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Article

Do OER Textbooks Have Value Beyond Cost Savings?

An Analysis of Student Attitudes and Faculty Teaching Strategies in an American University

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Abstract

The study examines the use of Open Educational Resource (OER) textbooks by 704 students in nine courses at an American public research university. It seeks to better understand the effectiveness of OER in comparison to traditional textbooks by surveying how often students read OER texts and examining how instructors in the courses are teaching using OER. The study found an alarming trend: the impact of OER has been limited because of students not reading assigned textbooks and instructors not actively teaching with them. This may be reflective of a phenomenon not previously noticed by OER researchers—high textbook prices causing many instructors to abandon serious use of required texts while students are still painfully purchasing them. This causes students to develop a habit of not reading textbooks. Findings of the study suggest that the frequency with which students use required texts, their attitudes towards textbooks, and how instructors are teaching with OER are important factors in assessing the effectiveness of OER that go beyond cost savings.

Note: In accordance with the conditions of the Institutional Review Board approval for this project, which stipulates that the identities of the instructors whose courses have been surveyed and their students must be protected, the institution studied will not be disclosed

Introduction

Undergraduate textbooks have become the fastest growing college expense in the last two decades (United States Bureau of Statistics, 2016). Coping with rising textbook prices, many students now forgo purchasing required works for their courses, or delay purchasing them to search for cheaper prices (Wakefield Research, 2018, p. 1; National Association of College Stores, 2021). Responding to this

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development, many instructors have switched to Open Educational Resources (OER), online textbooks that are free for students. A growing body of research literature has also attempted to examine the impact of OER on student learning (Illowsky et al., 2016; Watson, Domizi & Clouser, 2017; Ikahihifo et al., 2017; Lawrence & Lester, 2018; Jhangiani et al., 2018; Clinton, 2018; Grissett & Huffman, 2019).

However, studies of OER effectiveness have often overlooked one major issue, a decline in student use of textbooks. Research in the last two decades (Podolefsky & Finklestein, 2006; Berry et al., 2011; Starcher & Proffitt, 2013; Juban & Lopez, 2013; French et al., 2015; Gammerdinger & Kocher, 2018) have revealed that most undergraduates, including 82% of students surveyed in one study (Berry et al., 2011, 34), don't regularly complete assigned and required readings in their courses. In fact, there is a debate among scholars who study the subject on whether textbooks are important in undergraduate teaching. Whether this trend is related to high textbook prices and if OER texts can help improve student learning in this situation have not been explored. This study seeks to address the issue through an analysis of survey data from 704 undergraduate students who used OER in 2019 at a large public research university in the southern United States.1 Adding a critical perspective to studies on the effectiveness of OER materials, it applies methods used by studies on student textbook reading. The study reveals that the impact OER may have on student learning is limited due to many students not actively using assigned texts and instructors not using textbooks heavily in their teaching.

Literature Review

Findings from studies on student textbook use can be insightful for research on OER effectiveness in several ways. Like advocates of OER, researchers on the subject are also strongly concerned about rising textbook prices (Berry et al., p. 31; Juban & Lopez, p. 325; Gammerdinger & Kocher, p. 1). While OER advocates have sought to address this problem by replacing traditional texts with free alternatives, researchers on student textbook reading have questioned the relevance of using increasingly expensive assigned readings by examining whether students benefit from using them. They have also worked to develop strategies to make students effectively use textbooks to improve their learning.

Studies on student textbook reading are also skeptical on whether the inability to purchase textbooks is a major factor behind students not using them. Some have pointed to cases where student textbook use was low even though almost all students could afford required works (Starcher & Proffitt, p. 400-401; Podolefsky & Finklestein, 2006, p. 338-341). They, instead, viewed the subject primarily as a matter of student motivation and the role played by instructors in fostering student reading of assigned texts. Studies highlight issues such as students' poor reading strategies, failure of instructors to teach these strategies, and their inadequate emphasis on textbook use in teaching as the main factors discouraging students from reading assigned texts (Starcher & Proffitt, p. 405; French et al., p. 176-177). Researchers on the topic generally fall into two groups. One group, which is more optimistic, has highlighted data showing that students do see value in reading the textbook, even if they don't, and that certain strategies by instructors can encourage them to read (Berry et al., p. 37-38; Kerr & Frese, p. 28-29). The other,

which is more pessimistic, has often pointed to cases where students do not complete readings, even when instructors are actively encouraging them to do so. They have raised doubts on the value of textbooks (Juban & Lopez, p. 330).

These findings are important to research about OER textbook effectiveness because many OER studies have simply assumed that giving students access to free texts would improve their learning. They have sought to measure the effectiveness of OER works primarily by comparing student grades in courses that use OER with those taught using traditional texts, particularly among students who have struggled to purchase textbooks, such as those from low income families, under-represented backgrounds (African American, Hispanic/Latino, American Indian, Alaskan Native, Pacific Islander and mixed race), and first-generation students (Lawrence & Lester, p. 559-560; Jhangiani et al., p. 8-9; Colvard, Watson & Park, p. 264-266; Grissett & Huffman, p. 26). These studies also surveyed how students feel about OER works compared to traditional textbooks. They discovered that students prefer OER more since these books are cost free and have often used this to claim that OER benefitted student learning (Illowsky et al., p. 269-270; Watson, Domizi & Clouser, p. 293-294; Ikahihifo et al., p.131; Clinton, p. 183-184).

However, studies on OER impact overall have found that using OER textbooks did not lead to changes in student grades (Hilton, 2020, p. 869), even if students prefer these books over traditional ones. Studies have also not shown that using OER texts necessarily results in more students actually using the assigned materials. In fact, some studies have noted that at times OER can even lead to fewer students using required texts (Hendricks, Reinsberg & Rieger, p. 90; Grissett & Huffman, p. 28-29; Lawrence & Lester, p. 559). Causes for this have never been thoroughly studied.

Studies have also noted that students in certain STEM subjects, like mathematics, did not like reading required texts. Kersey (2019) argues that STEM courses are focused on having students solve equation-based questions. They also use online homework systems, interactive digital learning tools that provide quick explanations to questions and their connections to course concepts. Kersey surmises that quick explanations provided by online homework may make students feel that reading textbooks is unengaging and unnecessary. Basing his assumption on a survey of students in two STEM courses, one using a traditional and another using an OER textbook, he notes that students in general felt that reading textbooks did not benefit their learning and preferred to use more interactive learning materials like homework systems. Using an OER textbook in one course did not change this mindset among students or lead to more use of the class textbook (p. 253-257).

These discoveries raise questions about the extent that OER, as well as textbooks in general, are responsible for student success. Studies on OER impact have also not given much attention to the role played by instructors in encouraging students to use OER works or how important textbooks are to their teaching. Many have assumed that instructors would want to structure their courses around textbooks, making assignments and lectures closely connected to a book. OER advocates often highlight the advantage of OER texts over traditional works by noting that the former can be modified and selectively used to make them more relevant to specific courses (Hendricks, Reinsberg & Rieger, p. 90). Whether

instructors still build their courses around textbooks has not been tested, and studies have not explored the effectiveness of strategies used by instructors to encourage student use of assigned texts. Neither have they explored if online homework systems are changing the way instructors teach and the importance they place on textbooks.

However, studies on student textbook use also have limitations. Though they have questioned whether the ability to purchase required texts is a major reason behind students not using these works, these studies have not examined if students who cannot afford or frequently delay purchasing textbooks are reading less compared to others. There is a need to compare the behavior of certain student demographics, such as students who have difficulty purchasing textbooks versus those who do not; students in STEM courses, where textbooks are more expensive versus non-STEM students; and upper level (3rd and 4th year) students, who may have learned to skip purchasing assigned texts to cope with high prices versus lower level (1st and 2nd year) students who may be more likely to purchase the assigned text, regardless of cost. A comparison between these student demographics could help examine if high textbooks prices are having an impact on reading of required works by disadvantaged groups, and if using OER as opposed to traditional textbooks improves the amount of reading that students do.

This study is a preliminary exploration, applying methods from studies on student textbook use to investigate how students are using OER, with the aim of broadening the perspective of OER impact studies. It seeks to generate questions for further research rather than drawing definitive conclusions. Study findings taken from one institution are not necessarily applicable to many other institutions, whose student learning habits and faculty instructional strategies could be different. However, an examination of students at one institution could help uncover factors and issues behind student use of OER for researchers to consider and refine larger understandings on how to make OER more effective.

Methods

Survey

The study was conducted by the libraries of the institution studied to evaluate the impact of its OER stipends program, which provides financial compensation to faculty each year to replace traditional textbooks and learning resources with OER materials in one of their courses. It was approved by the university's Institutional Review Board, and surveyed students in nine courses that were taught at the institution in fall 2019 using OER textbooks (Table 1):

Table 1:
Courses surveyed

Course	Description
PHYS 1.	Course on physics for lower-level undergraduate students. (STEM)
PHYS 2.	Course on physics for lower-level undergraduate students. (STEM)
MATH 1.	Course on calculus for lower-level undergraduate students. (STEM)
MATH 2.	Course on algebra for upper-level undergraduate students. (STEM)
COMP	Course on computer programming for upper-level undergraduate students. (STEM)
SOC	Course on sociology for lower-level undergraduate students. (Non-STEM)
ENG 1.	English course for upper-level undergraduate students. (Non-STEM)
ENG 2.	English course for upper-level undergraduate students. (Non-STEM)
EDUC	Education course for upper-level undergraduate students. (Non-STEM)

All these courses were delivered in face-to-face format, which was representative of most courses taught at the institution and most other institutions in the United States during the time of the study. Instructors of these courses were OER stipend recipients who were willing to adopt OER texts in their teaching. The purpose of the stipends is to incentivize instructors to select and use low- or no-cost texts. The instructors were selected because they previously taught using very expensive traditional materials for their subjects, ranging from $100-$235. The instructors were asked to give their students a written survey questionnaire as a condition for receiving stipends (Figure 1.):

Figure 1
Survey questionnaire

1. How often do you purchase textbooks for your courses?
    a. Response options: All or most of the time; sometimes; little to none
2. For students who purchase textbooks always or most of the time: Why do you purchase textbooks (Please select all that apply)?

    a. Response options: Having textbooks are essential to completing the course or doing well in it; Instructors told you to do so; Other, please explain (free response option)
3. For students who purchase textbooks sometimes, a little, or none: Why do you not purchase textbooks?
    a. Response options: Unable to afford them; I do not feel they are useful to my learning; I can pass or do well in a course without them; Other, please explain (A free response option)
4. How often do you delay purchasing textbooks?
    a. Response options: All or most of the time; sometimes; little to none
5. Please choose the range that best represents your household/family's income
    a. Response options: Under $50,000; $50,000-$100,000; over $100,000
6. Are you a:
    a. Response options: Lower level: freshman or sophomore; Higher level: junior or senior
7. With which of the following racial/ethnic groups (from the US Census categories below) do you identify? (Students from underrepresented backgrounds were identified from results)
8. Are you a first-generation student?
    a. Response options: Yes/No
9. How often do you use the textbooks that you purchase?
    a. Response options: Quite a bit or always; moderately; a little or none
10. How often have you used the free textbook for your course?
    a. Response options: Quite a bit or always; moderately; a little or none
11. Are you satisfied, unsatisfied or neutral with the free textbook used in your course? Please explain (Free response question)
12. Do you have any suggestions on how teaching using free textbooks can be improved? (Free response question)

The survey applies methods from studies on student textbook use, collecting data on student reading of assigned texts, student attitudes towards reading, and instructor teaching strategies. It also breaks down student responses by demographics commonly used by research on OER impact, such as income group, under-represented and first-generation status, and student year of study to analyze if high textbook prices affect student reading of required works and the impact of using OER to replace them. The courses—five for upper-level students and four for lower-level students—ensure that there is a good representation from both groups. Five courses are in STEM subjects, and another four are non-STEM. Like many STEM area courses, the five STEM classes surveyed all require students to use online homework software. This allows for a good comparison of the reading patterns of students taking STEM and non-STEM courses, and whether interactive online homework influences teaching and textbook use. Switching to OER saved students in the courses a great deal of money and gave them access to textbooks at the start of class. The study explores whether this affected their reading and attitudes towards required texts.

Analysis

The survey was anonymous, and students were not required to complete all survey questions. The study accepted all responses that answered questions related to the student's year of study, under-represented and first-generation status, textbook purchasing and use, and instructors were asked to provide a copy of their course syllabus, showing the role that readings play in their teaching. Addressing the issue of why students read or do not read textbooks, and the role played by high textbook prices and instructors, the study uses a mixture of Chi-Square, Cramér's V and Bonferroni tests, which are used to determine if there is a statistically significant relationship between different sets of data, the nature of this relationship, and qualitative analysis of survey findings. Findings were analyzed in four areas:

A1. Student textbook purchase: Results for questions 1 and 4 were examined to discover how widespread students were in not purchasing or delaying purchasing textbooks. Chi-Square, Cramér's V and Bonferroni tests were conducted on the results of questions 1 and 4 with results of questions 5, 7 and 8 to see if low income, under-represented and first-generation students are more likely to not purchase or delay purchase assigned texts. They were also performed on the results of questions 1 and 4 with results of question 6, as well as between the results of questions 1 and 4 with students from STEM and non-STEM courses to see if there are any significant differences in textbook purchasing and delay purchasing between higher and lower-level students, as well as STEM and non-STEM students.

A2. Student use of textbooks: Results for questions 9 and 10 were examined to see how often students read traditional and OER works, and whether the use of OER led to more use of textbooks. Chi-Square tests were conducted, comparing results of questions 9 and 10 with those of 1 and 4 to see if use of textbooks is associated with how often students purchased or delayed purchasing assigned texts, and if students used the OER textbooks more. Tests were also conducted between the results of questions 9 and 10 with those of questions 5, 7 and 8 to see if low-income, under-represented and first-generation students are less likely to read traditional textbooks, and if they used OER works more. In addition, tests were conducted to see if upper and lower-level students were more likely to use OER texts, and if STEM and non-STEM students used OER more.

A3. Role of instructor in student textbook use: Results of question 10 were broken down by course to see how much students in each class read their OER textbook. Results for each course were compared with the class syllabus, along with student responses to question 12 to see what role the instructor played in how often students used OER texts.

A4. Student attitudes towards the value of textbooks and reading: Questions 2 and 3 encourage students to think about whether textbooks play an important role in their learning and how instructors teach courses. Students are given response options that enable them to reflect on these

questions, and the free response option for further reflection. Student responses to these questions are analyzed to gain a better understanding of their attitudes towards reading traditional textbooks. Questions 11 and 12 engage students to reflect on their attitudes towards OER works and how instructors used these books.

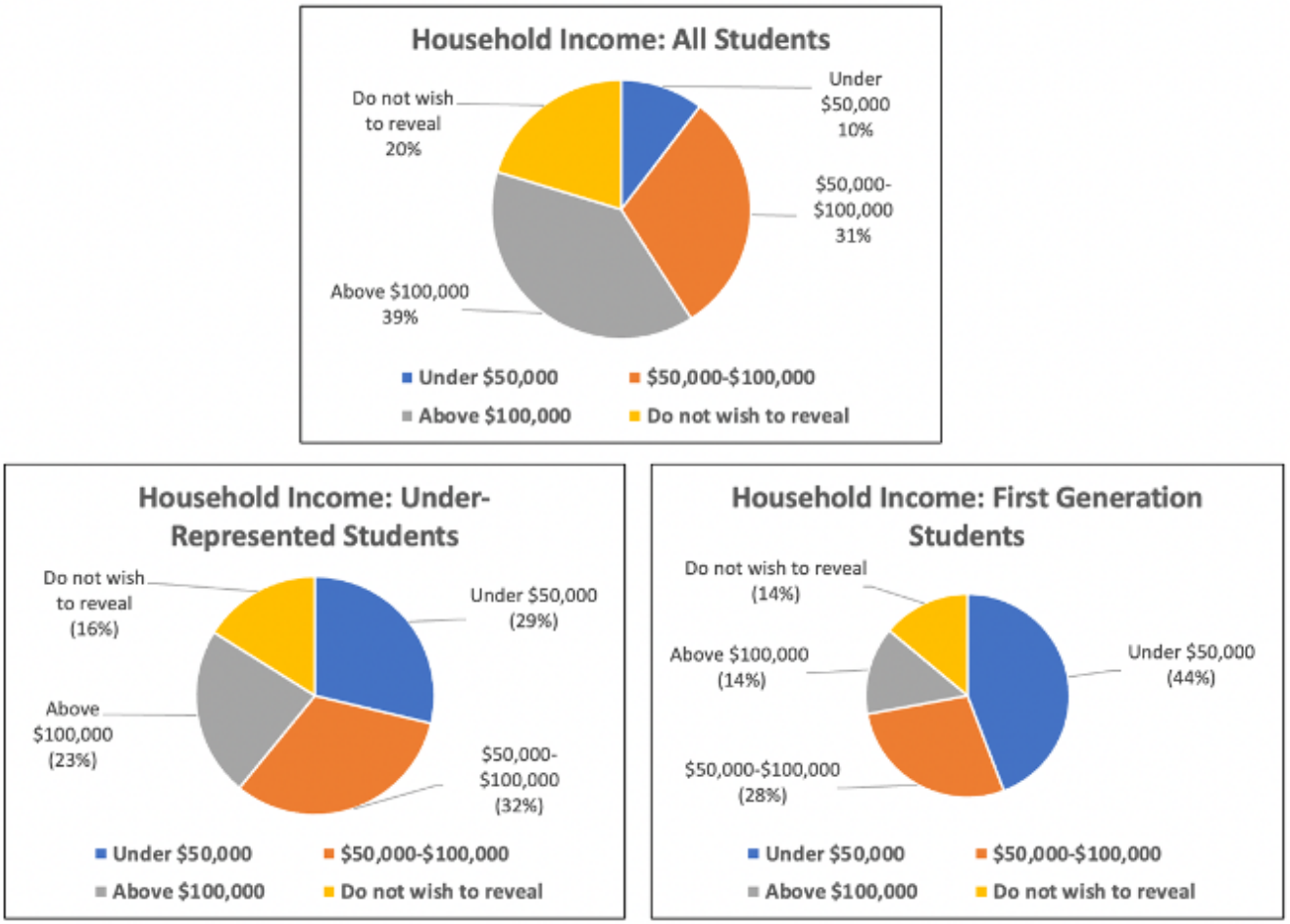
Results and Discussion

Respondents

704 out of 959 (73%) of students in the courses completed the survey. They include 324 lower-level and 380 upper-level students, with 87 from under-represented groups and 86 from first-generation backgrounds (See Appendix A for full breakdown). Using the US Census Bureau's estimate of average household income of the state that the institution is in during 2019, $53,199 (United States Census Bureau, 2019) as a basis to evaluate the household income of students, a high percentage of students belong to high income households. Under-represented and first-generation students were a small percentage among the total survey respondents. They are more likely to be from lower income backgrounds (Figure 3.).

Figure 3

Breakdown of Student household income levels



However, around 20% of students surveyed, including some first-generation students, did not answer the question on their household income. While it is possible that some students did not know their family income, sensitivity about family wealth could have discouraged some from revealing their income. The number of low-income students could potentially be higher.

Areas of Analysis

A1. Student textbook purchase

Two thirds of students reported that they purchased required textbooks all or most of the time (Appendix B). However, a third of students, a sizable percentage, do not regularly purchase these works. Over 44% of students also reported that they delay purchasing textbooks in their courses all or most of the time.

Breaking down textbook purchase by demographics, it appears that delayed purchasing is the main strategy for students from financially disadvantaged groups to cope with high textbook prices. Four Chi-Square tests were conducted using results of Questions 1, 5, 6, 7, and 8. Each Chi-Square test related the answers to Question 1 to those of Questions 5, 6, 7, 8, each respectively. The independent variables (IV) for each test are student household income, if students were upper or lower level, if students were under-represented, and if students are first-generation, respectively. The dependent variable (DV) is student textbook purchase. No statistical associations were found from these tests. Students at all income, under-represented and non-under-represented backgrounds, level of study, along with first-generation students, purchased textbooks at a similar rate. Those who did not purchase assigned texts did not fall into any specific group.

However, a Chi-Square test using Question 4 how often students delayed purchasing textbooks as DV and Question 5 household income as IV found some statistical significance (χ^2 (4)=57.935, $p<0.01$, $\alpha = 0.05$). A Cramér's V strength test found a weak association between household income level and delayed purchasing of required texts ($\varphi_c=0.227$). A Bonferroni post-hoc test comparing delayed purchasing of textbooks among different student populations further determined that students from households making under $100,000 were more likely to delay purchasing textbooks most or all the time, while those from households making over $100,000 were more likely to delay purchasing assigned works sometimes to none ($p=1.54975E-07<0.05/9=0.0056$).

Another Chi-Square test, using Question 7, under-represented and non-under-represented students as IV and delaying purchasing textbooks as DV also found statistical significance (χ^2 (2)=14.590, $p<0.001$). A Cramér's V strength test found a weak relationship ($\varphi_c=0.145$) between how often under-represented and non-represented students delayed purchasing required texts. A Bonferroni test determined that students from under-represented backgrounds are more likely to delay purchasing textbooks most or all the time ($p=0.0022<0.05/6=0.0083$) compared to other students. Interestingly, a Chi-Square test found

no statistical significance in how often first-generation students delayed purchasing texts compared to other students, even though these students were often from low-income backgrounds.

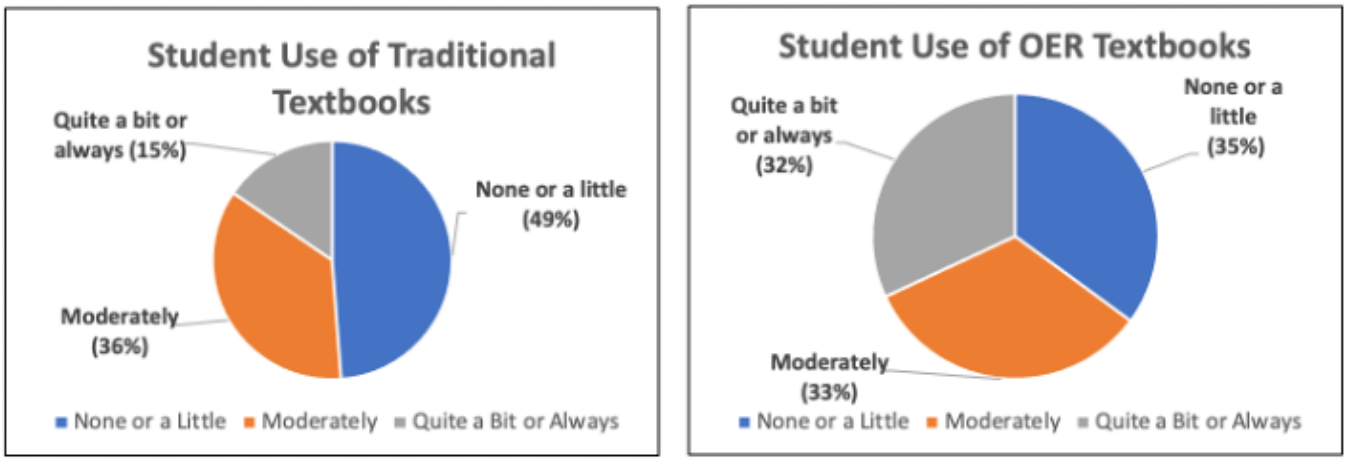
Chi-Square tests were also conducted to see if upper and lower-level students (Question 6), as well as STEM and non-STEM students were more or less likely to not purchase or delay purchasing textbooks (Question 4). A significance was found between higher and lower-level students (χ^2 (2)= 12.009, $p=0.02<0.05$). A Cramér's V strength test found a weak relationship ($\varphi_c=0.131$) between how often lower and upper-level students delayed purchasing assigned texts. A post-hoc Bonferroni test determined that lower-level students are less likely to delay purchasing textbooks than higher level ones ($p=0.003088715<0.0083$). This suggests that students learn to delay purchasing required works more as they progress in their studies. No significance was found on whether students in STEM and non-STEM classes were more likely to not purchase or delay purchasing textbooks.

A2. Student textbook use

Student use of traditional and OER works are as follows (Figure 4.):

Figure 4

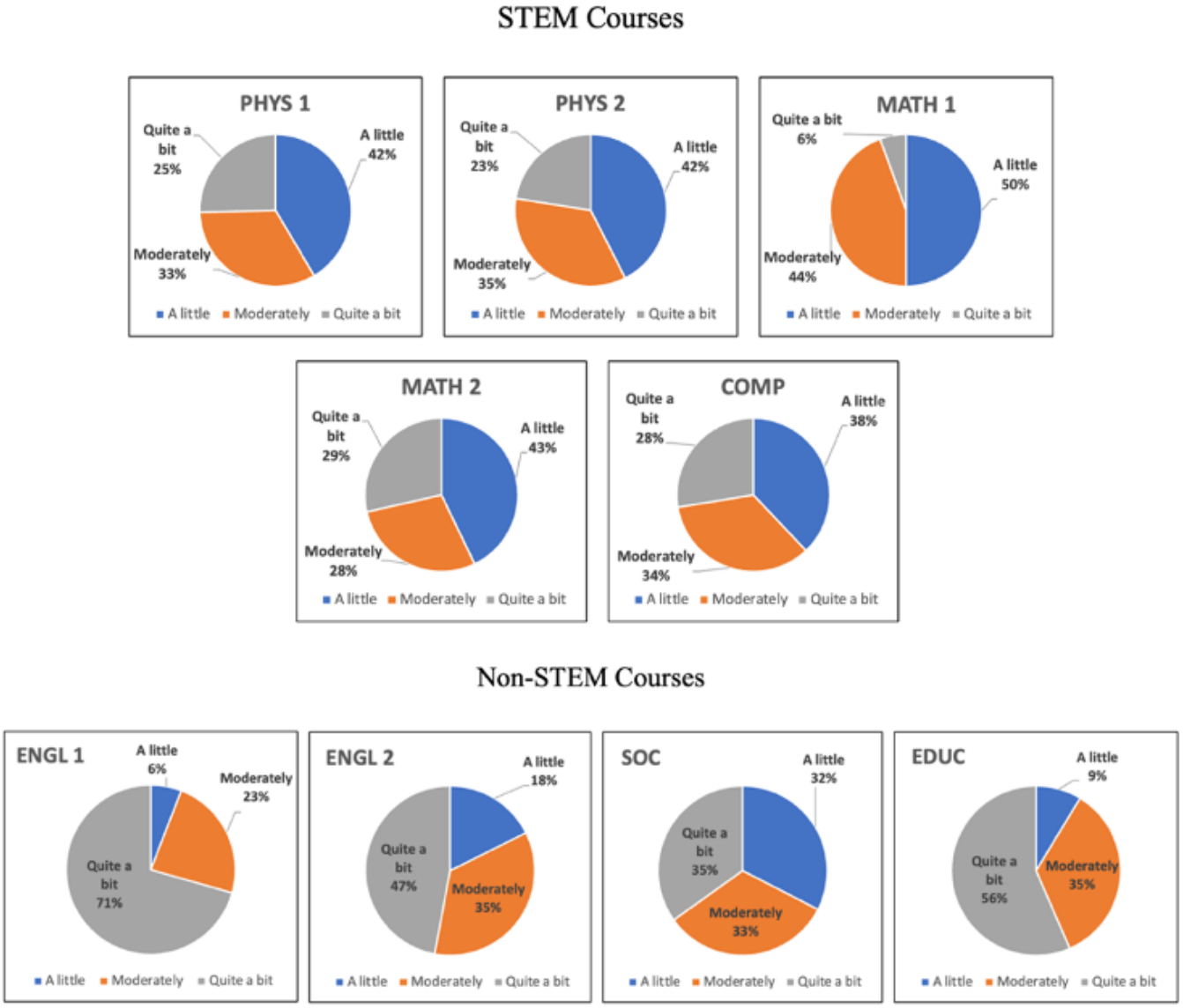
Student use of traditional and OER textbooks



Overall, student use of traditional textbooks was low. Only 15% of students used traditional works that they purchased quite a bit or always. OER did increase student textbook use to some extent. However, use of OER texts varied greatly by class. (Figure 5.):

Figure 5

Student OER use by class



Chi-Square tests, using Question 9, student use of traditional textbooks as IV and Questions 1 and 4, how often they purchased and delayed purchasing required texts as DVs found no statistical associations. This corresponds with the larger finding that student use of traditional texts was low,

regardless of whether they purchased or did not purchase them, or how often they delayed purchasing textbooks. Tests using Question 9 as IV and Questions 5, 7 and 8, student household income, student backgrounds, and whether students are first-generation as DVs also found no statistical associations. While students from different backgrounds purchased textbooks at a similar rate, they overall did not use these books much. Chi-Square tests also found no statistical association in how upper and lower-level students, or students from STEM and non-STEM courses used traditional texts.

Chi-Square tests were also conducted using Question 10, how often students used the free OER text in their courses as IV, and how often they purchased and delayed purchasing traditional textbooks as DVs. These tests discovered that students who purchased traditional texts all or most of the time were more likely to use OER (χ^2 (4) = 15.774, $p<0.003$, $\alpha = 0.05$). A Bonferroni test found that students who had purchased textbooks all or most of the time were more likely to use OER works quite a bit or always ($p=0.00308872<0.0056$), while others were less likely to read textbooks quite a bit or always. A Cramér's V strength test found the association between how often students purchased traditional texts and how often they used OER to be weak ($\varphi_c=0.106$). No statistical association was found between how often students delayed purchasing textbooks and how often they used OER works.

Tests using Question 10 as IV and Questions 5, 7 and 8 as DVs uncovered only one association. A test using Question 8, whether students were first-generation or non-first-generation as DV, discovered that first-generation students were more likely to use OER compared to other students (χ^2 (2)=15.231, $p<0.01$, $\alpha = 0.05$). A Bonferroni test found that first-generation students are more likely to use OER textbooks quite a bit ($p=0.001533811<0.0083$), whereas other students are more likely to use OER a little to none. However, a Cramér's V strength test found the association between first-generation students and OER used to be weak ($\varphi_c=0.148$).

Two other tests were carried out, with Question 10 as IV and Question 6, whether students were upper or lower level and students in STEM and non-STEM courses as DVs. An association was found between how STEM and non-STEM students used OER textbooks (χ^2 (2) = 58.874, $p<0.001$). A Cramér's V test found a weak relationship ($\varphi_c=0.289$) between use of OER works by STEM and non-STEM students. A Bonferroni test found that non-STEM students are more likely to use OER textbooks quite a bit or always, whereas STEM students were more likely to use these works a little or none.

Overall, the data suggests that students from all backgrounds, levels of study and in STEM and non-STEM courses have a dysfunctional relationship with traditional textbooks. Most spend large amounts of money and effort to purchase required texts but do not seriously use them. The ability to purchase textbooks does not directly correlate to student use of them. Students who did not purchase assigned readings do not fall into any disadvantaged demographic group that had difficulties purchasing them, and delays in purchasing textbooks did not affect student use of them. This, along with low use of traditional texts by students, raises the possibility that many students who did not purchase required textbooks are doing so mainly by choice, not seeing textbooks as necessary rather than inability to afford them. Analysis of student use of OER works also supports this conclusion. Students who did not

purchase textbooks were less likely to use required readings than others, even when given a free one. They may have ingrained attitudes inherited from experiences with traditional texts.

Data on the use of OER texts also indicates that free access to textbooks does not lead to more use of them. Chi-Square tests do not show that students from disadvantaged groups are more likely to use OER textbooks than others. The exception to this is first-generation students. They do not delay purchase of assigned texts even though many are from poorer backgrounds. This may be caused by lack of experience with college life. The same can be used to explain their use of OER readings.

While data shows that non-STEM students are more likely to use OER works, a breakdown of textbook use by class indicates that OER textbook use can vary greatly in each class, and only two non-STEM courses had high OER use (Figure 5.). This suggests that there may not be a difference in textbook use among STEM and non-STEM students, and that instructors may play a more important role in influencing OER use.

A3. Role of instructors in student textbook use

Breaking down OER textbook use by class and examining the syllabi of the courses, it was discovered that teaching strategies by different instructors was critical in influencing how often students use OER. Instructors of the nine courses used a variety of OER textbooks by OpenStax, Lumen Learning and other OER creators. Four of them (PHYS 2, ENGL 1 and 2, and EDUC) also created readings for their students that included parts of several OER works. However, only the instructors in ENGL 1 and EDUC—the two courses that had the highest level of student textbook use—made the reading of OER materials a priority.

Comparing instructor teaching strategies and student responses on how teaching using OER can be improved, three factors—the selection of readings, directions on how to use required texts, and integration of OER with the course—played an important role in student use of textbooks. Instructors of ENGL 1 and EDUC both engaged students to read by carefully selecting readings from a variety of OER, making them aligned with assignments. The instructor of EDUC also made class readings limited, assigning students no more than 15 pages per class, and made some activities and exercises from OER textbooks graded class assignments. Both instructors mentioned content from assigned works in their lectures and even gave students directions on how to read the books. The instructor of ENGL 1 often gave very specific instructions, asking students to focus on certain concepts and to think about a specific question when they are doing their weekly readings.

The other courses, however, took a different approach to textbooks. Instructors of the five STEM courses focused primarily on testing the usability of open-source online homework systems they operated, which are either completely free or low-cost systems. They sought to use these systems to replace learning packages offered by publishers, which typically contain a textbook and access to online homework, and are very expensive. Class lectures essentially focused on giving students instruction of important course concepts, which were tested both in class and at home through questions in online systems. Though the

instructors assigned OER textbooks to their courses, reading these works was not emphasized. Instructors of MATH 1, MATH 2, and COMP even called the textbooks "reference texts," giving students additional knowledge or a way to learn outside of class. While a textbook was assigned to students, it was one of several options given by instructors to study outside of class, along with alternatives that did not require extensive reading, like videos explaining math and programming concepts. The instructors of PHYS 1 and 2 assigned students specific readings for each week but did not emphasize the importance of reading them. The syllabus for PHYS 1, in fact, simply stated that it was best for students to "skim" over the chapters before class. However, lack of emphasis on reading assigned texts is not limited only to STEM courses. Instructors of SOC and ENGL 2 did not emphasize textbook reading either. The instructor of SOC, like STEM instructors, also described the course's OER textbook as "supplemental" instead of required reading.

A4. Student attitudes towards the value of textbooks and reading

In total, 637 of 704 students surveyed responded to Questions 2 and 3, explaining why or why not they purchase their textbooks. Among them, 434 students chose response options to explain why they purchase required texts:

1. Having textbooks is essential to completing the course or doing well in it;
2. Instructors told you to do so; and
3. Other.

Another 203 chose to explain why they do not purchase their textbooks by selecting these options:

1. Unable to afford them;
2. I do not feel they are useful to my learning;
3. I can pass or do well in a course without them; and
4. Other.

Some also wrote specific comments. Students were allowed to select all answers that applied to them.

Analyzing their responses (Appendix C), around half of the students who purchased textbooks most or all the time indicated that they did so mainly to comply with the directions of instructors, rather than feeling that assigned texts are useful for their courses. A few students also wrote in comments that they only purchased required works because other students did so, or that they often had no choice but to purchase textbooks for courses because these came in a package that included online homework. Among students who did not regularly purchase textbooks, only 17 indicated that they did so because they simply could not afford these works. Most students indicated that textbooks were not useful to their learning, that they can pass or do well in their courses without the required works, or a combination of both.

Students who purchased or did not purchase textbooks alike often wrote comments that questioned the value of these works to their learning. Their chief criticism was that many instructors did not use the textbooks they asked students to purchase. One student who purchased required texts regularly noted, "Sometimes I purchase a textbook due to teacher saying it's needed, and I find myself never or rarely using the book." Students who did not regularly purchase textbooks often blamed instructors for assigning them expensive works that were not used regularly. One student noted, "Some professors don't go by the book and say that what they say in class and their notes are more beneficial." Others claimed they are not sure if textbooks are useful since many instructors often assign students class readings but made it optional for students to purchase them.

Comments from students may not always reflect reality. It is possible that some students lack motivation to read and are trying to find excuses for not reading. However, the fact that a large majority of students in the survey were skeptical of the value of textbooks, regardless of whether they purchased them or not, suggests that students overall do not feel these works play an essential role in their learning or academic success. They may have gotten such feelings from past experiences with how instructors taught using textbooks. This is likely widespread among instructors. Results of student responses also reinforces the study's earlier conclusion that students have a dysfunctional relationship with textbooks, with many students purchasing expensive assigned texts but not using or seeing much benefit in them, and other students learning from their experiences to not use works required by their instructor.

In total, 692 students responded to Question 11, if they were satisfied, unsatisfied or neutral towards the OER textbooks. Around 270 gave substantive feedback to Question 12, how teaching using OER works can be improved. Interestingly, most comments from students were about the benefits of having free textbooks rather than their quality or how they were used. Students from both low and high-income households appreciated the free texts. One from the former group noted, "Having professors use these free resources makes my life easier because I don't have to worry about choosing between purchasing course material or groceries." Another, from the latter group stated, "I'm fortunate enough that my parents purchase my textbooks for me, but it makes me feel incredibly guilty when my tuition is already through the roof."

These comments may seem to contradict the study's earlier claim that most students could afford to purchase textbooks. However, the larger data suggest that many students are purchasing textbooks even though they have a hard time doing so. Students from wealthier backgrounds purchasing required texts may create pressure for less privileged students to do the same, but student comments suggest that even some students from higher income households find textbooks too expensive. While students liked the cost savings they received, many were ambivalent about whether OER works benefited their learning. Some noted that the textbooks did not improve their grades. Others questioned if required texts are necessary, claiming that they can do well from listening to lectures and reading instructor notes. Many students noted that they would only do readings that were strongly connected to assignments and exams. Some even asked for alternatives to textbooks, such as videos to study with.

Comments from students in ENGL 1 and EDUC, the two courses where instructors did make an active effort to engage students to complete readings and connect textbooks to assignments and class lectures, were more positive. Many students praised the instructors for their efforts, giving comments like "We actually use them (textbooks) in this class, and they are directly relevant to what we are learning." However, a few students, even in these courses, commented that they were not given enough motivation to read. This supports the earlier assertion that students are generally ambivalent about the value of textbooks.

Conclusion

This study challenges research on both OER effectiveness and textbook reading. It questions whether giving students OER reading materials benefits their learning. The situation in the study is not one where students cannot learn from textbooks because they lack access to them. Most students do follow course instructions and purchase works required by instructors. Though many delay the purchasing of textbooks, this factor does not appear to influence their reading. However, the impact of assigned texts on student learning has been severely undermined by poor utilization of them by instructors and a general student perception that these works are not useful to their learning. Statistical analysis and student comments from the survey both indicate that large numbers of students do not have a habit of using textbooks. Some are even deliberately not using required texts. While OER did increase student use of textbooks, findings of this study suggests that students would mainly use OER works if their instructors made a significant effort to link these materials to course assignments and assessments, and that OER did not change their views towards textbooks. Conclusions of this study question the assertion of some researchers on student textbook use: students feel that reading required materials are important to their learning, even if they don't do it (Berry et al.; Kerr & Frese).

This study has several limitations. It surveyed a relatively small number of students and instructors at one institution. Conducted before the COVID-19 pandemic, it also focused on face-to-face courses, the main form of instruction in American higher education at the time and did not account for the growth in online learning since 2020. To what extent instructors in online courses relied on textbooks needs further study. The institution being studied is also unique in some ways. A land grant university, it was originally dedicated to providing education to students from working class backgrounds. The university's national ranking rose in recent years, and it became an R1 research institution. Like other institutions on the rise, its enrollment and tuition also significantly increased. Perhaps these factors accounted for the current situation, with students from well-off backgrounds becoming the majority and most students purchasing textbooks. This might not be reflective of the student populations of other institutions. Despite this, the university studied is an important public research institution in its state and region, and some instructors in the STEM courses studied have received national acclaim for their teaching. The discovery of many students rejecting the use of textbooks and faculty not actively teaching with them in a large research university is alarming. Understanding this phenomenon is crucial to ensuring that OER texts can be implemented in a way that truly benefits students.

Several factors related to instructors and students need to be analyzed. From the instructor side, the role that textbooks play in courses must be put into the context of the different needs of instructors, what strategies they think are most productive in fostering student learning, and how much time they have to plan courses. It is possible that textbook reading is less relevant to certain instructors. STEM instructors, for example, may see required readings as cumbersome because their courses are based mainly on solving mathematical and computational equations. Instructors may want students to spend more time practicing solving equations on online homework systems and receiving instant feedback rather than reading. From this perspective, homework systems could be changing the way instructors teach, eliminating the role of textbook reading.

However, OER textbooks are more than just readings. Many OER works used in the study also have large numbers of practice questions, which can be assigned to students. These questions could be useful practice exercises to STEM students, since online homework can only give students a limited number of questions. One math OER textbook used in the study even has interactive online questions that explain answers. It is possible that many of the instructors studied did not want to heavily depend on OER texts because they were unhappy with the quality of the OER works they used. The study conducted a review of syllabi of courses taught by the instructors. It found that the instructors of MATH 1 and 2, COMP, PHYS 1 and SOC never actively used textbooks. Though they required students to have required texts, the instructors often made reading them optional. They probably did not explore the benefits of OER works because of this.

Why instructors are not actively using textbooks needs further study. One explanation, based on the results of the survey, which uncovered rampant delay purchasing of required works by students, is that many instructors may be accustomed to teaching without textbooks due to concerns that students will wait too long to buy them. They, as a result, did not feel that textbooks are important to their instruction and did not make a major effort to integrate OER works into their teaching. This could have created a reciprocal relationship, with high textbook prices causing students to delay their purchase, instructors becoming less reliant on using the books they assign, and students more aware of the dwindling significance of reading textbooks in their learning success. This hypothesis needs further investigation. If this is the case and is widespread among instructors, it may highlight a hidden outcome of rising textbook prices; the true impact of high textbook costs in some institutions is not students having no access to required readings, but instructors abandoning the effective use of them, leading students to question the value of textbooks.

Student reading skills also need to be further investigated. The study only looked at student usage of textbooks and attitudes towards them. It did not assess whether students have skills to complete assigned readings, gain required knowledge from them, and if OER use improved student grades. It is possible that the instructors studied were reluctant to enforce student reading of required texts because they feel students lack skills for reading, and that strategies to encourage them to read, along with teaching students how to read, are too time consuming. Instructors may turn to alternative resources to compensate students' reading, seeing these as more effective than textbooks. Activities of instructors in

MATH 1, 2 and COMP, such as giving students videos and other learning resources that do not require extensive reading and optional class texts may be evidence of this strategy. Student attitudes towards textbooks and their reading skills may also be in a reciprocal relationship with instructor teaching strategies, with the two influencing each other to reduce the role of required readings in higher education.

The conclusions of the study suggest that the OER community may need to rethink its strategies to support instructors and students. OER are a wide range of materials incorporating cutting edge educational technologies. They can include resources that do not require a lot of student reading. Developers of OER can create diverse teaching materials that effectively assist student learning but also reduce the amount of reading, and OER promoters can also assist faculty to creatively use non-textbook OER in their teaching. However, they should not give up vigorously promoting the importance of having students read and improving their reading skills. Studies have shown that students who develop strong reading skills tend to have higher metacognitive ability that allow them to excel in learning (Pressley, 2015). Not encouraging students to read may harm their growth. The OER community must actively assess why students are not reading textbooks and offer strategies for instructors to improve student reading. This is crucial to ensuring that OER textbooks have a positive impact on student learning.

Collectively, the study's findings indicate that student attitudes towards textbooks, their use of required works and reading skills, along with how instructors are teaching with OER texts are important factors in assessing the effectiveness of OER. Studies on OER effectiveness need to incorporate perspectives from research on student textbook use into their analysis. They must also address the issue of why instructors are not relying on required texts in their teaching, the role played by high textbook prices, and student reading skills in this phenomenon.

Conflict of Interest Statement

The Author declares no conflict of interest.

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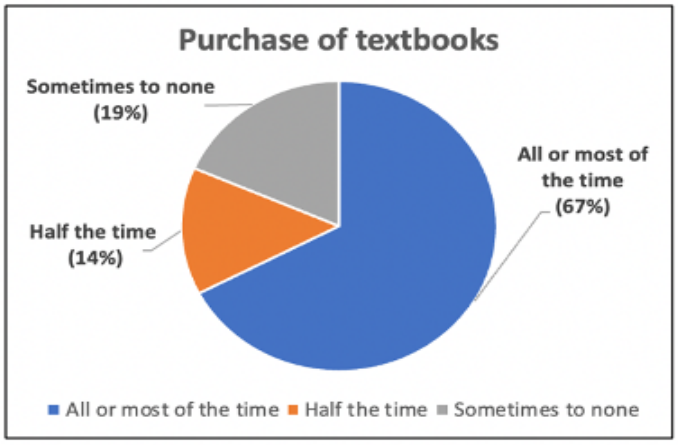
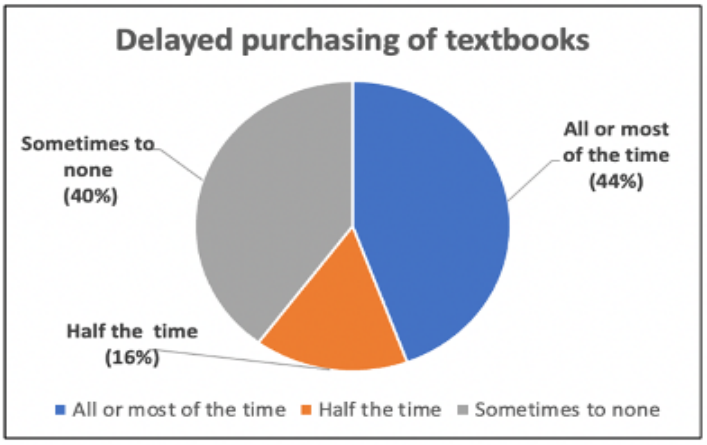
Appendix

Appendix A. Full breakdown of student demographics

Course	Number of Responses	Lower-level Students (1st, 2nd year)	Upper-level Students (3rd, 4th year)	Under-represented Participants	First Generation Participants
PHYS 1.	429/600	236	193	65	54
PHYS 2.	40/60	22	18	1	6
MATH 1.	18/22	15	3	3	2
MATH 2.	14/18	11	3	2	1
COMP	29/50	1	28	2	8
SOC	43/49	35	8	2	3
ENGL 1.	51/60	3	48	4	6
ENGL 2.	34/40	1	33	2	0
EDUC	46/60	0	46	6	6
Total:	704/959	324	380	87	86

Appendix B. Student purchasing and delayed purchasing of textbooks





Appendix C. Student reasons for purchasing and not purchasing textbooks