

OPEN PRAXIS

*Open Praxis*, vol. 12 issue 4, October–December 2020, pp. 555–567 (ISSN 2304-070X)

# Student Perceptions of Textbooks: Prior Behaviors and Beliefs Can Influence Zero Textbook Cost (ZTC) Adoption Impact

AmberNicole Pfannenstiel , Alex Redcay  & Daniel Albert   
*Millersville University (USA)*

[ambernicole.pfannenstiel@millersville.edu](mailto:ambernicole.pfannenstiel@millersville.edu), [Alex.Redcay@millersville.edu](mailto:Alex.Redcay@millersville.edu) &  
[Daniel.Albert@millersville.edu](mailto:Daniel.Albert@millersville.edu)

## Abstract

Many Open Educational Resource (OER) and Zero Textbook Cost (ZTC) studies explore cost savings, impact on learning outcomes, and student perceptions of the materials. While OER/ZTC research reports positive student perceptions (Brandle et al., 2019), textbook research reports negative student perceptions of digital textbooks (Behnke, 2018). This study explores student buying behavior and perceptions of textbooks, finding that perceptions toward the usefulness of materials is high when access to materials is high. Given this student perception, textbook purchasing is likely related to outside factors. This study adds to the growing body of research about how OER and ZTC may influence student costs and access to course materials, finding that student attitude toward course materials needs to be considered alongside adoption.

**Keywords:** Open Educational Resources, Zero Textbook Cost courses, Textbook Perceptions

## Introduction

Textbooks remain a fundamental requirement in most college courses, where many instructors adopt commercial textbooks (CT), textbooks that are widely reported as expensive and becoming even more expensive. As cost of attendance continues to rise for students, faculty and institutional administrators have explored ways to integrate and adopt affordable learning materials. As part of these explorations, Open Educational Resources (OER) and Zero Textbook Cost (ZTC) courses have become mainstream ways of reducing some of the cost burden in individual courses.

OpenStax (2018) and OER Commons (2020) define OER as openly published, remixable materials like the textbooks and resources published by OpenStax and others. The key with OER is that the author or organization allows others to download and share, and in many cases edit, remix, and re-post. ZTC courses draw from openly published materials that may not be remixable, library books, library materials, and library accessed articles instead of a single textbook. ZTC utilizes free materials like websites, videos, government websites, school databases and more. These resources may be free to students, and most likely are accessible for a longer period of time, but these materials are not remixable and re-postable. In some cases, the ZTC textbook cost burden falls to the institutional library instead of the student.

Faculty and programs adopting OER and/or designing ZTC courses eliminate textbook costs for single courses, eliminate textbook costs for specific programs, and provide access to materials to students on the first day of classes. This study draws from a survey administered to OER and ZTC courses as part of a campus wide initiative to lower student textbook costs. The results presented here focus on how students understand the cost burden of textbooks, how cost and access impact their perceptions and attitudes toward course materials.

Reception date: 7 May 2020 • Acceptance date: 20 September 2020

DOI: <https://dx.doi.org/10.5944/openpraxis.12.4.1119>

### *Institutional Context*

During the Spring 2019, the OER working group at Millersville University, a northeast public master's-level university, developed and implemented an Open Textbook Initiative (OTI) to incentivize faculty to adopt OER in a course Fall 2019. The program partnered adopting faculty (16 faculty) with faculty, librarians, and an instructional designer (members of the working group) familiar with and using OER/ZTC in courses. This program focused on helping adopting faculty find OER/ZTC materials, mentoring adoption of OER/ZTC materials in courses, connecting instructional design to design courses with OER/ZTC materials. Adopting faculty were provided \$1000 in professional development funds for adopting OER/ZTC materials for their course, completing a survey about their adoption experience, and distributing a survey to students enrolled in the OER/ZTC course.

The authors, members of the OER working group, designed the student survey loosely based on the COUP Framework (Bliss et al., 2013), to understand student reported perceptions of cost, use, and quality (perceptions) of the zero cost materials.

In the present study, we explore student reporting on their ability to pass a class without a textbook, and their textbook accessing (purchasing and opening) behaviors. The purpose of this initial investigation is to raise some of the complicated issues surrounding textbook access, issues that may impact student access behaviors when assigned OER and ZTC.

### *Literature Review*

In a collection on textbook research, Fuchs and Bock (2018) introduce the goals of their edited collection, *The Palgrave Handbook of Textbook Studies*, claiming quite simply “textbooks matter”. Faculty adopt textbooks to function as pedagogical tools, serving as a means to provide course content to students. With the assigning of these textbooks, faculty not only adopt textbooks and materials that convey important content knowledge, but also knowledge on the values and ways of thinking prized within a given course (Fuchs & Bock, 2018). Complicating this, Behnke (2018) finds that US college students value the convenience of digital textbooks, but not the modality of those books (preferring print). Behnke (2018), citing Joo et al. (2014) argues that student attitudes toward textbooks are influenced by “student subjective norms relating to environmental variables, student self-efficacy, perceived ease of use, and perceived usefulness” (p. 390). No one, single, element influences student attitudes and beliefs, instead a combination of factors that include the wide category of ‘environmental variables’ influence student perceptions of textbooks.

The research in this study started in and is influenced by conversations surrounding OER and ZTC adoption in courses. The survey results reported here come from an instrument designed by the authors, and influenced by the research related to cost, use, outcomes, and perceptions (COUP), a framework highlighted by Bliss et al. (2013). In building our survey to understand aspects of the student experience with OER and ZTC materials in our institutional context, we see complicated connections to students’ perceptions of, attitudes toward, textbooks more broadly, attitudes that impact their purchasing and accessing behaviors (as reported by Behnke, 2018; Fuchs & Bock, 2018).

Bliss et al. describe costs as the student and instructor perception of textbook costs, use as the student use and accessing of the OER textbook in the OER/ZTC course, and perceptions as self-reported perceptions of quality comparing OER to commercial textbooks (CT). Using the COUP framework to understand the existing research, this study draws from the Behnke and Fuchs and Bock research to probe the intersection of the cost, use, and perceptions categories to continue to understand student use of textbooks, and OER/ZTC materials.

Drawing from OER/ZTC research, overall student cost savings is often a driving force of campus-wide initiatives in support of faculty designing zero textbook cost courses. Campuses report large cost saving amounts, such as Hilton et al. (2014) report on student cost savings across two semesters at 8 institutions. Additionally, numerous studies have investigated student perceptions of textbooks, textbook costs, and textbook usage (see Hilton, 2016 and 2018 for reviews; Martin et al., 2017).

Cost research also focuses on semester costs, money spent by students (Hilton, 2018). Perceptions research explores student and instructor perceptions of quality (Bliss et al., 2013; Hilton, 2018, Lin, 2019). Outcomes research explores the impact on learning outcomes (Fischer et al., 2015; Croteau, 2017; Clinton & Khan, 2019). Other studies report positive impact on grades, including lowering DFW rates (Colvard et al., 2018). These studies focus heavily on the student and instructor perceptions of textbooks in the OER/ZTC/CT classroom, with comparisons and connections to course learning outcomes, comparison and connections to overall student textbook costs.

Recent research draws on both perceptions and outcomes, Brandle et al. (2019) report on student perceptions of ZTC courses and student's ability to access course materials. The researchers note that "the importance of instructors modelling how to access, read, and annotate digital materials cannot be overstated" (p. 96), finding that student learning benefits from focused attention on building digital material use skills.

Katz (2019) explored cost from a new perspective, the time students spend finding bargains for the textbooks required in courses. This exploration of the student experience of purchasing textbooks found that 43% of the students surveyed spent more than an hour textbook shopping, with many students waiting until late in the semester to purchase textbooks as they had found not all faculty use and reference the 'required' textbooks.

The amount of time spent on finding textbooks often "detracts from time they are able to spend on other responsibilities" (Katz, 2019, p. 17). Further, Katz finds that students respond by making choices in their spending on textbooks, impacting their access to textbooks. Katz argues that OER and ZTC materials can reduce the time spent, and positively impact access. Extending this further, do student attitudes about textbooks impact their accessing behaviors? Connecting Behnke, do any of the environmental variables and perceptions of usefulness stem from the time spent finding the sources? While OER and ZTC materials could reduce the time spent searching for the best textbook deal, is student accessing of course materials also impacted by the attitudes toward textbooks developed through many semesters of avoiding purchasing textbooks or spent stressfully searching for these textbook deals?

In the present study, we expand discussions of student perceptions of textbooks costs and student perceptions of textbook use to understand if ZTC course materials are impacted by the perceptions student already have of textbooks, if student perceptions of ZTC materials are impacted by their perception of their ability to pass a course without a textbook. To connect to and extend the research, this study first asks about student spending behavior (RQ1), then student attitudes about course materials (RQ2), finally student reported access to materials and how that corresponds to their attitudes about textbooks (RQ3 and 4).

As faculty who have adopted OER and ZTC materials, we know our textbook decisions have student financial impacts, cost matters and is an important consideration. We also want to begin to understand how perceptions of textbooks might impact student access behaviors, and how that could impact student accessing OER and ZTC materials when assigned.

## Methodology

### *Purpose*

The purpose of this study was to examine the relationship between Zero Textbook Costs (ZTC) resources, their ability to access and attitudes about the usefulness of textbook/class materials. The full student perception survey is openly available in the University Digital Repository: <https://millersville.tind.io/record/6040is>. The study also examined how much students are spending on textbooks and if this interferes with their ability to obtain the materials.

### *IRB and Design*

An expedited IRB application was approved by the University IRB in September 2019. Students were informed about the purpose of the study and were invited to provide their consent before data collection occurred. Data was deleted for students who did not consent to participation but completed the survey anyway. This study was non-experimental, cross-sectional, retrospective, and self-report.

### *Sampling and Data Collection*

Students (N=1142) from 18 unique courses were invited electronically to participate in the study and 469 surveys completed which resulted in 41% response rate. There were 9 students that answered twice but for different courses so these students were left in the data. There were 7 students who answered twice for the same class but their answers were unable to be reconciled so they were left in the dataset. After the remainder of duplicate or blank entries were removed by listwise deletion, 442 students remained.

### *Materials Variable*

Student attitudes were assessed by two questions regarding the (1) usefulness of textbooks or class materials to improve their grades or to (2) help them learn. Participants can respond with a 6-point Likert Scale with Strongly Disagree to Strongly Agree. Total scores ranged from 2 to 12 with higher numbers indicating a more positive view of textbooks usefulness. The materials total composite variable has excellent internal consistency ( $\alpha = .91$ ).

### *Pass Variable*

Student attitudes were assessed by a single question regarding whether or not they can pass any class without the use of textbooks/materials. Participants can respond with a 6-point Likert Scale with Strongly Disagree to Strongly Agree. Scores ranged from 1 to 6 with higher numbers indicating a more positive view of textbooks usefulness and their inability to pass a class without them and lower numbers indicating student confidence that they did not need textbook/materials to pass any class.

### *Access Variable*

Student access was assessed by two questions that asked about their access to all the required textbooks/materials: (1) I always purchase... (2) I have access...to all the required textbooks/materials. Participants can respond with a 6-point Likert Scale with Strongly Disagree to Strongly Agree. Higher scores indicated higher access with scores ranging from 2 to 12. The measure had adequate internal reliability ( $\alpha=.74$ ).

*Costs Variable*

Student perceptions of how cost impacted their access to textbooks was assessed by two questions: (1) Costs have led me to decline purchasing..., (2) I avoid paying for... all the required textbooks/materials. Participants can respond with a 6-point Likert Scale with Strongly Disagree to Strongly Agree. Higher scores indicated a higher likelihood that cost did not interfere with student purchase or accessing textbooks with scores ranging from 2 to 12. The measure had adequate internal reliability ( $\alpha=.69$ ).

**Results**

*RQ1: Was there a significant difference in how much students report spending in a typical semester versus a semester and spending in a typical class versus a ZTC course?*

Paired sample T-Tests examined the difference between reported spending between a typical semester and this semester, then a typical class with the ZTC class. Students reported spending significantly less on textbooks this semester (M=200, SD=137) compared to previous semesters (M=290, SD=175)  $t(440) = 14.2, p < .001$  and on textbooks for the ZTC class (M=8, SD=22) when compared to a typical class (M=89, SD=53)  $t(437) = 30.2, p < .001$ . Summary data for student spending behavior is displayed in Table 1.

**Table 1: How much do students report spending on textbooks?**

	Min (\$)	Max (\$)	Mean (\$)	Median (\$)	SD (\$)	N
Typical semester	0	1000	290	275	175.2	442
This semester	0	800	194	200	137.4	441
Typical class	0	400	89	80	52.9	438
ZTC class	0	200	8	0	22.1	442

*RQ2: Did student attitudes about materials impact how much they spent on textbooks?*

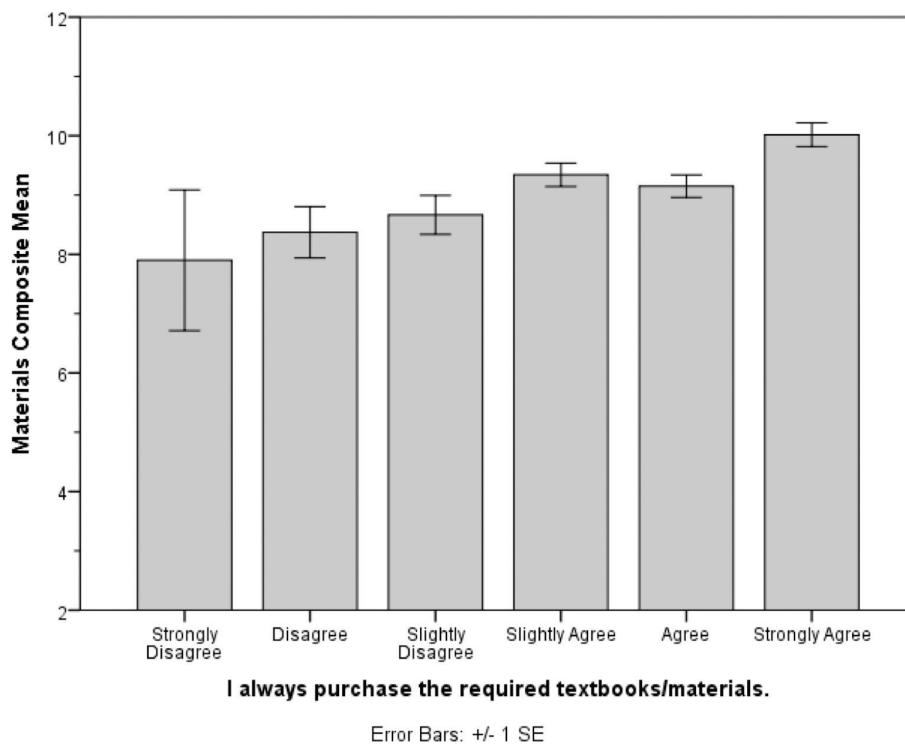
Three MANOVAs with Tukey’s B post hoc analysis were completed to determine the impact of student attitudes on how much they paid for textbooks. Student attitudes about the *usefulness* of class *Materials* to improve their grades or to help them learn did not significantly impact how much they spent on course materials typically or this semester, typical classes or the ZTC course ( $F(40,1568)=.638, p=ns$ ). Student attitudes about whether they can *Pass any class* without a textbook did not significantly impact how much they spent on course materials typically or this semester, typical classes or the ZTC course ( $F(20,1666)=.785, p=ns$ ).

Student reports about their *Access* to course materials did not significantly impact how much they spent on course materials typically or this semester, typical classes or the ZTC course ( $F(40,1646)=1.22, p=ns$ ). However, post-hoc tests were not able to be performed because one cell has too few cases. So the analysis was run a second time with the Access questions separately. The two access questions included: I always *purchase* or I have *access* to the course materials. None were significant except one post hoc. Students who reported that they agree (\$204=M), strongly agree (\$210=M), or *disagreed* (\$212=M), with the statement, “I always purchase the required textbooks/materials” spent significantly more this semester when compared with students

who reported that they strongly disagreed ( $M=7.9$ )  $F(20,1646)=2.1, p<.01$  with a medium effect size ( $\eta^2=.06$ ; power=.99). A small effect size is  $\eta^2=.01$ , medium effect size is  $\eta^2=.06$ , large effect size is  $\eta^2=.14$ .

*RQ3: Did student reported access to materials correspond to attitudes about textbooks/materials to improve their grades or to help them learn?*

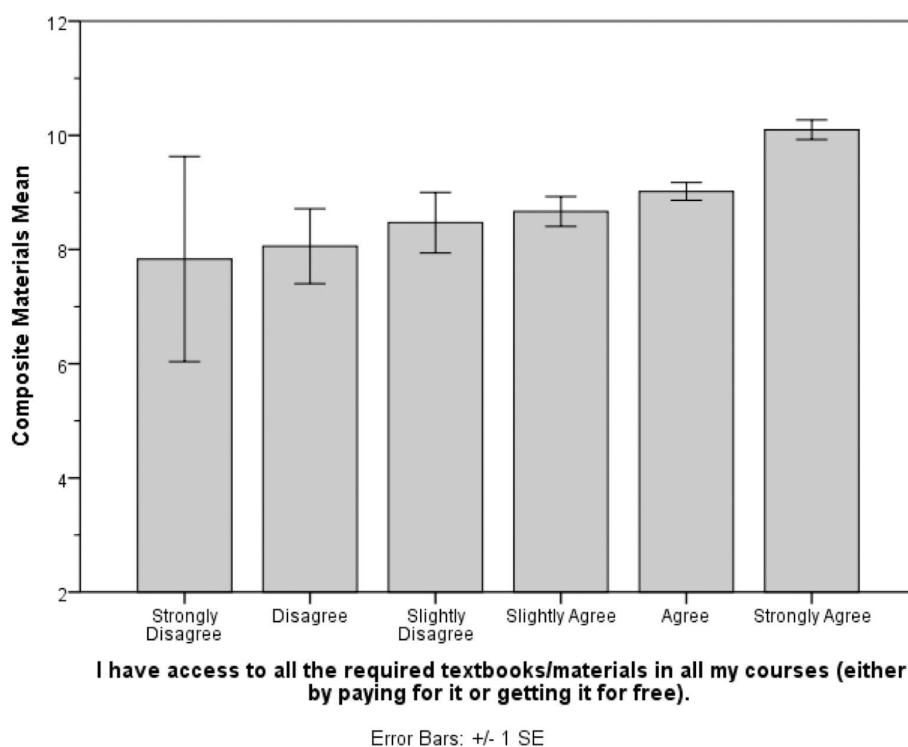
ANOVA with Tukey’s B post hoc analysis was completed to examine the independent impact of students purchase and access to the course materials on their attitude about their usefulness. Students who reported that they strongly agree ( $M=10.02$ ) with the statement, “I always purchase the required textbooks/materials were more likely when compared with students who reported strongly disagree ( $M=7.9$ ) or disagree ( $M=8.37$ ) to believe that textbooks were useful to improve their grades or to help them learn  $F(1,5)=5.44, p<.001$  with a medium effect size ( $\eta^2=.06$ ; power=.99). Data used for this analysis is displayed in Figure 1.



**Figure 1: Student purchase and access**

In Figure 1, student perceptions of the usefulness of materials are compared with their self-reported textbooks/materials buying behavior. Student perceptions of the usefulness of materials is measured using the Materials Composite Score, where 2 represents the lowest and 12 represents the highest perception of the usefulness of materials. Error bars represent 1 standard error.

Students who reported that they strongly agree ( $M=10.1$ ) with the statement, “I have access to the required textbooks/materials in all my courses (either by paying for it or getting it for free) were significantly more likely when compared with students who reported strongly disagree ( $M=7.8$ ) or disagree ( $M=8.1$ ) to believe that textbooks were useful to improve their grades or to help them learn  $F(1,5)=8.12, p<.001$  with a medium effect size ( $\eta^2=.09$ ; power=.99). Data used for this analysis is displayed in Figure 2.



**Figure 2: Student perceptions of usefulness and access**

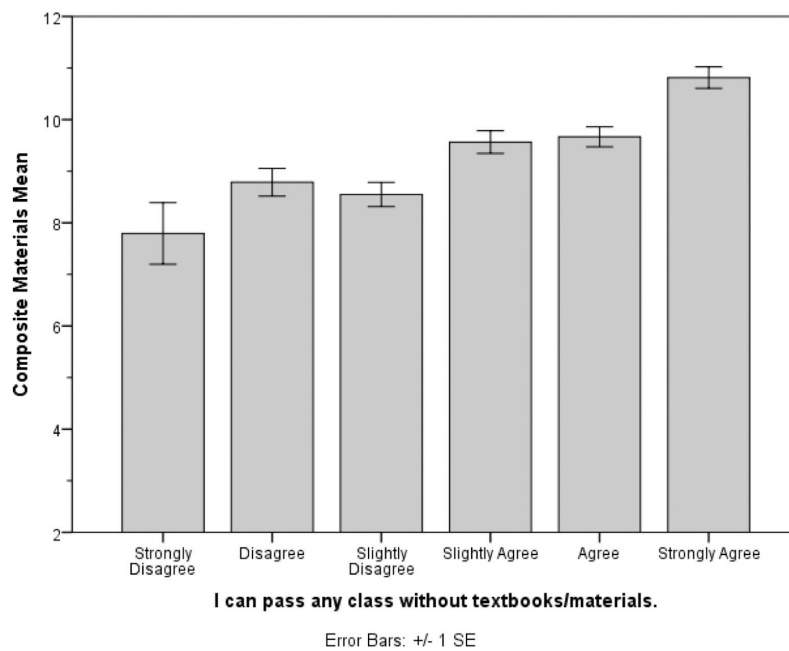
In Figure 2, student perceptions of the usefulness of materials are compared with their self-reported textbook/materials access behavior. Student perceptions of the usefulness of materials is measured using the Composite Materials Score, where 2 represents the lowest and 12 represents the highest perception of the usefulness of materials. Error bars represent 1 standard error.

Student access to materials and their opinions about the usefulness of materials are positively associated.

*RQ4: Did student beliefs about their ability to pass a class without textbooks influence their attitudes about the usefulness of textbooks/materials, whether they avoided buying them or if they had access to them?*

MANOVA with Tukey's B post analysis was completed to determine if the statement, "I can pass any class without textbooks/materials" would impact student beliefs about the usefulness of Textbooks/Materials, led them to avoiding purchasing textbooks, or ensuring access to them. Overall the model was significant in that the attitude of I can pass any class without course materials significantly predicts their attitudes about the usefulness of course materials and predicts their access to the materials  $F(5,425)=17.25$ ,  $p<.001$  with a large effect size ( $\eta^2=.17$ ; power=.99). The student attitude that they can pass any class without course materials significantly predicts their attitude about textbooks and their access behavior.

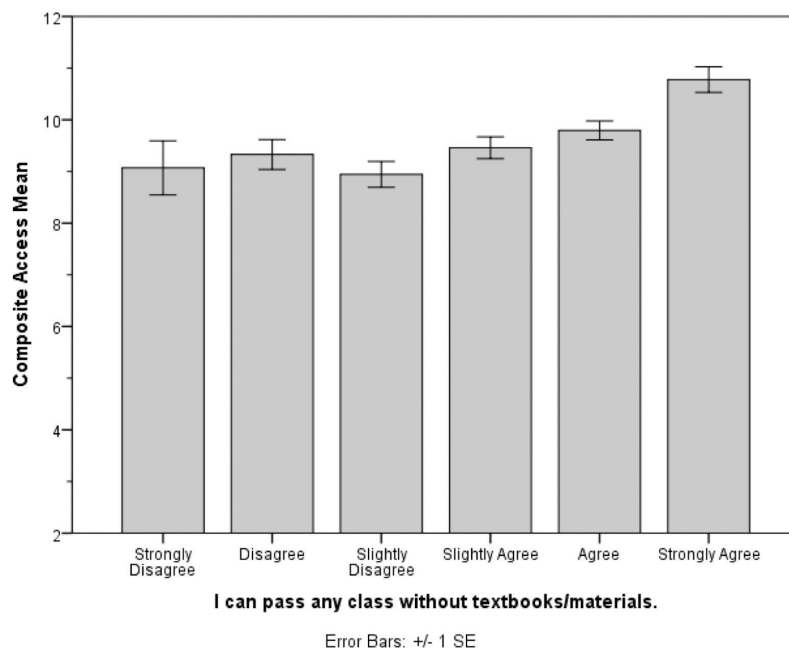
Students who strongly agreed ( $M=10.8$ ) with the statement, "I can pass any class without textbooks/materials" were significantly more likely to think textbooks were useful than all other groups including students who strongly disagreed ( $M=7.8$ ). Students who agreed ( $M=9.7$ ) with the statement were also significantly different from those who slightly disagreed ( $M=8.6$ ) and strongly disagreed. Students who slightly agreed ( $M=9.6$ ) were also significantly different from those who strongly disagreed. Generally, students who thought that they could pass the class without textbooks still found them significantly more useful than other students. Data used for this analysis is displayed in Figure 3.



**Figure 3: Student perceptions of usefulness and use**

In Figure 3, student perceptions of the usefulness of materials are compared with their perceptions of the need to use materials to pass classes. Student perceptions of the usefulness of materials is measured using the Composite Materials Score, where 2 represents the lowest and 12 represents the highest perception of the usefulness of materials. Error bars represent 1 standard error.

Students who strongly agreed ( $M=10.8$ ) with the pass any class statement also reported that they were significantly more likely to purchase and have access to course materials than all other groups including strongly disagree ( $M=9.1$ ). Generally students ensured that they had access to the materials but they were not needed to pass the class. Data used for this analysis is displayed in Figure 4.



**Figure 4: Student access and use**



In Figure 4, student access to materials is compared with their perceptions of the need to use materials to pass classes. Student access to materials is measured using the Composite Access Score, where 2 represents the lowest and 12 represents the highest perception of the usefulness of materials. Error bars represent 1 standard error.

Students who strongly agreed (M=6.4) with the pass any class statement also reported that they were significantly more likely to avoid paying for the textbooks when compared to students who slightly agreed (M=7.9), slightly disagreed (M=8.1), disagreed (M=8.2) or strongly disagreed (M=8.2). Students who thought that they could pass any class without textbooks also tried to avoid paying for the materials.

Students who think that they can pass any class without textbooks still find the textbooks useful, ensure that they have access to textbook materials but try to avoid paying for them. Students who reported that they were able to pass any class without textbooks also reported that they thought the textbooks were very useful which seems to contradict what we might expect. One might assume that if a student believes that they can pass any class without a textbook would not find the textbooks useful. However, this is not true according to this data.

## Discussion

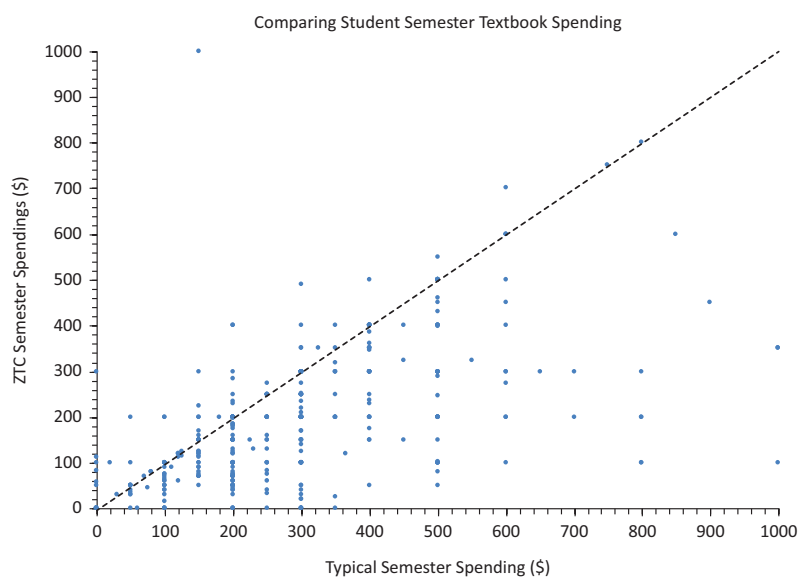
OER/ZTC textbook initiatives are often trumpeted as being beneficial to students in two dimensions, dollars spent and access to learning materials. That is to say OER/ZTC initiatives save students money and have the potential to improve student learning by providing equitable access to learning materials. Cost savings potentially benefit all students, but students who had the means to pay for commercial textbooks before ZTC adoption will see greater cost savings than students who were not purchasing. This concept is visualized in Figure 5 where student typical semester spending on materials is plotted against their textbook spending during a semester when enrolled in a ZTC course. Data points below the data line are students spending less money in the ZTC semester than in a typical semester and the distance the data point is from the dotted line represents their cost savings.

These two dimensions have interesting overlap in that students who are likely to save the most money are the ones who previously had access to materials. Those students who are not spending much money on materials to begin with and are likely seeing smaller cost savings and are the ones more likely to now have access when the course adopts ZTC materials.

Figure 5 is a comparison of individual student semester spending on textbooks in typical semesters and a semester when enrolled in a ZTC course. Individual data points represent one student reported spending behavior. The dotted line is added as a visual to represent equal spending in typical and ZTC enrolled semesters.

Students enrolled in ZTC courses for this study report saving on average \$75 - \$96 on course materials. A savings of \$75 is calculated when comparing the median typical semester materials spending with the ZTC semester materials spending. A savings of \$96 is calculated when comparing the semester spending means. These savings calculations are consistent with other findings and numbers used by organizations like OpenStax (2018) for quantifying cost savings (\$79.37) which is based on data from the 2015-16 National Postsecondary Student Aid Study by the National Center for Education Statistics (2018).

The variations in student spending on textbooks does not appear related to their attitudes about the utility of textbooks, their perception of their ability to pass classes without textbooks, or their general access to materials. Class material buying behavior also doesn't seem to be related to student attitudes towards the importance of the materials. Variations in textbook buying behavior are then likely related to other parameters such as student budget, major, or other factors. Again, returning to Behnke's (2018) discussion of Joo et al. findings, the bigger influence on class material buying seems to be "environmental variables", not "student self-efficacy, perceived ease of use, and perceived usefulness" (p. 390).



**Figure 5: Comparison of spending**

While the amount spent on textbooks shows no difference based on student attitudes about textbook utility, student material purchasing and access behavior is positively associated with their opinions of the usefulness of the materials. There are a number of ways that students can access the same course materials via a wide variety of mechanisms: purchasing, renting, borrowing from the library or friends, purchasing older editions of materials, or illegally pirating materials. Each of these different access mechanisms has various implications for student behaviors and long-term access differences. For example, students who share textbooks have access that is more limited than students who buy textbooks and the access for students who share textbooks likely disappears at the conclusion of the course. The positive association between student attitudes about textbooks and student access behavior implies either that students who find textbooks useful are already finding ways to access them, or students who access textbooks find them useful, or some unmeasured parameters influence the other two.

Our findings show a positive relationship between students reporting they can pass a class without a textbook and students finding textbooks useful. Seeing a positive relationship between student attitudes towards textbooks and their access to textbooks is worthy of further exploration to try to determine the directionality of this relationship. If student access to materials is causing them to have a more positive attitude towards the usefulness of materials, then providing more equitable access via ZTC initiatives has the potential to engage students more with learning materials which may positively influence student learning. However, if student attitudes towards materials are causing them to access materials more, then simply providing equitable access to materials is unlikely to get students who were not previously accessing materials to start utilizing materials. It is possible that students who want access to materials already have that access and so providing more equitable access will not change the amount that students access those materials if we do not also change student attitudes towards the usefulness of materials. At this time, this is an interesting finding, but incredibly complicated and needing further investigation. Due in part to limited study in textbook research (Fuchs and Bock, 2018), the possibility of intrinsic motivation, and the relatively small sample size of this study, further studies may or may not confirm this finding. We will continue to explore this positive relationship as we continue to engage with this survey.

We also probed student attitudes about the utility of textbooks by asking if they thought they could pass courses without the use of materials. Students who strongly believe they can pass courses without textbooks/materials avoid paying for the materials, but still are more likely to have access to the materials and find the materials useful. Even though students report that they avoid paying for materials if they believe they can pass courses without textbooks, the amount they spend on materials does not show the same association. This further shows that the amount students spend on materials is unrelated to their views on materials and is mediated by external factors. Student opinions about the necessity of using a textbook for passing a class provides interesting insight into the complex relationships students have with learning materials. Those who are more likely to access and see utility in learning materials also think they can pass courses without the use of those materials.

Simply providing access to materials without considering the complex relationships that students have already built towards learning materials could result in initiatives that are well intentioned but fail to produce large desirable impacts.

### Study Limitations

All data collected is self-reported by students enrolled in a ZTC course during the Fall 2019 semester at a Regional Master's Level Public University. The courses from which the study draws from are distributed amongst various academic disciplines and undergraduate levels, but these might not proportionally represent all classes taught at the University or distributions between course levels.

While writing this article, a global pandemic affected higher education (and the world). In some cases students were forced to return home, many might not have prepared for the extended break from campus leaving behind textbooks, or losing their access to materials when they lost access to the library. While our data was collected before this event, we discussed during data analysis in what ways this loss of access might impact student attitudes toward textbooks. We wondered if students enrolled in these OER or ZTC courses (designed by us and faculty in our program) lost internet access, therefore losing access to the free course materials digitally provided to them. While this is still an early exploration into student access and student attitudes, global events and campus events could impact the connections further. We think the complicated relationship illuminated by this data warrants further study including learning more about how and where students access materials to understand their perceptions further.

### Conclusion

Initiatives that encourage faculty to adopt OER and ZTC materials hope to benefit students by reducing their costs and improving student learning via equitable access to learning materials. The COUP Framework developed by Bliss et al. (2013) is an important framework for understanding cost, outcomes, use, and perceptions. Better understanding how student attitudes and behaviors combine to influence the desired outcomes is crucial to how OER and ZTC programs are integrated with the student experience and what positive outcomes we can expect to see for individual students. We find that the average student clearly saves money when enrolled in a ZTC course, but the potential cost savings are drastically different for individual students based on the amount they were previously spending for textbooks. We also find that student access to materials is positively associated with their opinions about the usefulness of those materials, but the direction of influence for those two variables have very different implications for OER and ZTC programs that need to be explored.

Students enrolled in OER and ZTC courses often come into those courses with established behaviors and opinions about materials that are most likely shaped by their interaction with commercial materials. In order to realize the full potential of the impact of adoption of ZTC, it is critical to understand the complex relationship students have with materials and design interventions that help students engage and utilize the potential of equitable access.

## Acknowledgements

This work would not have been possible without the financial support of the Provost and Deans at University. Additionally, the authors would like to thank the work of the Working Group for all their support of the various elements of the initiative projects like this require.

## References

- Behnke, Y. (2018). Textbook effects and efficacy. In E. Fuchs & A. Bock (Eds.), *The Palgrave Handbook of Textbook Studies* (pp. 383–398). Palgrave Macmillan. <http://doi.org/10.1057/978.1.137.53142.1>
- Bliss, T.J., Robinson, T.J., Hilton, J., & Wiley, D.A. (2013). An OER COUP: College teacher and student perceptions of Open Educational Resources. *Journal of Interactive Media in Education*, p.Art. 4. <http://doi.org/10.5334/2013-04>
- Brandle, S., Katz, S., Hays, A., Beth, A., Cooney, C., DiSanto, J., Miles, L., & Morrison, A. (2019). But what do the students think: results of the CUNY cross-campus zero-textbook cost student survey. *Open Praxis*, 11(1), 85–101. <https://doi.org/10.5944/openpraxis.11.1.932>
- Clinton, V., & Khan, S. (2019). Efficacy of open textbook adoption on learning performance and course withdrawal rates: a meta-analysis. *AERA Open*, 5(3). <https://doi.org/10.1177%2F2332858419872212>
- Colvard, N., Watson, C. E., & Park, H. (2018). The Impact of Open Educational Resources on Various Student Success Metrics. *International Journal of Teaching and Learning in Higher Education*, 30(2), 262–276. Retrieved from <https://www.isetl.org/ijtlhe/pdf/IJTLHE3386.pdf>
- Croteau, E. (2017). Measures of student success with textbook transformations: the Affordable Learning Georgia Initiative. *Open Praxis*, 9(1), 93–108. <http://dx.doi.org/10.5944/openpraxis.9.1.505>
- Fischer, L., Hilton, J., Robinson, T.J., & Wiley, D. A. (2015). A multi-institutional study of the impact of open textbook adoption on the learning outcomes of post-secondary students. *Journal of Computing in Higher Education*, 27, 159–172. <https://doi.org/10.1007/s12528-015-9101-x>
- Fuchs, E. & Bock, A. (2018). Introduction. In E. Fuchs & A. Bock (Eds.), *The Palgrave Handbook of Textbook Studies* (pp. 383–398). Palgrave Macmillan. <http://doi.org/10.1057/978.1.137.53142.1>
- Hilton, J. (2016). Open educational resources and college textbook choices: a review of research on efficacy and perceptions. *Educational Technology Research and Development*, 64, 573–590. <https://doi.org/10.1007/s11423-016-9434-9>
- Hilton, J. (2018). Open educational resources, student efficacy, and user perceptions: a synthesis of research published between 2015 and 2018. *Educational Technology Research and Development*, 68, 853–876. <https://doi.org/10.1007/s11423-019-09700-4>
- Hilton III, J. L., Robinson, T. J., Wiley, D., & Ackerman, J. D. (2014). Cost-savings achieved in two semesters through the adoption of open educational resources. *The International Review of Research in Open and Distributed Learning*, 15(2). <https://doi.org/10.19173/irrodl.v15i2.1700>
- Katz, S. (2019). Student textbook purchasing: the hidden cost of time. *Journal of Perspectives in Applied Academic Practice*, 7(1), 12–18. Retrieved from <https://jpaap.napier.ac.uk/index.php/JPAAP/article/view/349>
- Lin, H. (2019). Teaching and learning without a textbook: undergraduate student perceptions of Open Educational Resources. *International Review of Research in Open and Distributed Learning*, 20(3), 1–18. <https://doi.org/10.19173/irrodl.v20i4.4224>

- Martin, M.T., Belikov, O. M., Hilton, J., Wiley, D., & Fischer, L. (2017). Analysis of student and faculty perceptions of textbook costs in higher education. *Open Praxis*, 9(1), 79–91. <http://doi.org/10.5944/openpraxis.9.1.432>
- National Center for Education Statistics (2018). *2015–16 National Postsecondary Student Aid Study (NPSAS:16) Restricted-Use Data File*. Retrieved from <https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2018484>
- OER Commons (2020). *OER Commons & Open Education: The future of education, co-created with you*. Retrieved from <https://www.oercommons.org/about>
- OpenStax (2018, August 1). *48 percent of colleges, 2.2 million students using free OpenStax textbooks this year*. Retrieved from <https://openstax.org/press/48-percent-colleges-22-million-students-using-free-openstax-textbooks-year>