reported that using open educational resources benefits students, but few studies have investigated academic impacts of adopting library-sourced eBooks as the course textbook. This mixed-methods study utilizes the Open Education Group's COUP Framework (Cost, Outcomes, Usage, Perceptions), which has previously been used to investigate the impact of OER adoptions, and applies it to the adoption of a library-sourced eBook for a large university course. Results are based on analysis of qualitative data obtained from a student survey and focus group, as well as quantitative student grade point average and drop/fail rates. Findings show that this library-sourced eBook adoption significantly reduced costs for students with no statistically significant impact on student success metrics. Additionally, students reported that cost savings were appreciated and beneficial; they further described the course eBook as high quality, easy to find and use, and supportive of their performance in class. The authors conclude that the potential benefits to students justify the time, cost, and effort expended by the library to facilitate and support eBook adoptions.

Introduction

From January 2000 to December 2021, textbook prices skyrocketed by over 150 percent,[1] significantly above the average inflation rate of 65.5 percent. Likewise, the cost of college tuition and fees rose over 175 percent, compounding the financial challenge for students to attain a college degree. However, over the past five years the steep incline in textbook cost has faltered from its high of over 200 percent in 2017.[2] There are several possible reasons for the slight slowing in price increases. These include national and state legislative efforts to increase textbook price transparency, affordability initiatives, and open education efforts; faculty awareness and interest in opting for low- or zero-cost textbooks and alternatives; as well as librarians and others, such

* *Lily Dubach is Textbook Affordability Librarian, email: lily@ucf.edu; Penny Beile is Librarian Emerita and former Associate Dean of Academic Engagement, email: pbeile@ucf.edu; Sara Duff is Acquisitions and Collection Assessment Librarian, email: sara.duff@ucf.edu; and Rich Gause is a Subject Librarian, email: richg@ucf.edu. Amanda Walden is Associate Lecturer in the School of Global Health Management and Informatics, email: amanda.walden@ucf.edu. All are from the University of Central Florida.* *The authors would like to extend appreciation to Ryan Murphy, Institutional Research Analyst of UCF Institutional Knowledge Management, for providing requested student data.*

as instructional designers, providing services and resources in support of open educational resources (OER) and library-sourced materials creation and adoption.

These efforts to reduce textbook costs can have a significant impact on student success. Wimberly et al. reported that course drop and fail rates have the potential to decrease so significantly that if a fifty-student course transitioned from a $100 textbook to a free resource, one more student would pass the course.[3] Building upon earlier surveys, the Florida Virtual Campus administered a 2022 survey to which over 13,000 college and university students in Florida responded. The survey found that 32.4 percent of students noted they had earned a poor grade due to not being able to afford a textbook and 24.2 percent had dropped a course due to textbook costs.[4]

In 2015 the University of Central Florida (UCF) started a textbook affordability initiative with the goal of reducing textbook costs to positively impact student success. UCF is an urban university in Orlando, Florida, with a Carnegie Classification of Doctoral/Research Universities-Intensive. The institution enjoys over 70,000 enrollments (as of January 2022) and is recognized as one of the largest academic institutions in the United States.[5] In recent years, UCF received designation as a Hispanic Serving Institution,[6] and over 49 percent of enrolled students are minorities.[7] A high percentage of students transfer to UCF,[8] many via the DirectConnect to UCF program[9] which guarantees admission to UCF from partnered state colleges. Further, in the 2021-2022 academic year, 81 percent of students received financial aid or Pell Grants.[10]

UCF's immense size and diversity lends itself to large course sections and students with varied academic and financial needs. Reducing or eliminating the costs of textbooks for courses benefits all students, but it provides additional support for students who are "particularly vulnerable to the effect of spiraling textbook costs,"[11] such as students who might balance multiple responsibilities beyond their educational pursuits—such as family or job responsibilities—or students who rely on financial aid. A core mission of the institution is to provide access to an affordable college degree, and the textbook affordability initiative supports this student-focused mission.

Since the 2015 inception of textbook affordability efforts at UCF, originally led by librarians and instructional designers, a range of institutional departments and offices have joined the effort and Affordable Instructional Materials is now a Provost's Initiative.[12] At UCF, librarians are most actively engaged in supporting adoptions of library-sourced materials to use in lieu of traditional textbooks.[13] Typically, these library materials are electronic books (eBooks) with licenses that permit all students to access the item simultaneously. Not all traditional textbooks are available in this access model, so interested faculty may need to consider switching their previously required textbooks to ones available through the library.

Librarians at UCF can also support OER adoption. Unlike library-sourced digital books, OER are openly licensed[14] so there are no potential digital access restrictions to impede students using the materials. This has made OER popular for textbook affordability efforts and for researchers investigating associated student benefits. Recently, a UCF librarian and two instructional designers examined an American History course that adopted an OER as the required course material.[15] The authors found no negative outcomes associated with students using OER instead of a traditional textbook; in fact, they reported a theme of gratitude from students relating to the benefits of free access to the materials, while academic performance levels were maintained. The study analyzed quantitative, survey, and focus group data across all four strands of the COUP Framework: Cost, Outcomes, Usage, and Perceptions, which

was developed by the Open Education Group to help study the impact of OER adoption on student behaviors and learning.[16]

The present study also utilized the COUP Framework to investigate the adoption and use of a library-sourced eBook in a Medical Terminology course. This course was selected for the study due to its high enrollment, the timing of the eBook adoption, interest from the instructor, and expertise from librarians who assisted with the implementation. This investigation is patterned after the American History course study, the primary difference being a focus on library-sourced eBook rather than OER adoption. The next section describes the course, the instructor, and how the eBook was adopted. The remainder of the paper summarizes relevant literature, outlines this study's methodology and results, and provides discussion on the findings based on the COUP Framework.[17]

Medical Terminology Course

Medical Terminology is a junior-level course with high enrollment: 1,000-1,500 students every fall, spring, and summer semester. The now-online course is managed by the Health Informatics and Information Management program[18] and run by a single primary instructor who creates the materials and sets up the sections. This ensures all students receive the same material and quality of instruction. The primary instructor initially selected a publisher course pack that included video lectures, PowerPoints, and practice opportunities aimed at the practice-intensive nature of learning medical terminology.

Shortly thereafter, the primary instructor was approached to participate in an inclusive access program that provided students an eBook and online course pack at a reduced price. The program was adopted to ensure affordable access for students and to avoid delays due to financial issues. Students could opt-in and the costs would be added to their accounts. However, the instructors frequently experienced technical issues using the inclusive access program, including a semester where the publisher course pack was unavailable for two weeks at the beginning of the semester. An ideal product was eventually identified that came with timely customer support and seamless integration into the university's web-based learning platform.

Although this subsequent product was high quality, instructors still needed to coordinate with several parties and follow up with students, thereby increasing their workload. Medical terminology definitions and concepts do not change often, yet new editions come out frequently, limiting access to older, cheaper editions. The inclusive access program reduced the price, but it remained more expensive than older editions and instructor-created materials.

During the spring 2020 semester, the primary instructor participated in a UCF Libraries Faculty Advisory Committee meeting discussing library-sourced materials and OER, which prompted the course instructor to research current textbooks available as library eBooks. The subject librarian became involved with the purchasing and implementation of a library-sourced eBook for another class in summer 2020.

The success of adopting this library-sourced eBook, along with the struggles of the current medical terminology text and process, prompted a discussion at the beginning of fall 2020 between the instructor and subject librarian about identifying a library-sourced option for the medical terminology course. They identified an acceptable textbook that required OER supplementation to cover core knowledge. Additional materials could be sourced with support from the subject librarian and instructional designer.

The librarian purchased the eBook and adoption was set for spring 2021. To reduce costs, the publisher course pack was eliminated in favor of instructor-created materials. Creating materials required significant time and effort but, because the base knowledge of medical terminology does not often change, the initial effort would result in requiring only occasional maintenance and updates later. This resulted in zero textbook costs for the students.

Literature Review

This literature review builds upon the review completed for the 2020 article, "Analysis of an Open Textbook Adoption in an American History Course."[19] Where the review for the 2020 article focuses solely on impacts of OER adoptions, this review summarizes the existing literature on library-sourced eBook adoptions and includes newer studies on OER where the literature lacks library-sourced eBook equivalents. Three education databases were searched, including Library Literature & Information Science Full Text (H.W. Wilson), Education Source (ProQuest), and LearnTechLib. Google Scholar and the library's Primo Discovery were also used. Key search concepts related to library-sourced eBooks, librarian involvement in textbook affordability, eTextbooks, OER, and faculty-student perceptions using eBooks. Citation linking analysis was also used to help identify additional articles. A search revealed 319 publications that fit the topics, which were further narrowed to nineteen within the date range 2018-2022. The publications are summarized following each strand of the COUP Framework.

Cost

The Cost strand, according to the Open Education Group's COUP Framework[20] explores how OER can impact financial and cost metrics for students and institutions, including the costs of textbooks previously assigned and calculated savings after transitioning to an open textbook; fee models for supporting OER; and changes in tuition revenue due to changes in drop rates, enrollment intensity, and persistence (and subsequent performance-based funding due to those changes). As described below, most research studies reviewed for this article reported on student savings after adoption of free-to-students course materials (both OER and library-sourced), although some studies considered the cost to the library to provide materials and publisher models related to unlimited user eBooks that could be adopted as course textbooks.

Of the reviewed articles, savings for OER adoptions varied in scope and time frame, ranging from one course, to one academic year, to covering the entirety of textbook affordability efforts. Examples include Beile et al.,[21] who reported $109,548 in savings for one course over two semesters at UCF; Delimont et al., at Kansas State University, who noted approximately $425,000 in savings for courses using open and alternative educational resources over an academic year,[22] and Nicholas et al., who found in 2018 that the University of Georgia textbook affordability program had savings of over $3 million since its inception in 2013.[23]

Library-sourced eBook adoptions have likewise reported potential savings, often through the lens of the cost of the program to the library. For example, Raish et al.[24] stated that the Pennsylvania State University library paid $26,343 in licensing fees for eBook titles which saved students between $383,000 and $417,000 each semester. Similarly, East Carolina University library[25] acquired thirty-one potential textbooks for $3,000 which, when added to forty-two eBooks that were part of the existing collection, saved students between $34,292 to $45,994 per semester. A pilot project at the University of North Carolina at Greensboro, which combined the use of OER and library-sourced eBooks with ten mini-grants alloting $1,000 per faculty

member involved in the program, reported saving students $150,120 in fall 2015.[26]

Although library-sourced eBooks could provide a solution to the negative impacts of high-cost course materials, they are not always available for library purchase. Rokusek and Cooke[27] at Florida Gulf Coast University (FGCU), noted that the user access model is important when determining if the eBooks are suitable for course use. FGCU used GOBI to locate eBooks that matched social science textbooks, and found that twenty-seven (17.7 percent) of 152 textbooks offered suitable unlimited-user access or nonlinear (typically 325 or fewer permitted accesses per year) eBooks. Books in unsuitable format (i.e., limited users or print) were about twice as expensive as those with unlimited users, meaning that students would get access to cheaper textbooks (in the $68 range) but still needed to pay for more expensive books. These reports demonstrate that by successfully helping instructors replace traditional textbooks with library-sourced eBooks libraries can play a significant role in reducing the cost of a college education for students.

Outcomes

The COUP Framework's Outcome strand seeks to investigate and provide "empirical evidence about the magnitude and direction of the learning impacts of OER adoption."[28] Similarly, the literature reviewed for this article focused on student grades and course completions—typically accepted student success markers—to measure learning impacts. While published reports predominantly focused on OER rather than library-sourced eBooks, both OER and library-sourced eBook study results were included in this review. Reports of how the cost of course materials influenced academic behaviors and decision-making, as well as (when available) their impact in relation to various demographic variables, are summarized here.

A review of OER efficacy conducted by Hilton III summarized sixteen studies published between 2015-2018.[29] Of those studies, nine reported statistically significant results that favored students using OER, while one study's results favored using commercial textbooks, and the remaining six either reported no statistically significant differences or did not discuss statistical significance. Colvard et al.[30] further analyzed drop/fail/withdraw (DFW) rates and grade point average (GPA) of the nine studies favorable for OER, and found that DFW rate decreased by 2.68 percent, and that A and A- grades increased by 5.50 percent and 7.73 percent, respectively. Part-time students increased their grades by 53.12 percent and their DFW rates decreased by 29.54 percent.

Student self-reports in survey studies also suggest that use of OER or free-to-student course materials may have a positive impact on student learning and success. Spica and Biddix reported that 3.3 percent of students believe that they have failed courses due to not being able to afford course materials, which would have been mitigated by having access to free or low-cost course materials.[31] This aligns with Florida Virtual Campus Survey results, which found that 32.4 percent of students believe they earned a poor grade due to not being able to afford a textbook and that 24.2 percent had dropped a course due to the cost of course materials.[32] Beile et al. also found that 82 percent of students said that they had delayed purchase of a textbook, 60.8 percent had not purchased a textbook, and 25.2 percent took fewer classes due to textbook costs.[33]

Beile et al. further reported that students who are at least partially responsible for purchasing their own course materials are less likely to purchase the textbook, and that they are more likely not to take a course with an expensive textbook than are students who rely

on other means to purchase textbooks (e.g., parents or grants). This finding suggests that financially at-risk students may be more vulnerable to and likely to suffer from high textbook prices.[34] Spica and Biddix likewise found differences in academic performance barriers for low-income students and non-adult learners and went on to add that younger learners are more susceptible to the consequences of course material costs.[35]

As noted in the introduction, Wimberley et al. found that the total minimum costs of required course materials had a significant effect on the percentage of students who pass a course, concluding that if a course with fifty students moved from a one hundred dollar textbook to zero cost course materials, then one more student would pass the course every semester.[36] As they describe, reducing the costs of required course materials "is what meaningfully improves aggregate student success outcomes, regardless of whether the method is OERs, advertising-supported websites, the library purchased digital items or library print reserves."[37] These findings suggest that removing the barrier of the cost of course materials can increase access and academic success and help level the field for students with significant financial needs.

Usage

The Usage strand of the COUP Framework focuses on the unique aspects of OERs that allow faculty to change the content. However, the content of the actual library-sourced eBook was not amended even though the course instructors created supplementary content. Further, the emphasis of this study is on the student experience rather than the faculty's perspective and use; therefore, for the purposes of this review, the usage section describes how students interacted with these course materials.

Existing studies generally reported on preferences between traditional print textbooks and library-sourced eBooks, how students used these eBooks, and issues students may have encountered with accessing eBooks. Most studies stated that, when given an OER or library-sourced eBook option at no cost to students, students overwhelmingly used it instead of the traditional print textbook. Carr et al. noted that 70.8 percent of students used only the libraries' online access, while 13.9 percent used both print and the library-sourced eBook.[38] Delimont et al. found that 89.9 percent of students surveyed used the open/alternative educational resources option.[39] Ratto et al. stated that only 4 percent of students surveyed did not use the library eBook option.[40] Both Su and Chulkov and VanAlstine revealed that students preferred electronic textbooks if cost was their driving decision.[41,42]

The literature also included studies of student usage of eBook features, such as highlighting, text searching, and bookmarking. Beile et al. found that students often were not aware of the various features that online books offered.[43] Hendrix et al. likewise noted that "over one-half of the students (54 percent) did not use any of the e-textbook engagement features," but added that students who used the features identified the text search feature the most useful.[44] In a Rutgers University survey, Todorinova and Wilkinson reported that 55 percent of students stated it was easier to take notes and 48 percent said it was easier to collaborate with other students when using an eBook.[45] From these reports, and as suggested by Roberts et al.,[46] it appears that students find eBook features useful but need further instruction on how to use them.

Perceptions

Within the COUP Framework, Perceptions refers to how faculty and students think and feel about the effectiveness and quality of open resources compared to traditional textbooks.[47]

Library-sourced eBooks often are the same texts already selected by instructors, and students may not recognize or care whether the online text is open or library-sourced, alleviating concerns about content quality and alignment with course objectives. As such, studies investigating student and faculty perceptions about inclusion of library-sourced content in textbook affordability projects reported mostly positive reactions from both students and faculty.

In general, faculty responded positively to library-sourced eBooks and other affordability measures, with occasional reservations about their implementation. Pittsley-Sousa found that faculty surveyed at Eastern Michigan University reported not seeing a significant change in student performance, although 29 percent went on to add that they believed more students were reading the assigned materials. They also noted that students complained less about the cost of textbooks and participating faculty planned to use library eBooks for future courses.[48] Delimont et al. indicated that faculty typically believe that students perform better using OER or free alternatives to commercial textbooks.[49] Carr et al. stated that most of the instructors who responded to the invitation to use library-sourced textbooks were enthusiastic about the project, praising the opportunity to reduce costs for their students. The few instructors who chose not to participate did so due to their concerns about poor image quality, potentially lacking content, access issues, author royalties, and belief that students should own the textbook for future reference.[50]

Two studies were identified that described student perceptions using open or library-sourced course materials. Carr et al. found that 62.5 percent of surveyed students at East Carolina University who used library-sourced eBooks were highly satisfied with the materials, while 23.6 percent were somewhat satisfied, 11.1 percent neutral, and 1.4 percent somewhat dissatisfied and highly dissatisfied, respectively.[51] An analysis of survey responses about the Open and Affordable Textbooks (OAT) program at Rutgers reported that students participating in the program identified improvements in their experience regarding access, reading, note-taking, and collaboration.[52] Further, 69 percent of students surveyed rated their experience as a 4 or 5 on a 5-point scale, with 5 as the highest. In sum, both instructors and students perceived library-sourced eBooks positively with some concerns expressed.

Methodology

This study employed a mixed-methods approach to investigate the impact of a library-sourced eBook adoption on academic behaviors and performance of students enrolled in a Medical Terminology class. Quantitative data requested from the university's Office of Institutional Knowledge Management included demographic information paired with GPA, pass/fail, and withdrawal rates. The data covered two major semesters pre-adoption (spring and fall 2020) and two major semesters post-adoption (spring and fall 2021) of the library-sourced eBook. Qualitative data were collected during the fall 2021 semester through administration of a survey and focus group discussions.

During the fall 2021 semester, all students enrolled in seven course sections of the Medical Terminology course that adopted the library-sourced eBook were invited to complete a survey. The textbook affordability librarian posted survey invitations in Canvas, the institution's learning management platform, with the initial invitation sent during week five and a follow up reminder sent during week eight. Outside of Canvas, students also received email reminders. At the end of the survey, students were invited to register for a subsequent focus group conducted on Zoom.

The survey was created in Qualtrics with questions based on a previous survey at the same institution examining student outcomes and OER.[53] Questions were altered to suit a library-sourced eBook instead of OER, but the survey followed the same categories of questions related to cost, usage, and perceptions. These questions were designed to identify the impact of textbook costs on student decisions and behaviors. Demographic questions were asked to determine how representative the respondents were to course enrollment. Several questions included decision-tree logic and only displayed if certain answers were selected in previous questions. Survey questions and answer choices are available as *Library-Sourced eTextbook Survey Questions* on UCF's institutional repository.[54]

The focus group further explored student responses to the survey. Students who completed the survey were invited to sign up for the voluntary focus group, which offered a free beverage coupon as an incentive. The focus group included three researchers and eight students, who answered semi-structured interview questions. Questions explored the same categories as the survey but were structured to receive more in-depth and nuanced responses. Students were asked about costs, usage, and perceptions of the library-sourced eBook. Focus group questions are available on UCF's institutional repository.[55]

Results

Of the 1,324 students enrolled in the course in fall 2021, 149 students (11.25 percent) responded to the survey. However, none of the survey questions were forced response, excluding the initial question to agree to participate in the study, so the number of replies to each question varies.

Demographic questions were asked to determine how representative survey respondents were compared to all students in the class. Table 1 illustrates that slightly more students who self-identified as Asian or multi-racial responded to the survey than were enrolled in the course, while the reverse was true for those identifying as White/Caucasian. Overall, however, the representation of racial and ethnic backgrounds of survey respondents was comparable to those enrolled in the course.

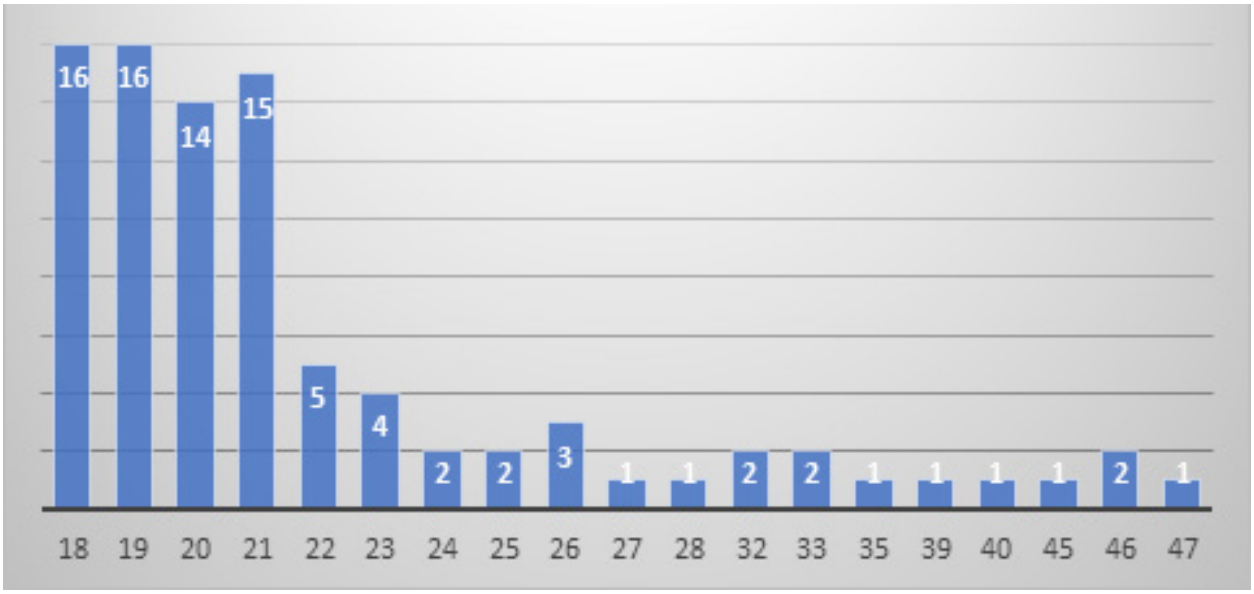
TABLE 1
Race / Ethnic Identification

	Survey Respondents		Medical Terminology Students, Fall 2021	
	n	**%**	**n**	**%**
Asian	12	12.24	132	9.95
Black / African American	15	15.31	192	14.64
Hispanic / Latinx	29	29.59	406	30.65
International	0	0.0	50	3.76
Multi-racial	7	7.14	47	3.54
Native American / Alaska Native	1	1.02	2	0.15
Native Hawaiian / other Pacific Islander	0	0.0	5	0.37
White / Caucasian	33	33.67	482	36.38
Prefer not to answer	1	1.02	8	0.58
Total	**98**	**100.00**	**1,324**	**100.02***

*Rounding error

Students were further compared by age. Age distribution of survey respondents was 82.22 percent (n=74) twenty-five years old or under and 17.78 percent (n=16) over age twenty-five, with an average age of 22.6. This is compared to all student enrollments in the course in fall 2021, which had 90.78 percent (n=1,202) age twenty-five or under and 9.22 percent (n=122) over age twenty-five, with an average age of 21.6. Students who responded to the survey were slightly older than students enrolled in the course (see Figure 1 for age distribution).

FIGURE 1
Age Distribution of Survey Respondents



When comparing gender identities between survey respondents and all students enrolled in the course, survey respondents selected female 81.64 percent (n=80), male 17.34 percent (n=17), and non-binary 1.02 percent (n=1) of the time. The gender distribution of the course for fall 2021 was 72.36 percent (n=958) female and 27.64 percent (n=366) male. Students who identified as female were more likely to respond to the survey than those identifying as male.

As an institution with a large population of transfer students, the enrollment status of students who responded to the survey was of interest. When asked their status of whether transfer student or first time in college (FTIC), 48.98 percent (n=48) of survey respondents answered that they entered UCF as a transfer student compared to 50 percent (n=49) who started their academic career at UCF. One student (1.02 percent) was uncertain about their status. For students enrolled in the course overall, 46.15 percent (n=611) were transfer students, and 53.85 percent (n=713) were FTIC. The percentage of both survey respondents and students enrolled in the course was comparable to the approximate 49 percent transfer and 50 percent FTIC incoming undergraduates at the institution.[56]

Cost

Adoption of a course textbook that is free to students can have financial impacts. These impacts are often tracked as potential savings compared to previously assigned textbooks, as well as the effect that textbook costs have on academic behaviors. This section reports estimated student

savings, a summary of how students noted the cost of textbooks influenced their academic behaviors, and insight into students' other burgeoning financial needs through identification of how savings would be otherwise spent.

The course instructor and co-instructors taught eighteen sections of the Medical Terminology course in the year following adoption of the library-sourced eBook, reaching 3,219 students. The eBook was available for free* and the library online and print copies were available for purchase from the campus bookstore. A total of 129 textbooks were purchased from the bookstore, which equates to approximately 4 percent of student enrollments. The remaining 96 percent of students potentially saved $303,425, calculated by subtracting the actual total cost of purchased textbooks from the probable total cost if all students enrolled in all sections purchased the textbook. It is important to note that these are *potential* savings, as students likely purchased or rented copies from stores beyond the campus bookstore or may have shared or acquired other free versions of the textbook beyond the library. Not all purchases, rentals, or free options are accounted for in this estimation.

When asked how textbook costs have influenced their academic decision-making, more than two-thirds of students (68.7 percent, n=68) who responded to the question indicated that they had not purchased a textbook due to cost. This rose to 78.8 percent (n=78) for those who have delayed purchasing a textbook due to cost, followed by sharing a textbook (49.5 percent, n=49), taking fewer courses (27.3 percent, n=27), and not taking a course (22.5 percent, n=22). The Florida Virtual Campus Survey investigated similar questions, finding that 53 percent of student respondents (n=7,314) reported not purchasing a textbook, 44 percent (n=6,072) taking fewer courses, 38 percent (n=5,244) not registering for a specific course, and 24 percent (n=3,312) dropping a course due to textbook costs.[57] Table 2 provides summary data of the impact of textbook costs on students' academic behaviors.

Students also were asked who pays for their tuition and for their textbooks, with options ranging from self, parents or other family members, scholarships/grants, and financial aid/loans. Multiple responses were allowed. Scholarships were relied upon the most to pay tuition, followed by financial aid, students, then parents. However, the responsibility for paying for

TABLE 2
Impact of Textbook Costs on Student Academic Behaviors

Have you ever:	Yes		No		Prefer Not to Answer		Total
	n	%	n	%	n	%	
Not purchased a textbook due to cost?	68	68.69	31	31.31	0	0.00	100.00
Delayed purchasing a textbook due to cost?	78	78.79	21	21.21	0	0.00	100.00
Shared a textbook with a peer due to cost?	49	49.49	48	48.49	2	2.02	100.00
Taken fewer courses in a semester due to cost?	27	27.27	71	71.72	1	1.01	100.00
Not taken a course because textbooks were too expensive	22	22.47	75	76.52	1	1.01	100.00

* It is important to note that, although a library-sourced eBook is free to students, there were initial costs related to both time and money for selecting and purchasing the eBook. The purchase price for this specific eBook was $127.81 of library funds. The time it took the librarian to investigate options, communicate with the faculty member, and select the eBook accounted for approximately twelve hours of librarian time. Beyond this, it is critical to consider the amount of time it took the faculty member to overhaul the course and create assignments to suit the new material, estimated to take upwards of 160 hours.

TABLE 3
Purchasing Responsibility for Tuition Compared to Textbooks (Multiple Responses Allowed)

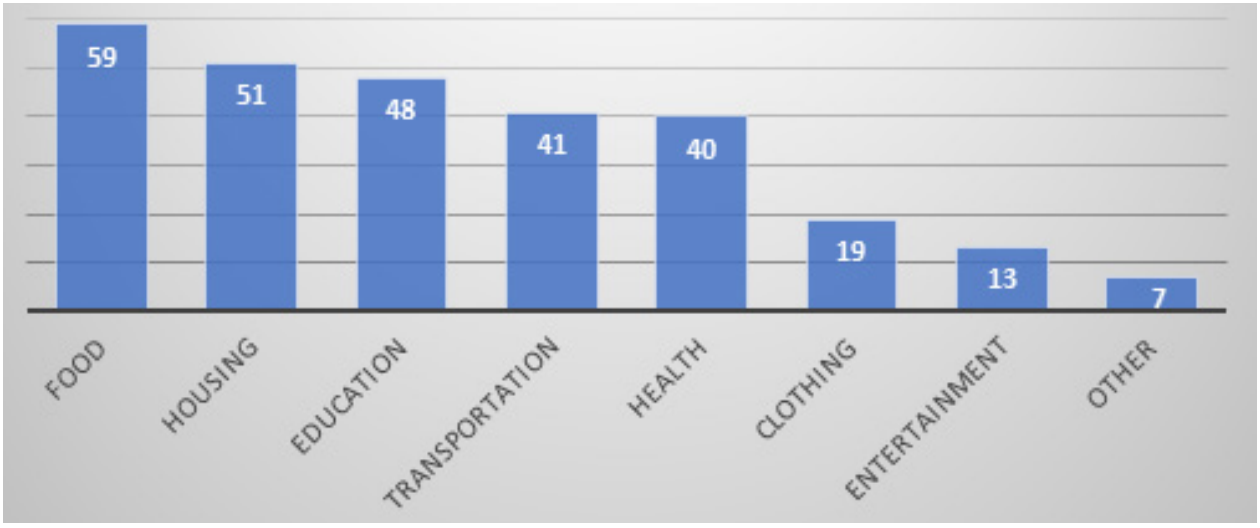
	Tuition		Textbooks	
	n	%	n	%
Students/"Self"	40	24.54	57	37.25
Parents or Family Members	25	15.34	27	17.65
Scholarships/Grants	55	33.74	44	28.76
Financial Aid/Loans	42	25.77	24	15.69
Other	1	0.61	1	0.66
Total	163	100.00	153	100.00

textbooks shifted to students, followed by scholarships, parents, then financial aid. As illustrated in Table 3, students bore full or partial responsibility for paying tuition 24.54 percent of the time, increasing to 37.25 percent for textbooks.

A chi-square test of independence was conducted to examine the relationship between who pays for textbooks and how it affected decisions to not purchase a course textbook, delay purchase of the textbook, take fewer courses in a semester, or not take a course due to the cost of textbooks. The relationship between how textbooks are paid for and not purchasing a textbook was statistically significant at the .01 level ($x2 = 53.97$, 8 df, $p < .01$), as was delaying purchase of a textbook ($x2 = 50.62$, 8 df, $p < .01$), taking fewer courses in a semester ($x2 = 64.86$, 12 df, $p < .01$), and not taking a course due to the cost of textbooks ($x2 = 34.5$, 12 df, $p < .01$). The 37 percent of students who were at least partially responsible for purchasing their own textbooks were less likely to purchase a course textbook, and were more likely to delay purchasing a textbook, take fewer courses in a semester, or not take a course due to the cost of a textbook than students who rely on other sources for purchasing their textbooks.

To explore how free or low-cost textbooks could alleviate other financial needs, students were asked, "If all your textbooks were free, how would you spend the saved money?" with multiple responses allowed. As indicated in Figure 2, students responded that textbook savings would first go toward food, then housing, additional credit hours, transportation, and

FIGURE 2
Potential Textbook Savings Expenditures



health, with clothing, entertainment, and "other" markedly lower. The "other" response allowed comments, with respondents noting saved funds would be directed to savings, other bills, and childcare fees. Focus group attendees likewise agreed that purchasing food was their top priority, but also mentioned items that would assist with education. One student stated, "I'd probably prefer to pay for food or bills than textbooks. My parents and I pay for my textbooks out of pocket; the scholarships I have don't cover textbook costs." Related to how scholarships often do not cover textbook costs, students also agreed that textbook costs can significantly impact the loan debt that students may carry after graduation, with one adding that textbook costs might be "at least 30 percent of loans because of the ridiculous astronomical costs of books."

Outcomes

Academic outcomes are frequently analyzed to investigate whether adopting a different or free-to-students textbook impacts student learning and academic success. In this case, a traditional textbook sourced from a textbook publisher was replaced by a library-sourced eBook. Widely recognized student success markers often include pass, fail, and withdrawal rates, as well as average end-of-semester GPA. Performance on each of these indicators was compared before and after adoption of the library-sourced eBook.

Student data from the two major semesters prior to adoption of the library-sourced eBook (spring and fall 2020) were aggregated and compared to aggregated student data from the two major semesters after adoption (spring and fall 2021). Following the Drop/Add period, a total of 2,567 students were enrolled in the course during the two major terms prior to implementation of the eBook and are included in analysis. Comparably, 2,517 students remained in the course after Drop/Add during the two major terms following adoption of the library-sourced eBook. The impact of the library-sourced eBook adoption was investigated by analyzing the two groups (pre- and post-adoption) on the student academic success markers of pass/fail/withdrawal rates at the end of the semester and average end-of-semester course GPA. Pass rate is the number of students who receive a course grade of A, B, C, or D, while Fail is the number of students receiving a failing grade of F. Withdrawal is the number of students who withdrew from the course after the Add/Drop deadline. Withdrawal rates can serve as an indicator of course persistence, while Pass and Fail rates are generally accepted as indicators of student performance in the course, as is course GPA.

A comparison of Pass/Fail rates between groups was conducted using a chi-square test of independence and no statistically significant difference was seen between students who paid for a traditional textbook when compared to those who had access to the library-sourced

TABLE 4
Pass, Fail, and Withdrawal Rates of Students Enrolled in Course; Traditional Textbook Compared to Library-Sourced eBook

	Traditional Textbook		Library-Sourced eBook	
	n	%	n	%
Pass rate (A, B, C, or D grade)	2,538	98.87	2,486	98.77
Fail rate (F grade)	16	0.62	22	0.87
Withdrawal rate	13	0.51	9	0.36
Total	2,567	100.00	2,517	100.00

eBook, $x2(1, N=5,062) = 1.068$, $p=0.30$. Further, no statistically significant difference was found between the number of students who withdrew from the course when comparing the two major semesters before and after adoption of the library-sourced textbook, $x2(1, N=5,084) = .654$, $p=0.42$ (see Table 4).

Likewise, no statistically significant difference was found with average end-of-semester course GPA when comparing students enrolled in the classes using the traditional textbook compared to those using the library-sourced eBook, $x2(4, N=5,062) = 8.151$, $p=0.09$ (see Table 5). In sum, no changes in student academic outcomes were noted that could be attributed to adoption of the library-sourced eBook. Students who used the library-sourced eBook performed equally well as students using the traditional textbook.

TABLE 5
Average Course GPA of Students Enrolled in Course; Traditional Textbook Compared to Library-Sourced eBook

Traditional Textbook			Library-Sourced eBook		
N	**mean**	**SD**	**n**	**mean**	**SD**
2,554	3.91	.44	2,508	3.88	.52

Usage

The Usage strand from the COUP Framework is defined as the degree to which faculty and students exercise the permissions offered by the OER and how this use impacts student learning. However, the library-sourced eBook used was a fixed medium, electronic publication supplemented with additional course materials. As such, this study explored the Usage strand from the perspective of how students learned about the library-sourced eBook option, as well as their experience related to locating and accessing it, and ease of use for reading, taking notes, and studying.

To begin the survey, students were asked whether they used the assigned textbook for the course, to which 90.1 percent (n=128) responded that they did, while 9.9 percent (n=14) did not. Students who used the text were then asked whether they used the default option of free online library eBook or another alternative, such as an electronic or print copy accessed in another way. Of the 128 students who used the assigned textbook, 84.4 percent (n=108) used the free online library eBook, 3.9 percent (n=5) purchased an electronic copy, 7.0 percent (n=9) purchased a print copy, and 4.7 percent (n=6) accessed a free electronic version from another source. No students who attended the focus group purchased a textbook, but one student noted they had found and used a free PDF version online that was easier to access and use than the library-sourced eBook.

Students who purchased an electronic copy did so because they did not know a free version was available from the library (40 percent, n=2), wanted to keep the book as a reference for later (20 percent, n=1), or did not find the library-sourced version acceptable, with one indicating the book was hard to access and use and another noting that the platform said the book was "only free for the first two weeks" (40 percent, n=2). Similarly, students who accessed a free electronic version of the eBook from another source did so due to not knowing a free version was available (33.3 percent, n=2), wanting to keep the text as a reference for later (33.3 percent, n=2), or seeking increased functionality on their e-reader or computer (33.3 percent, n=2). The nine students who purchased a print copy added that they did so

because they preferred studying from a hard copy (55.6 percent, n=5), did not know a free version was available (33.3 percent, n=3), or wanted to keep the print copy as a reference for later (11.1 percent, n=1).

As several survey respondents noted that they did not know a free textbook was available, the focus group further explored this topic. When asked when they discovered the textbook was available for free, students noted a variety of communication overtures, including a campus bookstore textbook search, information seen in the syllabus, and via email sent by the professor. All attendees added that they would like to see the free textbook option when searching and registering for classes.

Overall, students generally agreed that the library-sourced eBook was easy to find (96.80 percent, n=91), to use (94.68 percent, n=89), to read (92.56 percent, n=87), and to study from (86.18 percent, n=81) (see Table 6 for a summary of responses). However, the number of Strongly Agree/Agree responses declined for "easy to study from," prompting the authors to explore this more in a focus group setting. When students discussed how they read and studied from the eBook, a common theme of reading the eBook online initially and then downloading the eBook so notes could be taken and the text highlighted emerged. Several students, however, mentioned that they did not know about the ability to download chapters. This lack of knowledge led librarians to create a how-to video mid-semester addressing this functionality.

TABLE 6
Student Responses Regarding Ease of Use of the Library-Sourced eBook

	Strongly Agree/ Agree		Neither Agree nor Disagree		Disagree/Strongly Disagree		Total
	n	%	n	%	n	%	%
Easy to find	91	96.80	3	3.20	0	0	100.00
Easy to use	89	94.68	2	2.13	3	3.19	100.00
Easy to read	87	92.56	1	1.06	6	6.38	100.00
Easy to study from	81	86.18	6	6.38	7	7.44	100.00

When asked what features students most preferred about using the eBook, most students cited portability and the word search function for looking for quiz terms. Students also were asked what improvements they would suggest, with responses primarily related to addressing technical challenges. Overwhelmingly, students pointed out that the graphical resolution was especially problematic, while others added that they had issues with downloading the book or book chapters, and that the user interface was clunky and in need of updating. Focus group students likewise complained about resolution of images and graphics, but everyone agreed that the issue was not impactful enough to make them purchase a print copy. All students who attended the focus group session indicated that, based on this experience, they would be on the lookout for other courses that offer free online textbooks.

Perceptions

The COUP Framework defines the Perceptions strand as what faculty and students think and feel about OER, especially compared to traditional textbooks. The current study investigated perceptions of a library-sourced eBook rather than an OER and focused on student perceptions rather than faculty perceptions.

To arrive at general perceptions of quality, students were asked to rate the quality of free educational materials available online when compared to traditional materials (defined as printed or digital materials for purchase). Results were positive, with 64 percent (n=64) of one hundred respondents indicating that the quality of free online materials was about the same or better and 25 percent (n=25) noting the quality was about the same. Of the remaining, 5 percent (n=5) thought free online materials were slightly worse and 6 percent (n=6) did not feel they were familiar enough with free online materials to answer the question.

When asked to elaborate upon their responses, students tended to comment on aspects such as expanded access and usability that free online course materials can provide. Most comments about the quality of free educational materials were positive. For example, students noted that it was difficult to differentiate them from traditional materials, and added observations such as: "thankfully the free educational materials I have used online have been about the same quality as purchased resources, which has been a huge plus since they are free;" "usually quality is the same and we're just paying for the homework or lab codes;" and "I can say this would be my second class using a free textbook and both were about the same or slightly better than a digital textbook I had to pay for in other classes. This free textbook did not cut corners in any way in terms of content, how it is structured and all the way down to the details of the headings, etc." The students who indicated that the quality of free materials tends to be subpar pointed out technical aspects like contending with blurry words and graphics and not having audio that some eBooks provide.

Students who focused on access cited the convenience of using eBooks, accessible anytime, anywhere, and freedom from contending with a large, print textbook. One student commented that "there are advantages of having educational material online, such as accessibility. I am a disabled veteran with spinal injuries and not having to lug around heavy materials helps. Also being able to access the entire book from the internet gives me range in my schedule. I would hope that all courses offer free digital course materials in the future." Similarly, comments about usability of free educational materials online tended to be in comparison to print rather than free versus paid, with students citing the ability to change font, spacing, zoom, and transfer among devices as positives, leading one student to comment, "I believe the free education materials online is (sic) easier to navigate. If needing to search a specific term you can simply just type it in."

Exploring student perceptions of quality specific to the library-sourced eBook, 79 percent (n=75) strongly agreed or agreed that the eBook was high in quality, 12.6 percent (n=12) neither agreed nor disagreed, and 8.4 percent (n=8) disagreed or strongly disagreed. The dimensions of credibility, value, and relevance enjoyed even higher scores. The slightly lower rating for quality may be attributed to low image quality pointed out earlier by students. Focus group attendees added that the free eBook positively influenced their perception of the class and thought it reflected well on the professor for making the effort to ensure that students had access to the materials they need. One student commented that open textbooks (OER) can sometimes be lacking in quality, but that was not seen with this eBook. See Table 7 for a summary of student ratings for worth dimensions of quality, credibility, value, and relevance of the library-sourced eBook. Credibility, value, and relevance each received ratings of over 95 percent, leading researchers to surmise that students perceived these dimensions on par or better than traditional textbooks.

TABLE 7
Student Perceptions of the Library-Sourced eBook: Worth Dimensions

	Strongly Agree/ Agree		Neither Agree nor Disagree		Disagree/Strongly Disagree		Total %
	n	%	n	%	n	%	
Quality	75	78.95	12	12.63	8	8.42	100.00
Credibility	92	97.87	2	2.13	0	0	100.00
Value	90	95.75	3	3.19	1	1.06	100.00
Relevance	90	95.75	3	3.19	1	1.06	100.00

Finally, students were asked to rate the effectiveness of the library-sourced eBook in supporting their learning in the class, with 97.88 percent (n=92) of students agreeing or strongly agreeing that the eBook supported their performance in the course, 96.81 percent (n=91) that it prepared them for quizzes and exams, 93.68 percent (n=89) that it increased their learning about the subject, 87.10 percent (n=81) that the eBook increased their interest in the subject, 84.04 percent (n=79) that it increased their enjoyment of the class, 81.94 percent (n=77) that it encouraged them to think about content in a new way, and 73.40 percent (n=69) that the eBook challenged the way they thought about the course. Table 8 provides a summary of student ratings on these learning dimensions based on use of the library-soured eBook.

TABLE 8
Student Perceptions of the Library-Sourced eBook: Learning Dimensions

	Strongly Agree/Agree		Neither Agree nor Disagree		Disagree/ Strongly Disagree		Total %
	n	%	n	%	n	%	
Supported performance in course	92	97.88	1	1.06	1	1.06	100.00
Prepared me for quizzes and exams	91	96.81	1	1.06	2	2.13	100.00
Increased my interest in the subject	81	87.10	9	9.68	3	3.22	100.00
Increased my learning about the subject	89	93.68	4	4.21	2	2.11	100.00
Increased my enjoyment of the class	79	84.04	11	11.70	4	4.26	100.00
Encouraged me to think about content in a new way	77	81.94	12	12.73	5	5.33	100.00
Challenged the way I think	69	73.40	18	19.15	7	7.45	100.00

Limitations

Although the demographics of the survey respondents were very similar to the demographics of students enrolled in the course, only 11.25 percent of students responded to the survey. This smaller sample size may indicate that the results are not representative of all students enrolled in the course. Because the survey was entirely optional, it is possible that students with more extreme experiences or opinions completed the survey, possibly skewing the results.

Discussion

The Medical Terminology course instructor, working in tandem with librarians, successfully adopted a free-to-students library-sourced eBook in lieu of a traditional textbook. A significant

number of students who responded to the survey noted that, due to textbook costs, they had previously delayed purchasing, not purchased, or shared a textbook, and some had taken fewer courses or not taken a course. Access to the library-sourced eBook reduced the need to make these potentially negative academic decisions for students enrolled in the Medical Terminology course. In this investigation, there was no statistically significant change to the pass, fail, and withdrawal rates nor the end-of-semester course GPA after adoption of the library-sourced eBook, although the GPA of students prior to the adoption of the eBook was high at 3.91, making the average difficult to improve upon. It was estimated that the library-sourced eBook saved these students $303,425 in 2021 alone.

Even though this study did not reveal improvements to academic outcomes, it is possible that, over time, continued and broader access to free textbooks could improve average GPA and shorten time to graduation. As noted in the literature review, Hilton III's summary of studies showed positive academic outcomes in most cases.[58] Further, some students in this Medical Terminology course noted that they would spend textbook savings on increased credit hours, in turn shortening time to graduation, which is another positive outcome to both students and academic institutions with access to free or low-cost course materials. If other librarians wish to pursue a study of this type, they might consider doing so with a course with a broader grade distribution or more grade variability, which may allow impact on course GPA to be more easily discernible. It is plausible that the more expensive the traditional textbook is, the more likely it will be for students to engage in negative academic behaviors. For example, students may be more likely to purchase a thirty dollar textbook than a textbook that costs $150. Like grade variability, exploring a free-to-students textbook adoption may reveal more impact if the cost of the traditional textbook is more expensive.

While tuition tends to be paid by scholarships and loans, this study found that the responsibility of paying for textbooks tends to fall to students. Analysis suggests that students who were responsible for purchasing their own textbooks were more likely to avoid or delay purchase of a textbook, take fewer courses, or not take a course than students who rely on other means to pay for textbooks. Although financial aid status was not analyzed, it is probable that students who are more financially "at risk" are more likely to engage in those behaviors, which may have a negative impact on their academic performance. Providing free-to-students textbooks, whether OER or library-sourced, then becomes an issue of access and equity. In the long-term, some students indicated that textbook costs could significantly increase their debt, and free or low-cost textbooks can reduce that burden.

Survey results suggested that students overwhelmingly felt positive about the textbook itself. Not only did they rate the library-sourced eBook as generally easy to find, use, read, and study from, they added that it supported their performance, prepared them for assessments, and increased their interest in the subject overall. The positive survey responses align with the consistent feedback the instructor receives from students each semester after adopting the library-sourced eBook. This underscores the importance of selecting high quality course materials that align with course objectives and student learning outcomes when identifying potential OER or library-sourced eBooks.

However, students also were quick to acknowledge a variety of user access and technical issues. User access issues were of two types and included limitations associated with downloading chapters or maintaining digital checkout periods, in addition to students simply not being familiar with eBook functionality. The issue with digital checkout periods was due to

the eBook's digital rights management (DRM). Full eBook downloads had to be read in Adobe Digital Editions or related software; students could borrow the eBook for up to twenty-one days at a time, after which students could immediately download the eBook again. Unfortunately, this twenty-one-day limit happened in conjunction with the first exam of the course, which added confusion for students on how to gain access to the eBook again. Had it been clearer to the students that they could download PDF chapters that would not expire, this issue could have been mitigated. Other technical issues most often related to poor quality of eBook images, particularly when magnified. This research project gave librarians insight into how students attempt to solve eBook issues, with many preferring to first attempt to solve them on their own and then by reaching out to the course instructor, who in turn contacted the library for assistance. Rarely did students contact the library directly about access or technical issues.

Considering that students appeared to prefer to figure out eBook platforms on their own, librarians should anticipate this and address potential questions by working with instructors to add videos, guides, or other instructional content to courses for students to access when needed, even when libraries are closed. Further, in addition to providing information on basic eBook functionality, librarians should describe more advanced study features, such as highlighting or notes, so that students are aware of these eBook capabilities. Finally, when those resources are insufficient for addressing student needs, librarians should ensure that students know how to engage with the library for further assistance.

Beyond teaching the students how to use eBook features, it may also be possible for librarians to adjust settings for the eBooks themselves. For example, when the issue arose, the acquisitions librarian was able to increase the checkout time for a whole-book download, ensuring that students would not lose access during critical periods of the semester. Of course, librarians should opt for DRM-free eBooks whenever possible to proactively mitigate potential access issues. If a DRM-free option is unavailable, or if the library wants to ensure the students know how to use the eBook, then information on how to negotiate these issues can be added to instructional materials. Regarding technical issues, such as poor image quality, librarians can reach out to platform or publisher representatives to try to address the problems or suggest supplemental material.

Unanticipated outcomes of the initiative were the emerging relationships between librarians and course instructors, course instructors and students, and students and librarians. This research project, and the communication leading up to it, led to a greater understanding between the instructor and the subject librarian about the functions and benefits of library eBooks. The instructor then had an opportunity to provide the subject librarian a deeper view of the course and issues the students encountered. The findings from this research project provided evidence that the course instructors can now bring to other faculty to illustrate benefits to students and how to mitigate potential issues associated with adoption of a library-sourced eBook. Faculty may be more receptive to switching to a similar option if they hear a success story from a peer.

In this study, the COUP Framework, which was developed to explore impacts of OER adoption on student outcomes, was successfully applied to a library-sourced eBook adoption and investigation. Study results have been shared in a variety of ways on campus: to communicate to university administrators the impact of the adoption on student outcomes and experiences and the library's role in supporting student success and efforts to decrease the cost of a college education; as a way of partnering with course faculty to consider adopting,

implementing, and investigating the impact of library-sourced eBook adoptions; and to engage with students and directly support their academic success. As faculty and librarians continue to provide library-sourced and OER course materials, free-to-student textbooks may result in improved student outcomes through cost savings and immediate access to required course content. While significant cost was involved, both in personnel and purchasing or developing materials, the instructors and librarians deemed the effort worth pursuing because of the potential benefits to students.

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