



Open Educational Resources & The Cost of Required Course Materials in Four-Year Universities

The 2018 Washington State Legislature directed the Washington State Institute for Public Policy (WSIPP) to “conduct a study on the cost of textbooks and course materials and the use of open educational resources at four-year institutions of higher education across the state.”¹ The legislature directed WSIPP to examine the types and average costs per student for required textbooks and course materials, the use of open educational resources, and any other relevant information or best practices in the development and dissemination of open educational resources.

Section I provides background information on open educational resources (OER), postsecondary course materials, and relevant legislation in Washington. **Section II** presents estimates from public, four-year institutions in Washington on the cost of course materials by item type and course type, and it examines the prevalence of zero-cost courses. **Section III** contains estimates by school and area of study of the total cost of all required materials over the duration of bachelor’s degree completion. **Section IV** discusses notable practices in support of OER, factors limiting their adoption, and other innovations in the provision of postsecondary course materials at four-year universities. **Section V** summarizes the key findings.

Summary

The 2018 Washington Legislature directed WSIPP to study open educational resources and the cost of textbooks and required course materials.

We found that, on average, students completing a bachelor’s degree at public universities in Washington were expected to spend approximately \$2,734 on required textbooks and course materials. Students completing degrees in business or engineering were expected to spend over \$3,400, on average. These estimates assumed students purchased used items whenever possible and purchased all items from the campus book store.

Open educational resources (OER), an alternative model for course materials, relies on content that is free to use, alter, and distribute for educational purposes. We could not precisely measure the prevalence of OER use in Washington’s public four-year universities, because OER use has not been tracked systematically. Using data from campus book stores, we found that 26% of undergraduate courses required \$0 of course materials.

Relying on interviews, a review of available research, and additional analyses, we examined several potential practices for supporting OER use in four-year universities. We found that grant programs like Washington’s current OER Grant Pilot Program were a potentially cost-effective approach to supporting wider OER adoption in four-year universities.

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¹ Engrossed Second Substitute House Bill 1561, Chapter 268, Laws of 2018.

I. Background

This study examines the costs of required course materials and the use of open educational resources at public four-year institutions in Washington.

Paying for course materials is a financial concern for many college students. For some students,² the out-of-pocket cost of required materials can approach or exceed the cost of university tuition. Innovations in information technology could theoretically reduce the cost of producing and distributing educational materials, but market forces have not slowed the growth in the price of textbooks. In recent years, the price of textbooks has increased at a rate several times the inflation rate.³

In response to concerns about the cost of required course materials, the Washington State Legislature has required that university-affiliated bookstores provide “unbundled” options for purchase;⁴ disclose the costs of materials to faculty, staff, and students; disclose how new editions of textbooks vary from previous editions; and promote book buy-back programs.⁵ The legislature has also directed faculty to consider the least costly practices in assigning materials.⁶

² Particularly students who receive significant financial aid.

³ Bureau of Labor Statistics. (2016, August 30). [College tuition and fees increase 63 percent since January 2006](#).

⁴ [RCW 28B.10.590](#) defines a bundle as “a group of objects joined together by packaging or required to be purchased as an indivisible unit.” Unbundled items are available for purchase as individual units.

⁵ [House Bill 1224, Chapter 457, Laws of 2007](#) and [Second Substitute House Bill 1025, Chapter 241, Laws of 2009](#).

⁶ [Substitute House Bill 3087, Chapter 81, Laws of 2006](#).

Legislative Assignment

...the Washington institute for public policy shall conduct a study on the cost of textbooks and course materials and the use of open educational resources at four-year institutions of higher education across the state and submit a report to the appropriate committees of the legislature...the study should address:

- a) *The types and average cost per student for required textbooks and course materials, including digital access codes and bundled items, in the state, at each four-year institution of higher education, and in specific degree programs;*
- b) *The use of open educational resources at four-year institutions of higher education and in specific degree programs or courses, or both; and*
- c) *Any other information regarding textbooks, course materials, or best practices in the development and dissemination of open educational resources that the Washington state institute for public policy deems relevant.*

E2SHB 1561, Chapter 268, Laws of 2018

One potential low-cost practice is the use of open educational resources (OER). Open educational resources are “teaching, learning and research materials in any medium that reside in the public domain or have been released under an open license that permits free access, use, adaptation and redistribution.”⁷ Instructors can create, adopt, or adapt OER for their courses to supplement or replace traditional textbooks.

⁷ Hewlett Foundation. [Open Educational Resources](#).

A transition toward greater OER use has been evident in Washington’s two-year colleges in recent years.⁸ The 2018 Legislature created the Open Educational Resources Grant Pilot Program, awarding public four-year universities grants to either (1) designate a campus OER coordinator or (2) support faculty adoption or creation of OER.⁹

Postsecondary Course Materials

New textbooks increasingly incorporate digital content and media, but the use of printed textbooks remains widespread. Multiple surveys have found that college students exhibit a clear preference for print textbooks over digital textbooks. For example, in a 2018 survey, the National Association of Campus Stores found that 74% of college students preferred print.¹⁰ The popularity of digital course materials has been increasing in recent years but at a slow rate.¹¹ An online survey of 527 students from San Jose State University found that students reporting a preference for print materials most frequently cited “ease of use” and “note-taking ability” as reasons for their preference.¹² Students preferring digital textbooks most frequently cited the materials’ lightweight, convenient access, and search functionality.

The survey from San Jose State also found that students preferring digital textbooks were more likely to cite lower cost as their reason for the preference. When digital and

paper versions of an identical, new textbook are both available, the digital price is typically lower. That said, this finding does not necessarily imply that the net effect of shifting toward digital textbooks will lead to lower costs for students. The National Association of Campus Stores’ survey found that 21% of students preferring print textbooks cited the inability to retain access to the content after the course or inability to re-sell the book as their primary reason for preferring print. While a used paper textbook can be sold to another student, a used access code has no resale value. Digital materials typically cannot be re-sold.

Options for Acquiring Course Materials

WSIPP’s analyses focus predominantly on the costs of course materials purchased through campus stores. While many third-party retailers sell textbooks, most students prefer to purchase their books through campus stores.¹³ Nevertheless, many other options exist.

3rd Party Retailer. Campus stores may not have enough used books on hand to meet student demand, and students may prefer to purchase books from a third-party retailer. Web sites operated by campus stores display prices available from third-party retailers alongside their prices. We estimated that students could save 23% over the course of degree completion by purchasing used materials from a third-party retailer when possible (see [Appendix III](#) for more detail).¹⁴

⁸ Final Bill Report. E2SHB 1561.

⁹ Engrossed Second Substitute House Bill 1561, Chapter 268, Laws of 2018.

¹⁰ National Association of College Stores. (2018). *Student watch: Behaviors and trends of student consumers*.

¹¹ Ibid.

¹² Tan, T. (2014) *College students still prefer print textbooks*. *Publishers weekly*.

¹³ Rosen, J. (2016, November). *The college bookstore, disrupted*. *Publishers weekly*.

¹⁴ Our methodology and results are shown in Appendix section A. We provide estimates at the degree-level.

Textbook Rental. Textbook rental is another widespread option for students. We estimated that the average savings for textbook rental through a campus bookstore was 14.5%, compared to the cost of purchasing the same book used from the campus store ([Appendix III](#)). A potential drawback of textbook rental is that the same textbook would need to be rented multiple times for students taking a course series that relied on the same textbook. This is common in fields with expensive textbooks, such as foreign languages and chemistry. In these cases, a student needs to consider the likelihood of a continuation in a course sequence and the likelihood that a subsequent course in the sequence would rely on the same book.

Textbook Buy-Back. Similar in concept to rental, textbook buy-back is another potential cost-savings measure. Public, four-year higher education institutions in Washington are required to promote and publicize book buy-back programs.¹⁵ Campus store staff said that this model was particularly economical when professors could adopt a previously used edition and/or anticipate re-use of a previously used edition in advance.¹⁶ In theory, when a new book retailing for \$100 enters the market, the bookstore can aim to buy back copies from students at the end of the term for \$50, then re-sell the used books before the next term to a new student for \$75, who can then potentially sell the book back to the bookstore.

We included an analysis of potential savings through student buyback programs in [Appendix III](#) of the report. At the rates

available at the beginning of summer 2019, as students were finishing the academic year, the potential savings were modest. In some instances, a student could sell a new textbook to the bookstore for half the retail price, but these instances were rare. We estimated that buy-back programs were only offering to buy back about half of the items they sold during the academic year. When buy-back was available, the price offered to students was usually between 15% and 25% of the used price.

Inclusive Access. Another alternative sales model, referred to as “Inclusive Access,” makes course materials available to all enrolled students at a discounted price and charges the university per student enrolled. Inclusive Access is essentially volume-discounted textbook rental, where the university pays the publisher and then seeks reimbursement from students. Similar to the way that universities charge students for tuition, room, board, or other required fees, the university pays the publisher and then adds the negotiated price to the student’s bill for that term. Using data from Washington State University, we found that Inclusive Access courses were flagged as being discounted by 20%, 40%, or 50%. Inclusive Access items are less expensive on average than access codes or bundles, but students do not retain access to the materials after the course.

Course Reserves. Finally, in some cases, there are other ways to access required course materials without purchase or rental. For a book that does not require extensive use and can be made available through a university’s library, a professor can place a limited number of copies “on reserve.” When a book is placed on reserve, students take turns borrowing the book for short

¹⁵ [RCW 28B.10.590](#).

¹⁶ UW bookstore staff (personal communication, March 15, 2019).

periods of time. Data on the prevalence of informal book sharing among students is imperfect, but surveys have found that between 23% and 58% of students reported sharing a book with classmates.¹⁷ In recent years, illicit sharing of course materials has been aided by new websites, platforms, and continued improvements in information technology.¹⁸ A new version of a book can be purchased, scanned page by page, compiled into a PDF, and then made available for download. The necessary hardware and software are available on ordinary smart phones, though the quality of the images depends on the technology used.

Open Educational Resources

OER are materials that are free to use, alter, and distribute for educational purposes. They can take the form of digital textbooks, web resources, or public domain media. In contrast to traditional copyright, OER are licensed explicitly to promote copying and redistribution without costs or restrictions. OER are often distributed digitally, rather than in bound volumes, but the defining characteristic of an OER is the form of its license, not its medium.

In the U.S., interest in OER has increased rapidly in recent years. The percentage of faculty reporting “awareness” of OER increased from 34% in 2015 to 46% in 2018.¹⁹

¹⁷ Office of Distance Learning & Student Services. (2019). *2018 student textbook and course materials survey: Results and findings*. Florida Virtual Campus: Tallahassee, FL and Meyer, L. (2016 August). *Report: Students shun new textbooks to reduce education expenses*. *Campus technology*.

¹⁸ Elletson, G. (2019 October). *‘Pirate libraries’ find a market among students seeking to avoid high textbook prices*. *The Chronicle of Higher Education*.

¹⁹ Seaman, J.E., & Seaman, J. (2018). *Freeing the textbook: Educational resources in U.S. higher education*. BABSON Survey Research Group.

In 2017, New York’s community college system announced an \$8 million investment in OER and more than half of state legislatures introduced at least one OER-related bill. Several state legislatures funded grant programs similar to Washington’s OER grant pilot, which promote substitution of OER for traditional textbooks and have reported that each dollar spent has saved students \$10-\$15 in textbook costs.²⁰

The growing interest in OER among faculty and university administrators²¹ has been accompanied by new business models for OER development and dissemination. Lumen Learning, a for-profit company based in Portland, Oregon, contracts with colleges to provide OER materials through its platform. Top Hat, based in Toronto, Canada, uses a “freemium” distribution model. OER are available for free, but products targeted toward tests, quizzes, homework, and classroom management require fees.²²

Price, Student Expenditures, and Cost

“Price,” “student expenditures,” and “cost” are not interchangeable measures of textbook affordability. For example, an increase in the retail price of textbooks could coincide with a decrease in student expenditures on textbooks if higher textbook prices induced more students to forego purchase or if higher prices induced fewer faculty to require textbooks. Analyses of the cost of textbooks usually focus only on the retail price or student expenditures. WSIPP’s analysis considers both prices and student purchasing decisions when considering “cost.”

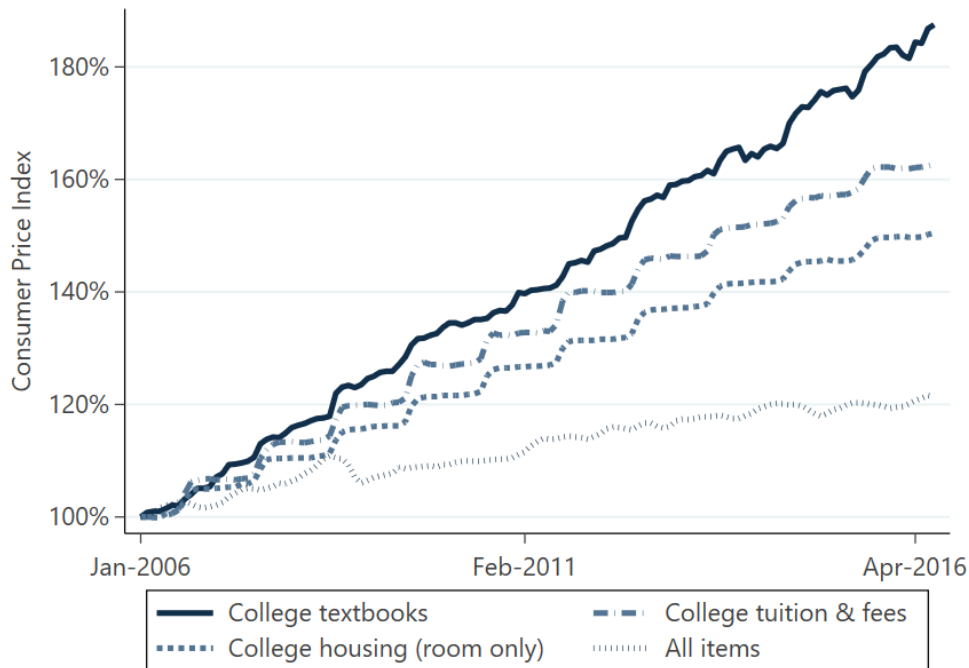
²⁰ Dimeo, J. (2017, April). *Turning point for OER use? Inside Higher Ed*.

²¹ Seaman & Seaman (2018).

²² Johnson, S. (2018 April). *Can a for-profit, venture-backed company keep OER free—and be financially sustainable? EdSurge*.

Exhibit 1

Inflation in the Price of Postsecondary Education and Course Materials



Notes:

Source: Bureau of Labor Statistics (2016).

The Consumer Price Index (CPI) compares prices for groups of similar goods over time.

The rate of increase in the price of "all items" is a standard measure of inflation.

Price of Course Materials

The cost of providing postsecondary education has increased at a rate above inflation for many years, and this growth has proven difficult to slow.²³ Despite innovations in information technology, higher education remains a labor-intensive industry, and cost growth for labor-intensive goods has tended to outpace inflation.²⁴ Increasing costs of higher education are borne both by students and governments. In Washington, since the early 2000s, increases in state appropriations have

increased at approximately 2.5% per year,²⁵ compared to a 2.2% annual rate of inflation for the same period.²⁶

As shown in [Exhibit 1](#), the retail price of textbooks is increasing at a rate several times the rate of inflation. Between January 2006 and April 2016, the Consumer Price Index (CPI), a standard measure of inflation, increased approximately 20%. The price of new college textbooks increased more than 80% over the same period.

²³ Archibald & Feldman (2010). *Why does college cost so much?* Oxford University Press.

²⁴ Ibid.

²⁵ Hoagland, C., Cramer, J., Hansen, J., & Fumia, D. (2019). *Higher education funding: Models used in Washington and similar states*. (Doc No. 19-03-2301). Olympia: Washington State Institute for Public Policy.

²⁶ Bureau of Labor Statistics. (2016, August 30). *College tuition and fees increase 63 percent since January 2006*.

The Bureau of Labor Statistics (BLS) focuses primarily on retail textbook prices in its estimates of inflation. The BLS estimates inflation by tracking the prices of comparable textbooks over time, which captures, for example, whether the price of introductory biology textbooks is increasing. These estimates do not take into account whether new biology textbooks are qualitatively superior to previous versions, whether biology professors are actually assigning textbooks, whether professors are choosing to use the most recent version of a textbook, or whether students are choosing to purchase the textbook.²⁷

Surveys of College Student Expenditures on Course Materials

Surveys of student expenditures ask students how much money they spent on course materials over a given period. Conceptually, trends in student expenditures capture the combined effect of changes in retail prices, changes in materials assigned by professors, and changes in student purchasing decisions. The results are potentially sensitive to the particular sample of students surveyed, their response rates, the accuracy of self-reports, and how students interpret survey questions. For example, a student who acquired a tablet or e-reader specifically for digital course materials may or may not include it in their estimates of required costs, depending on their interpretation of the wording of the survey question. Some surveys separately ask about spending on electronic devices for this reason.²⁸

As shown in [Exhibit 2](#), estimates of the levels of expenditures and trends in expenditures vary.²⁹ The 2019 survey from the National Association of College Stores found an average annual cost of \$415, while a 2015 survey from the Washington Financial Aid Association found an average annual cost of \$825. Assuming that students take four to five years to complete their degree, these estimates suggest a range of \$1,660 and \$4,125 for the average total cost of materials during bachelor's degree completion.

²⁷ The Consumer Price Index (CPI) tracks self-reported expenditures on educational materials to determine how much weight to assign its expenditure category when calculating the CPI.

²⁸ [National Association of College Stores](#).

²⁹ Survey results are reported in nominal dollars.

Exhibit 2

Previous Studies on the Cost of Textbooks and Spending on Course Materials

	Source	Year(s)	Sample	Methodology	Finding(s)
National surveys on annual student spending	National Postsecondary Student Aid Study (NPSAS)	2016	Nationally representative, undergrad	Survey item from a nationally representative sample of college students.	2016: \$542
	National Association of College Stores (NACS)	Annual	National, undergrad	Survey distributed to students by national* sample of campus stores.	2008: \$700 2017: \$579 2018: \$484 2019: \$415
	Student Monitor	Annual	National, undergrad	Interviews with 1,200 students from national* sample of colleges.	2017: \$503 2018: \$507
Washington surveys on annual student spending	Washington Financial Aid Association (WFAA)	2013, 2015	Washington, undergrad	Survey of students' annual expenditures on books and supplies.	2013: \$650 2015: \$825
	UW-Office of Student Financial Aid (OSFA)	2015	Univ. of WA, undergrad, submitted FAFSA	Survey of students' annual expenditures on books and supplies.	2015: \$734
University-reported estimate on federal survey	College Board/Integrated Postsecondary Education Data System (IPEDS)	Annual	National	Universities report average cost of "books and supplies" for IPEDS. College Board annually calculates averages.	2008: \$1,077 2017: \$1,250 2018: \$1,240 2019: \$1,240
National estimates of changes in retail prices over time	Bureau of Labor Statistics (BLS)	2016	National	Compare the retail price of "similar" textbooks over time (e.g., price of Introductory Biology in 2016 versus 2006).	Retail textbook prices are rising at 3-4 times the rate of inflation.

Notes:

Survey results reported in nominal dollars.

* The sample is national in scope, but the results are not necessarily statistically representative of the United States or directly comparable across years due to changes in sample composition.

Cost of Books and Supplies Reported by Universities in Federal Data Collections

Another source on the cost of college materials is the Integrated Postsecondary Education Data System (IPEDS) data collection. Public universities and most private universities provide data on their cost to the federal government each year. The IPEDS survey instructs universities to report the average cost of “books and supplies for a typical student for an entire academic year.” Universities are instructed to exclude groups of students with atypical costs, such as art majors.³⁰

The College Board annually estimates the national average cost of books and supplies reported by universities. They found that the 2018 average cost for public universities was \$1,240.³¹ Compared to surveys of student expenditures, the College Board’s estimate is significantly higher. One potential explanation is that universities include a wider variety of items when reporting on “books and supplies” compared to students reporting expenditures. It is also possible that universities overestimate the average cost of materials to ensure that students are eligible to receive sufficient financial aid to cover the costs of attendance. A university’s report of the cost of books and supplies affects how much federal financial aid students are eligible to receive, and the cost of required materials varies across courses and programs. If student eligibility for financial aid is set at the average cost, then students enrolled in more-costly-than-

average courses would not be able to qualify for sufficient aid.

With respect to cost trends, [Exhibit 3](#) shows that four-year universities in Washington fall into one of two groups.³² The first group reported a very slight upward trend between 2006 and 2018. The second group reported larger increases in the cost of materials from 2008 through 2016, and then a large decrease in 2017.

The first group consists of two institutions: Central Washington University and Washington State University. They estimated that the cost of books and supplies increased gradually over time but remained between \$900-\$1,000 between 2006 and 2018.

The second group consists of the other four universities.³³ At The Evergreen State College (TESC), the reported cost was \$900 in 2006, \$1,050 in 2016, and \$750 in 2018. Western Washington University and Eastern Washington exhibited similar trends. Year-to-year changes at the University of Washington were somewhat more pronounced. Their highest estimate was \$1,200 per year, which decreased to \$825 in 2017 in response to the results of the student expenditure survey conducted by the Washington Financial Aid Association (WFAA).³⁴

³⁰ National Center for Education Statistics. (2019). [Institutional characteristics for 4-year academic year tuition reporters. IPEDS 2019-20 Data Collection System.](#)

³¹ CollegeBoard. [Average estimated undergraduate budgets by sector, 2019-20.](#)

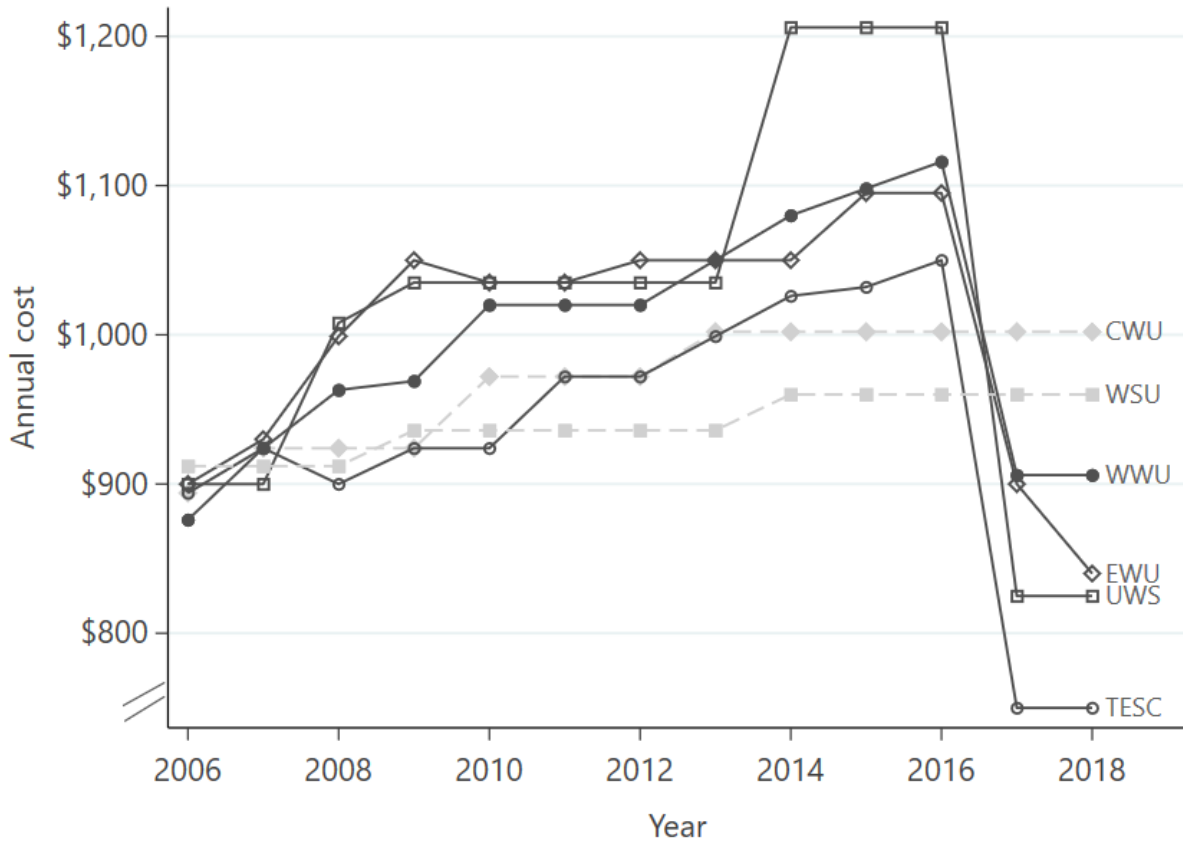
³² All figures reported in nominal dollars.

³³ UW-Tacoma and UW-Bothell were omitted due to insufficient historical data.

³⁴ M. Davis, Director of Systems and Analysis, Office of Student Financial aid at the University of Washington (personal communication, August 27, 2019).

Exhibit 3

University Estimates of Annual Cost of Books and Supplies



Notes:

Source: Integrated Postsecondary Education Data System (IPEDS).

Figures are reported in nominal dollars.

University of Washington's Bothell and Tacoma campuses did not report data before 2007 and their reported values matched UW-Seattle starting in 2007.

The 2018 estimates ranged from a low of \$750 for The Evergreen State College to a high of \$1000 for Central Washington University.

Because the accuracy of institutional estimates was difficult to assess, and in order to fulfill the legislative assignment to investigate costs *by program*, WSIPP used a novel approach to estimate the required costs of course materials.

WSIPP Cost Estimates

In [Section II](#), we focus on the costs of course materials at the item level and course level. These analyses relied only on data provided to WSIPP by university campus stores, which included required materials and their prices.

WSIPP's analyses in [Section III](#) combine data on course materials assigned, course material prices, and student course-taking to estimate the cost of purchasing all materials required for degree completion under multiple assumptions. We used data on prices and course-taking in Washington's public universities to estimate what students would spend if they purchased all required course materials at current prices and took the same sets of courses that recent graduates took. This approach does not define cost in terms of reported student expenditures. Instead, it defines cost as the amount of money Washington's public universities require—or at least implicitly expect—students to spend on course materials en route to baccalaureate degree completion.

WSIPP is not aware of other studies that aggregated individual item prices from the courses that students took en route to degree completion. A potential advantage is that it defines cost in a way that universities and course instructors can directly influence and in a way that public agencies in Washington can directly observe.

Public, Four-Year Institutions of Higher Education in Washington

Central Washington University (CWU)

The residential CWU campus is in Ellensburg, but CWU also has locations around the state. For this study, information from all campuses was included and combined.

Eastern Washington University (EWU)

The main EWU campus is in Cheney, but EWU also has a branch campus in Spokane. Information from all campuses was included and combined in this study.

The Evergreen State College (TESC)

The main TESC campus is in Olympia, but TESC offers programs at a Tacoma campus too. Information from all campuses was included and combined. TESC was omitted from analyses in the main body of the report because of its flexible and interdisciplinary academic structure. Neither courses nor students are typically located within a single department; there is no standard course numbering system for equating similar courses across years; and individual courses vary considerably in the number of credits awarded. Additional information is available in [Appendix IV](#).

University of Washington (UW)

The main campus for UW is in Seattle. We received disaggregated data that allowed us to separately analyze course-taking and course costs at the Seattle (UW-S), Tacoma (UW-T), and Bothell (UW-B) campuses.

Washington State University (WSU)

The main WSU campus is in Pullman, but WSU also has campuses in Spokane, Tri-Cities, and Vancouver. For this study, information from all campuses was included and combined.

Western Washington University (WWU)

The WWU campus is in Bellingham. WWU does not have additional branch campuses.

II. Costs of Required Materials by Type and Course

This section of the report satisfies part (a) of the legislative assignment by analyzing the costs of required course materials. It focuses on costs by item and the per-student cost by course. It addresses part (b) of the assignment by addressing the prevalence of courses in Washington that potentially use open educational resources.

Data

The data for [Section II](#) of the report came directly from the four-year university bookstores. WSIPP contacted each four-year university bookstore and requested a dataset containing all required course materials for each course from the 2018-19 academic year. This is information that all campus bookstores are required to post online for students at least four weeks before the start of each quarter. This

request specified that courses for which no materials were required, such as those relying only on OER materials, were retained in the dataset. All campus stores provided data that identified each course, the course's required materials, the campus store's new (retail) cost of each item, the campus store's minimum used price for the item, any available information about the type of item (e.g., "Book" or "Access Code"), and, if applicable, a code identifying the item. For textbooks, the code was typically the International Standard Book Number (ISBN). To the extent that additional data were available, WSIPP also requested detailed information about item type and alternative purchase options (e.g. the cost of renting an item). An example of the data WSIPP received is shown in [Exhibit 4](#).

Exhibit 4

Example of Data Available from Campus Stores

University	Year-term	Course ID	Item (ISBN)	Item type	New	Used	Minimum
WSU	2018 - Fall	Eng_101a	978-0521671880	Book	\$21.99	\$10.99	\$10.99
WSU	2018 - Fall	Eng_101a	978-1642810059	Book	\$12.34	\$4.99	\$4.99
WSU	2018 - Fall	Eng_101a	10123456	Access Code	\$70.00	N/A	\$70.00
WSU	2018 - Fall	Econ_101	978-0538453059	Book	\$125.00	\$85.00	\$85.00
WSU	2018 - Fall	Biol_305	NO TEXT REQ	N/A	\$0	\$0	\$0

All campus stores submitted data that met or exceeded the minimum specifications of WSIPP’s request. Nevertheless, differences in data systems across campus stores, differences across universities in academic structure, and differences across universities in data provided imposed constraints on between-university comparisons. For example, Washington State University operates on a semester schedule, while most other universities operate on a quarterly schedule. The Evergreen State College operates on a quarterly schedule, but the number of credits awarded per course varies considerably; at Evergreen, a single course enrollment can be equivalent to full-time enrollment elsewhere. As a result, not all exhibits and analyses will include all data from all universities.

Cost of Materials by Item Type

WSIPP combined data for academic year 2018-2019 from each campus store to create a comprehensive list of each item required for purchase in public four-year universities in Washington.

Books were the most common type of required course material, and most books were available new or used. Used books from the campus store were 26% cheaper than new books (\$54 compared to \$73). The most common exception to used book availability was when a course required the purchase of a “bundle,” which meant that students were required to purchase a specific book (new or used) and an access code. [Exhibit 5](#) shows average prices by course material type at Central Washington University, who provided detailed information about item type.

Course Materials Included in Analyses

Access code: A code that grants students access to online materials, such as readings, homework, and quizzes.

Book: The “new” price is the retail price charged by the campus store. “Used” is the lowest price at a campus store for a used copy of the book.

Bundle: A bundle typically includes a new book and an access code sold together.

Coursepack: A set of readings requiring copyright fees. Universities bind and sell them.

Ebook: A digital book or textbook.

Inclusive Access: A distribution model in which publishers discount the cost of digital materials conditional on receiving payment for every student enrolled in the course.

Other: Course materials that could not readily be classified into the categories above or below.

Course Materials Excluded from Analyses

Art supplies: Art kits sold by a campus stores cost between \$10 and \$60.

Clickers: Some courses require students to participate in class using a handheld device. For example, during class a professor may pose a multiple choice question and ask students to select what they think the correct answer is. An example, the iClicker, has a retail price of \$30.

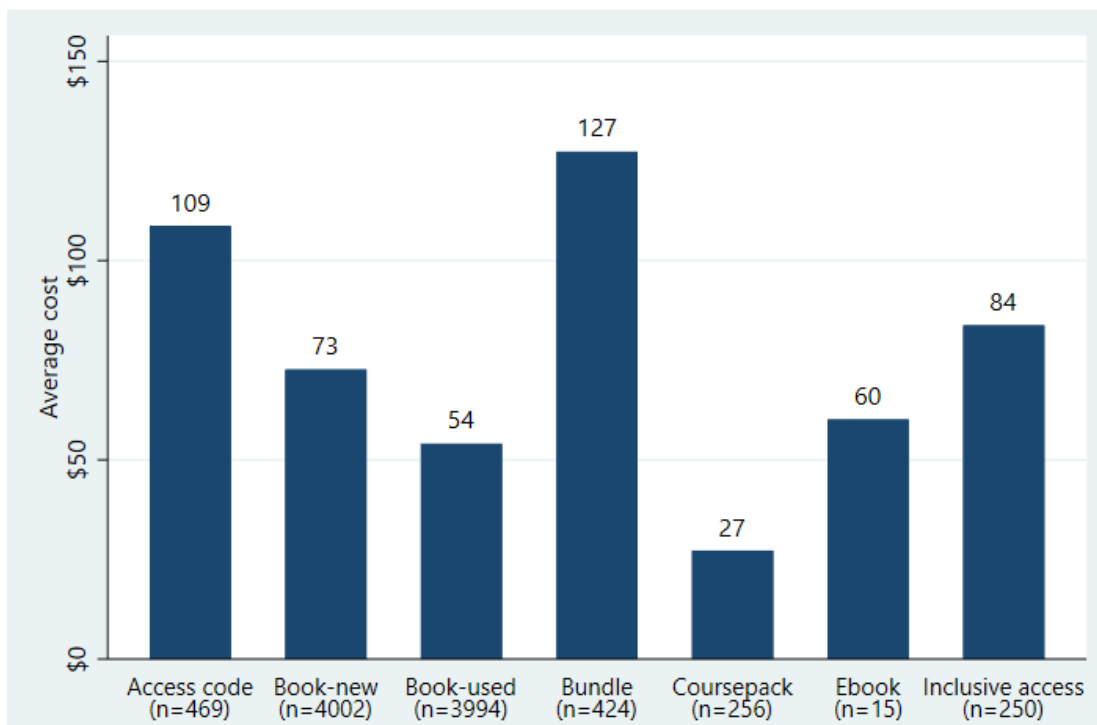
Goggles and lab coats: Typical prices for goggles and lab coats through the campus stores are \$15 and \$30, respectively.

Third-party services: Some courses require students to purchase access to a web site or application that hosts quizzes, homework, or other academic features. An example is Top Hat, in which a subscription costs about \$25.

In Exhibit 5, textbooks and other kinds of books—such as paperback books—are combined into a single category, but bundles typically include a textbook. The average price of a bundle at Central Washington University, \$127, is close to the average price of a new hardcover book, which was \$125 at Western Washington University and \$141 at the University of Washington.³⁵

Access codes grant students access to digital materials, which can include the required homework and quizzes. When possible, campus stores are required to offer students the option to purchase each bundle component separately.³⁶

Exhibit 5
Example Costs of Required Items



Notes:

The n's are the number of each type of item in our dataset for Central Washington University (CWU). An identical item that was required in multiple courses was repeated in the data. Each bar is a frequency-weighted average of costs for the item type indicated, where the frequency was determined by the number of courses requiring the item.

The data for this exhibit were restricted to CWU because not all institutions were able to provide detailed information about item type.

"Book-used" is the least expensive price available for purchasing the book used at the campus book store.

"Access code" is the cost of an access code that allowed access for a single term. "Inclusive Access" indicates purchase through an Inclusive Access model.

³⁵ WWU and UW provided data that differentiated hardback/hardcover from other book types. The calculation for UW combined the Tacoma, Bothell, and Seattle campuses.

³⁶ RCW 28B.10.590.

Cost of Items by Campus Store

We analyzed differences in item pricing across campus stores by comparing the prices of identical items that were sold at multiple university-affiliated bookstores (Appendix I). The International Standardized Book Number (ISBN) allowed us to identify identical items across bookstores. For the most part, at the item level, prices were similar across campus stores. The exception was Eastern Washington University, where equivalent items sold for about 16% more on average, compared to other universities (e.g., \$64 compared to \$55). These results indicate that, with the exception of Eastern Washington University, pricing decisions from individual campus stores are similar. It is unclear why Eastern Washington University tended to charge more on average for similar items.³⁷

Cost of Materials by Course Characteristics

To compare costs by course characteristics, we summed the cost of required items within a course (Appendix I). When multiple purchasing options were available - such as new versus used, or the option to select the length of time to purchase an access code - we assumed that students would purchase the least expensive items possible.

Often, multiple sections of the same course were offered in the same term within a university. For example, a large lecture class may require enrollment in an associated section for laboratory work, and students choose to enroll in one of the available

³⁷ At the time of this report's publication, campus store administrators at Eastern Washington University were reviewing their approach to costs. D. Tinker, Director of the University Bookstore, (personal communication, December 6, 2019).

sections. When the required costs varied by section, we selected the median section with respect to cost. That is, for a course with three sections requiring total costs of \$50, \$60, and \$80, respectively, we selected the value in the middle, \$60. When there was an even number of sections for a course, we picked the lower of the two potential middle values.³⁸

Exhibit 6 shows the average per-course minimum cost by university and course category. Darker shaded cells represent higher costs. Course categories relied on standardized codes for classifying instructional programs (CIP codes). Courses classified as business, management, marketing, and related support services were the most expensive, with an average cost of \$98 per course. Courses in the sciences, like engineering, physical sciences, biology, and computer science were also more expensive on average. Courses in the humanities and interdisciplinary courses tended to be less expensive. The least expensive course category was visual and performing arts. This result should be interpreted with caution because students in these courses may be expected to provide their own materials, like musical instruments or art supplies. These costs would not be tracked in the campus store data we received.

³⁸ We use the median section and break ties by rounding down rather than using the mean across all sections for several reasons. First, if students have discretion over section enrollment, they may choose to enroll in a less expensive section, which would lead to lower enrollment in higher cost sections. The average would equally weight all sections. Second, in order to remove duplicate item purchases for students across courses, we needed students to purchase specific sets of items—not an average of items. Third, one university provided data in a way that led to large numbers of low-enrollment sections for upper-division courses, such as independent studies. Counting these sections multiple times would lead to an unrealistic estimate of average per-course costs. Using the median section resolves this concern.

Exhibit 6

Average Minimum, Per-Course Cost of Required Materials by University and Course Type

Course subject CIP	CWU	EWU	UW-B	UW-S	UW-T	WSU	WWU	Total
Business, Management	118	133	109	86	87	59	102	\$98
Security/Law Enforcement	112	72				66		\$92
Engineering		105	152	73		66	109	\$85
Psychology	107	104		54	99	57	72	\$83
Physical Sciences	71	129	68	68		83	86	\$82
Biological and Biomed...	67	111	90	57		72	125	\$81
Engineering/Engineering Tech	85	76						\$81
Mathematics and Statistics	61	87	85	60	80	133	85	\$81
Foreign Language/Literature	120	109	81	64	94	57	70	\$72
Computer and Info Science	81	42	90	64	93	64	63	\$71
Public Administration		70		63	75		61	\$66
Social Sciences	78	76		53	49	55	73	\$65
Family and Consumer Sciences	85	169				38		\$63
Health Professions	82	56	38	63	46	46	91	\$62
Transportation and Materials	61							\$61
History	41	63		43	58	64	67	\$55
Legal Professions and Studies				25	71			\$55
Parks, Recreation, Leisure	43	49				58	54	\$52
Area, Ethnic, Cultural...	53	75		46	44	41	43	\$51
Education	58	54	41	11		35	49	\$48
Communication, Journalism	64	52	21	54	49	29	43	\$46
Philosophy/Religious Studies	49	66		31	42	31	38	\$42
English Language/Literature	51	47	14	41	33	31	42	\$41
Multi/Interdisciplinary	22		40	42	39	38	39	\$40
Liberal Arts and Sciences	59	41				4	35	\$33
Natural Resources and Cons.	67		66	41	25	32	27	\$33
Architecture		52		55		10		\$31
Agriculture				141		23		\$30
Leisure and Recreation	30							\$30
Visual and Performing Arts*	40	23		38	19	17	27	\$27

Notes:

Personal awareness and self-improvement, personal and culinary services, military science, library science, and "unknown" were omitted due to small cell sizes. Courses with no cost or zero cost were included in calculations. The Evergreen State College was omitted because its courses are difficult to categorize by subject and vary considerably in credits awarded.

*Results for visual and performing arts should be interpreted with caution because they often require materials that are not tracked as course costs by campus stores, which were not included in our analyses.

Washington State University had the lowest course material costs on average, but the amount of variability across course type is substantial. Because not all universities offer the same kinds of courses, average differences in course costs across universities should be interpreted with caution. For example, while Washington State University's courses were the lowest cost on average, their courses in mathematics and statistics were significantly more expensive on average than similar courses at other universities in Washington.

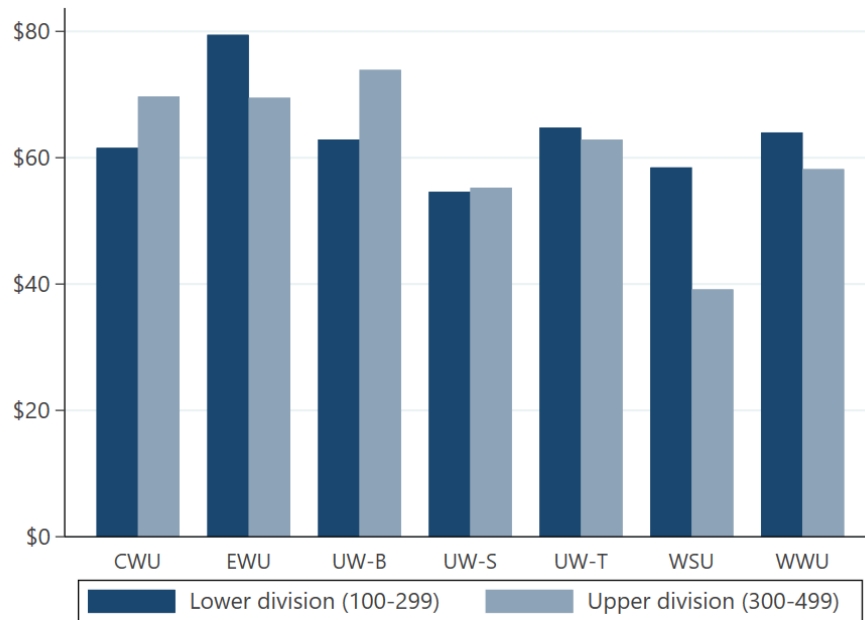
In [Exhibit 7](#), we show that the lower average cost for Washington State University courses was attributable in part to its low costs in upper-division courses. It is unclear why upper-division courses at Washington State

University would be inexpensive relative to other courses in the state. We cannot rule out that the lower cost observed for Washington State University was due to differences in dataset construction across campus stores. In [Appendix I](#), we discuss data issues in detail.

[Exhibit 7](#) shows the cost of lower-division and upper-division courses across universities. We found that upper-division and lower-division course costs were similar on average, with a few exceptions. For lower-division courses, Eastern Washington University had the highest average cost, \$79, which was about \$15 higher than the next highest value (\$65 at the University of Washington's Tacoma branch). For upper-division courses, the most notable finding was the relatively low average cost at Washington State University.

Exhibit 7

Average Per-Course Minimum Cost by University for Upper-Division and Lower-Division Courses



Note:

The average cost per-course is the unweighted average across undergraduate courses during the 2018-19 academic year, as tracked in bookstore data. For courses with multiple sections, the course cost for the median cost section was used. The estimate for upper-division courses at WSU should be interpreted with caution, for reasons discussed in [Appendix I](#).

Zero-Cost Courses

Part (b) of WSIPP’s legislative assignment was to address the use of OER. Through outreach to universities in Washington, WSIPP found that information on the prevalence of OER use was limited. Staff members at each university had detailed information about infrastructure and initiatives to support OER use, but they were developing systems for comprehensively identifying and tracking OER use. Some campus stores flagged specific courses as relying on OER materials, but OER courses were not reliably identified.

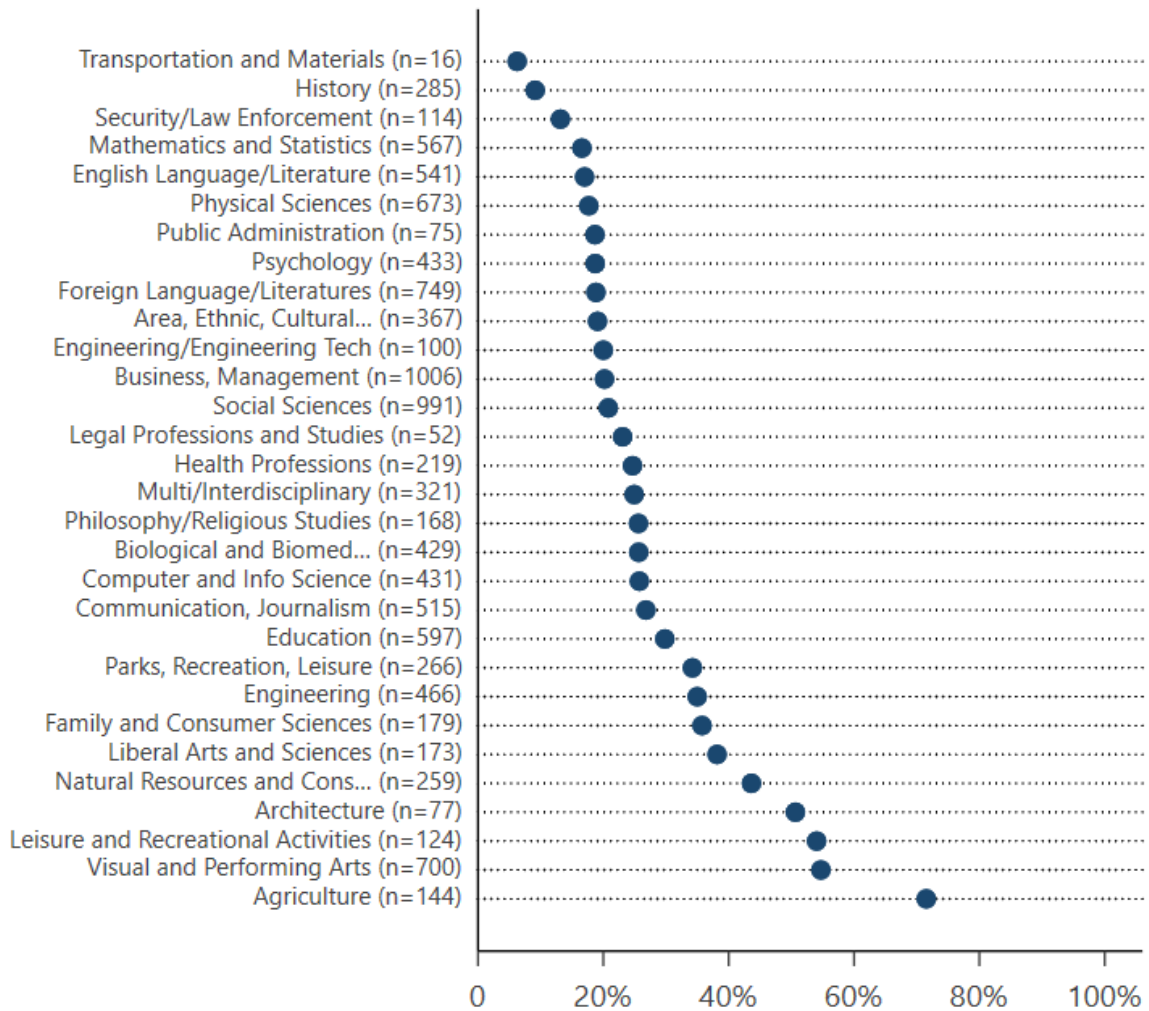
For example, if an instructor were teaching a course in which no course materials were required for purchase, the instructor would inform the campus store that no materials were required—without mention of OER. This approach should identify zero-cost courses to students, but it does not establish that the course is zero-cost because the instructor is relying on OER. Overall, we estimated that 26% of all courses in Washington require \$0 of course materials.³⁹ For lower-division undergraduate courses, our estimate was 20%.

Exhibit 8 shows the percentage of zero-cost courses in Washington by course CIP code. According to data from campus stores, courses categorized as agriculture, visual and performing arts, architecture, natural resources and conservation, and liberal arts and sciences were the most likely to have no required costs for course materials. As previously shown, these course subjects were among the least expensive on average, and it makes sense that subjects with many zero-cost courses would be less expensive. Again, for visual and performing arts, the results potentially understate the true cost of required materials and supplies, because students may be expected to provide their supplies. Course subjects with the lowest prevalence of OER were transportation and materials movement (only 16 courses in our data were in this category), history, and homeland security/law enforcement. Except for visual and performing arts, in most large-enrollment subjects, about 15%-35% of courses were zero-cost.

³⁹ It should be noted that faculty likely use OER materials alongside traditional course materials. Our analysis of zero-cost courses does not capture this use of OER.

Exhibit 8

Prevalence of Zero-Cost Courses Across Course Subjects



Note:

A zero-cost course is a course in which the total cost of required course materials is zero dollars. These courses were identified primarily using 2018-19 data from public, four-year university campus book stores. Each dot is the state-wide proportion of all courses assigned to the indicated CIP code. In parentheses, n is the total number of courses at any cost, not the count of zero cost.

III. Costs of Degree Completion

This section of the report satisfies part (a) of the legislative assignment by analyzing the average cost per student for required course materials at each four-year institution and in specific degree programs.

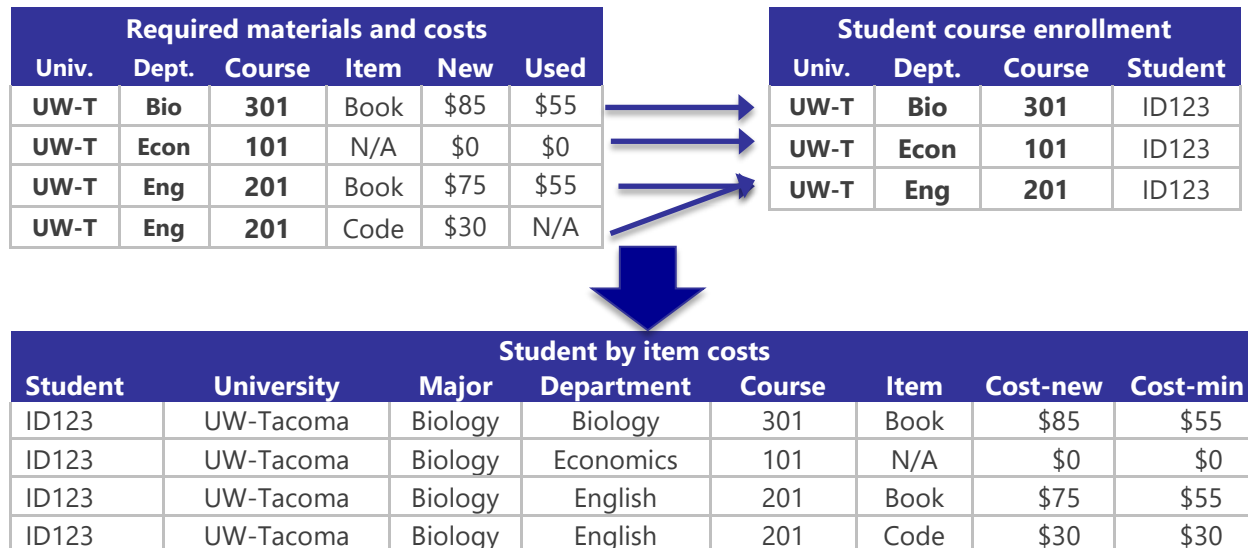
Data and Methodology

For Section III of the report, we combined data on postsecondary course enrollment with the data from university bookstores analyzed in the previous section (Exhibit 9). With information on the courses that graduates took and the cost of required

items for each course, we estimated the cost of degree completion by summing each student's required item costs. Having information at the item-level for each student allowed us to remove duplicate item purchases. For example, if Spanish 101 and Spanish 102 required the same textbook, a student who purchased the textbook for Spanish 101 would not need to purchase it again for Spanish 102. Methodological details are in Appendix I.

Exhibit 9

Estimating the Cost of Degree Completion:
Connecting Cost and Enrollment



Note:

Student major came from a separate file provided by the Washington State Education Research and Data Center (ERDC).

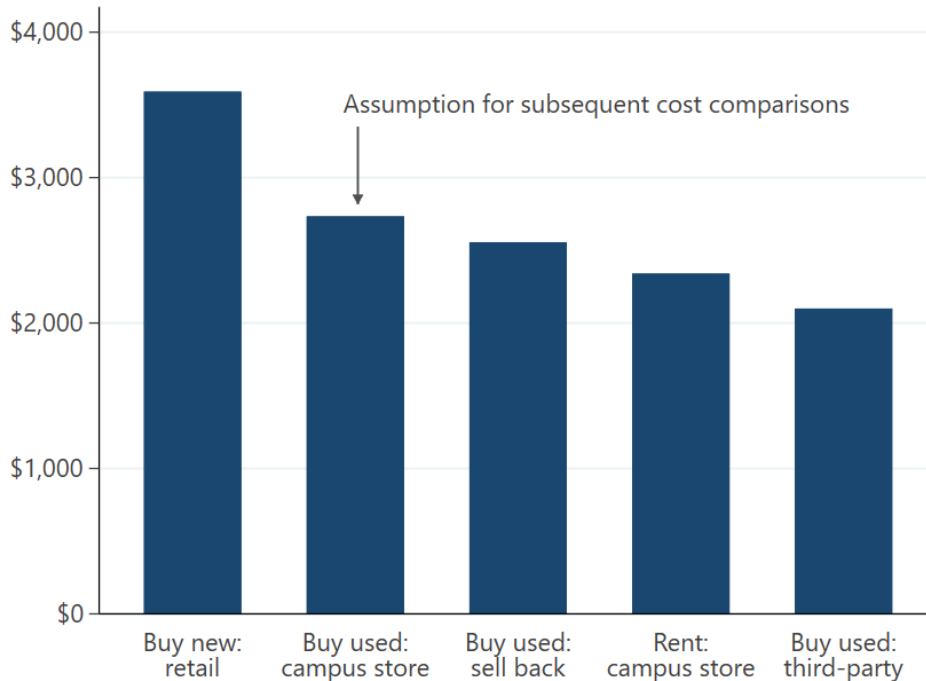
The cost of purchasing all the required materials for four-year degree completion depends on how students chose to purchase the items. We did not have information on how students chose to purchase their required course materials, but we had the necessary data to estimate what they would be expected to spend across a variety of assumptions about student purchasing decisions.

Exhibit 10 shows that, on average, across universities,⁴⁰ students who purchased all required items *new* from the campus book store would be expected to spend \$3,591. Students who purchased required items *used* from the campus book store whenever possible would be expected to spend \$2,734. For a student who preferred to buy used items and then, when possible, sell them back through a buy-back program, the total cost would be \$2,556. A student who preferred to rent books when possible, rather than purchase, would spend \$2,340. Lastly, a student who purchased used books at the lowest price available—either from the campus store or a third-party retailer—would spend \$2,099.

⁴⁰ We were unable to estimate the costs of degree completion for The Evergreen State College due to its unique curricular structure.

Exhibit 10

Average Cost of Required Course Materials for Degree Completion



Notes:

Each bar is the average cost across all students who earned a bachelor's degree from a public, four-year university in Washington in 2018. WSIPP estimated the average cost by summing the costs of all items associated with each course degree completers took, assuming 2018-19 costs for all courses, irrespective of when the course was actually taken. The cost per course was determined using 2018-19 data from campus stores.

"Rent: campus store" assumed that students rented materials whenever available at the campus store, at the lowest cost available. "Buy used: third-party" assumed that students purchased used materials from a major online retailer of used textbooks whenever the price was cheaper than the campus store used textbook price. Additional methodological details are in [Appendix I](#).

For subsequent comparisons in [Section III](#), we assumed that students purchased all materials from the campus store and purchased used materials whenever available.⁴¹ Campus stores do not have an infinite supply of used books, but our estimates assumed that students would

always be able to purchase required materials used from the campus store if the campus store stocked the used item at all.

[Exhibit 11](#) shows the average cost of required course materials for degree completion across universities. We estimated that the average costs of required course materials for the University of Washington graduates were lower than other universities in the state, ranging from \$2,168 for the University of Washington Bothell to \$2,433 for the University of Washington Seattle. We estimated that Central Washington University and Eastern

⁴¹ The reason we chose used prices for subsequent comparisons is that we had detailed data on retail and used prices across institutions and degree programs. We did not have access to similarly detailed data across institutions and degree programs about sell back and third-party options. The exhibit above estimated *average* savings across universities and degree programs using methods described in [Appendix I](#). We did not estimate how average savings for alternative options varied across universities or degree programs.

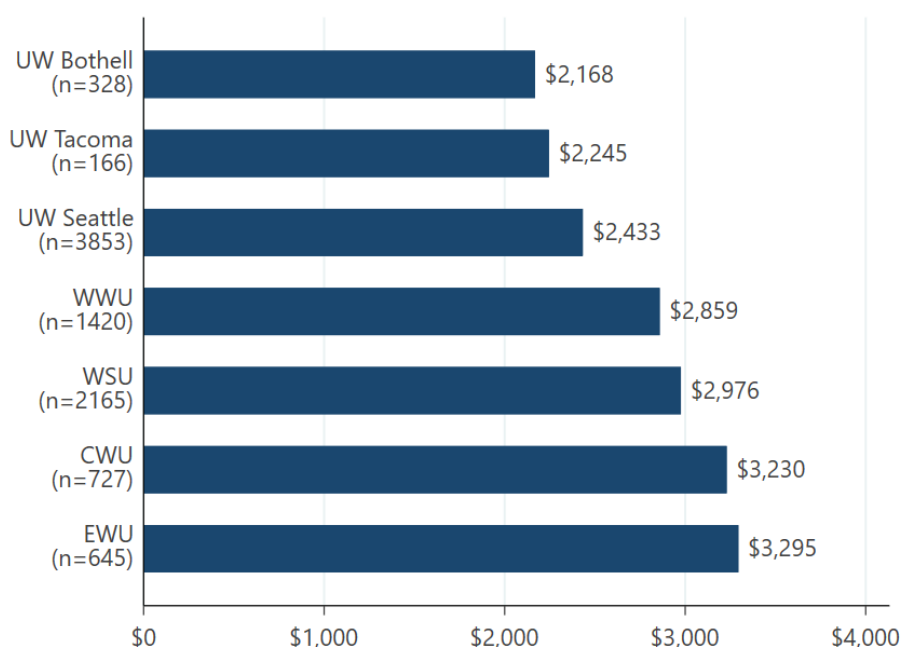
Washington University graduates were expected to spend the most on required course materials.

Eastern Washington University also had high average costs at the course level, and the results below suggest that its higher course-level costs lead to higher degree costs. High course costs on average—where each

course is equally-weighted, as they were in [Section II](#)—would not necessarily lead to higher average degree costs at a university where more students tended to enroll in less expensive courses, or in cases where expensive course materials were often re-used in subsequent courses. We found that removing duplicate required purchases decreased total costs by about 10%.

Exhibit 11

Average Cost of Required Course Materials for Degree Completion by University



Notes:

Each bar is the average cost across all students who earned a bachelor's degree from a public, four-year university in Washington in 2018. The cost for each student was estimated by summing the costs of all items associated with each course degree completers took, assuming 2018-2019

Not all universities offer the same degree programs and have equal numbers of students across degree programs, but accounting for between-university differences in types of degrees earned by students had only modest effects on the results in [Exhibit 11](#). We used statistical methods to compare average costs while

accounting for differences between universities in available degree programs ([Appendix I](#)). Essentially, this approach compared costs by isolating same-program differences in costs of required course materials. Across various model specifications, we continued to find that the total cost of course materials for graduates

from Eastern Washington University and Central Washington University was significantly higher than other universities, while the Tacoma and Bothell branches of University of Washington were the least expensive.

[Exhibit 12](#), below, shows the key information for making between-university comparisons of costs within similar degree programs. As before, we used pre-determined CIP code classifications, and darker cell shading represents more expensive degree programs. Also similar to before, we found that engineering and business were particularly expensive areas of study. Programs in the humanities were among the least expensive, and the social sciences were generally in the middle. The cost of required course materials for engineering and business degrees was usually in the \$3,000-\$4,000 range, while the cost of required course materials for English or communication programs was typically in the \$2,000-\$2,500 range.

We discuss methodological concerns and potential limitations in [Appendix I](#). In short, we did not find reason to believe that the differences in required costs between universities and between degree programs are misleading or spurious. Accounting for methodological challenges in matching current course material costs to previously offered courses taken did not substantially change our findings. For example, when we

compared costs of required materials across degree programs using six-digit CIP codes—a more granular approach, where business programs like marketing are differentiated from business programs like accounting—the between-university differences were often larger.

Finally, while our findings that some universities and degree programs tended to have higher course material costs than others were not sensitive to alternative analytical approaches, a key limitation is that we relied on data from a single academic year. While a single academic year did seem sufficient for across-university and across-program comparisons (i.e., comparing entire rows or columns in [Exhibit 12](#)), we are cautious about drawing strong conclusions at a more granular level (i.e., comparing individual cells in [Exhibit 12](#)).

Idiosyncratic, year-to-year changes in course-taking patterns among graduating students could have significant effects on estimates for individual cells. For example, a spike in students who completed education degrees while pursuing substantial coursework in the physical sciences could inflate our estimate of the average cost of the course materials for an education degree, because our methodology considers all courses taken by recent graduates, not only courses from the department awarding their degree.

Exhibit 12

Average Cost of Required Materials for Degree Completion by University and Area of Study:
Estimated Using Campus Store Prices for Courses Offered in 2018-2019

Degree CIP	CWU	EWU	UW-B	UW-S	UW-T	WSU	WWU	Total
Engineering/Engineering Tech	3,391	4,371					3,639	\$3,653
Business, Management	3,904	4,308	2,995	3,042	2,664	3,401	3,637	\$3,425
Engineering		4,581	3,490	2,797		3,771	4,175	\$3,238
Security/Law Enforcement	3,788				2,174	2,731		\$3,120
Transportation and Materials	3,072							\$3,072
Leisure and Recreation	2,743	3,015				3,157	2,238	\$2,906
Physical Sciences	2,631	3,462		2,588		2,709	3,171	\$2,777
Biological and Biomed...	2,930	3,448	2,120	2,540		3,187	3,405	\$2,754
Psychology	3,689	3,586	1,487	2,325	2,324	2,976	2,619	\$2,674
Computer and Info Science	3,520	2,193	2,227	2,365	2,789	3,367	3,242	\$2,663
Mathematics and Statistics			2,563	2,521		2,839	3,565	\$2,658
Public Administration	2,798	3,286		2,215			2,449	\$2,622
Family and Consumer Sciences	2,886	2,715				2,570		\$2,620
Multi/Interdisciplinary	3,565	2,869	1,714			2,655	2,342	\$2,599
Health Professions	2,814	2,801	1,443	2,348	2,074	2,877	3,036	\$2,570
Architecture				2,780		1,762		\$2,539
Education*	2,898	2,862		1,576		2,365	2,747	\$2,528
Social Sciences	2,983	2,959	1,311	2,194	1,908	2,904	2,688	\$2,481
Agriculture						2,464		\$2,464
Foreign Language/Literatures	3,024	3,161		2,072			2,708	\$2,393
History	2,519			2,050		2,728	2,329	\$2,302
Liberal Arts and Sciences					1,714	2,407		\$2,292
Natural Resources and Cons...				2,133	1,498	2,506	2,442	\$2,251
Area, Ethnic, Cultural...				2,172	1,992	2,183		\$2,160
Communication, Journalism	3,051	2,556	1,300	2,057	1,832	2,159	2,064	\$2,134
English Language/Literature	2,585	2,525		1,955		2,278	2,050	\$2,117
Philosophy/Religious Studies			1,336	1,958			2,376	\$1,736
Legal Professions and Studies				1,725				\$1,725

Notes:

The Evergreen State College was omitted from the exhibit because its curricular structure makes courses degree programs difficult to categorize.

*Degree CIP" is the description of the Classification of Instructional Program (CIP) code associated with a student's first major.

The source of the data is the Washington State Education Research and Data Center (ERDC).

Results for Visual and Performing Arts were excluded from degree-level estimates. See [Appendix I](#).

* Education can include music education, whose costs are difficult to estimate for similar reasons as discussed for Visual and Performing Arts in [Appendix I](#).

IV. OER Key Considerations

This section addresses part (c) of the legislative assignment. To learn more about the use of open educational materials in higher education, we interviewed librarians, faculty members, and instructional designers across Washington’s public four-year universities. We also spoke to representatives at the Washington Student Achievement Council, State Board for Community and Technical Colleges, Open Oregon Educational Resources, and Creative Commons. In this section, we highlight the main takeaways from these conversations.⁴²

There are multiple topics to consider if Washington wants to increase OER use at the four-year university level, including the time required to use and develop OER, training programs, the structure of grant programs, and, institution-based policies.

Implementing OER Takes Time

The time it takes to find and use OER varies based on what type of materials individuals need for their courses. Through our conversations and research, we identified three major OER-related activities, which we refer to as *adopting*, *adapting*, and *creating*, that influence the time commitment needed for OER. (See [Exhibit 13](#) for examples).

⁴² This section does not report evidence-based practices for using, developing, modifying, or sharing OER. OER use and practices are not consistently tracked within each institution.

Exhibit 13 OER-Related Activities

Adopting OER: Re-using or re-sharing openly licensed materials - created by others - without changing the content. For example, an instructor may search and download online materials like assignments or articles to share with students.

Adapting OER: Changing or modifying the content of open educational materials created by others. For example, an instructor may find an assignment online and need to make changes to its content to fit their course needs.

Creating OER: Creating original content published in the public domain or with an open license. For example, an instructor may write his or her own open textbook to use instead of a commercial textbook.

It is difficult to estimate the actual time it takes librarians, instructional designers, and faculty to perform various OER-related activities, and we found varying estimates from multiple sources. For example, one report focusing on OER efforts at several community colleges in Washington found that instructors and librarians spent an average of 82 hours working together to redesign courses using open materials.⁴³

⁴³ West, Q., Hofer, A., & Coleman, D. (n.d.) *Librarians as open educational leaders: Responsibilities and possibilities*.

Another source suggests that faculty may dedicate anywhere between 90 to 280 hours (or more), depending on whether faculty members adopt OER directly, modify the materials to fit the course and student needs, or create new materials.⁴⁴

Once OER are implemented, we learned from interviewees that OER need to be regularly updated to ensure content is relevant and accessible to students.

While the length of time is difficult to estimate, it's clear from our conversations that individuals need to consider the time that is likely required to work with OER.

[Exhibit 14](#) provides examples of OER-related activities across several Washington universities.

Exhibit 14

Examples of Open Educational Resources at Several Four-Year Universities in Washington

Through Washington's OER Grant Pilot Program, participating faculty at Western Washington University each received \$4,000 to attend a workshop to learn about OER and use materials for their courses.¹ Examples are listed below:

- Two professors worked together to compile free articles into an open textbook for a management course.
- An instructor created an open textbook including online videos and lectures for an introductory music course.
- A computer science professor created an online textbook that students can use to code directly in the text.

Since 2016, participating faculty at the Washington State University have received between \$1,500 to \$4,000 from the institution's Affordable Learning Grant for the exploration and development of OER.² Examples listed below:

- One professor used an open textbook available on OpenStax for his introductory Biology course.
- Another professor combined materials from two open textbooks to develop his own text for a marketing course. This material allows students to respond to the text and provide feedback about the course.

Participating faculty members at the University of Washington received \$3,000 each through an institutional grant called the Open Textbook Award to aid in the modification of OER or creation of new materials.³ Examples below:

- One professor created a new open textbook focused on statistics and modeling for behavioral science.
- One professor authored an online course book and supplemental materials for a Portuguese language course.

Notes:

¹ [Open educational resources at Western.](#)

² [Affordable learning grants save students thousands.](#)

³ [Open educational resources and open textbooks: UW libraries open textbook award.](#)

⁴⁴ Dillely, R. (2018, September 28). *Reassigned time as faculty incentive to adopt OER*. Community College Consortium for Open Educational Resources and R. Dilly (personal communication, October 23, 2019).

Grant Programs Incentivize OER Use

We found that grant programs are one of the most common methods to incentivize OER efforts on campuses and compensate librarians, faculty members, and others for a portion of their time.⁴⁵

For example, Washington State University and Western Washington University have used institutional funds to support OER efforts. Faculty members at Washington State University have received funding through the Affordable Learning Grant program to attend workshops, where they learned how to review open textbooks in their disciplines. They also collaborated with librarians and staff in the Academic Outreach and Innovation Department to adapt materials for psychology, communications, and marketing courses.⁴⁶

Alternatively, at Western Washington University, student technology fees have funded stipends for faculty members to redesign their courses using OER.⁴⁷

The 2018 Washington Legislature provided funding to the Washington Student Achievement Council (WSAC) to administer the Open Educational Resources Grant Pilot Program. The aim of the program was to expand the availability of affordable learning materials for students. Grantees were required to use funds to “create a designated campus coordinator” to be the point person on OER for the school and/or “support faculty to adopt and modify, or create new, open educational resources.”⁴⁸

In January 2019, two universities, Western Washington University and Central Washington University received \$36,000 each to support OER efforts.⁴⁹ More information for each university is provided below.

⁴⁵ Yano, B. (2017). *Connect OER Annual Report, 2016-2017*. Washington, DC. SPARC and Boyoung, C., & Jenkins, M. (2015). *A qualitative investigation of faculty open educational resources usage in the Washington community and technical college system: models for support and implementation*. Washington State Board for Community and Technical Colleges.

⁴⁶ Mordhorst, T. (2017, October 24). [Affordable learning grants save students thousands](#).

⁴⁷ Western Washington University. [Open educational resources at Western](#).

⁴⁸ [RCW 28B.10.819](#).

⁴⁹ Washington Student Achievement Council. [OER grants](#).

Western Washington University

The Academic Technology Department at Western Washington University used the funding to provide a week-long summer workshop, led by librarians, instructional technologists, and instructional designers. Faculty were trained on how to license OER, adapt materials, create their own work, and publish content. Participating faculty received \$4,000 stipends to attend the workshop and collaborate with staff to transform the course curriculum using OER for five courses.⁵⁰ For example, one professor used the stipend to write an open textbook for an introductory music course.⁵¹

Central Washington University

The Brooks Library at Central Washington University used grant funding to provide participating faculty members \$1,000 stipends, which faculty used to help adapt OER for 26 general education courses. The goal of the project was to provide students an additional option to complete general education requirements by enrolling in courses with no-or-low cost course materials, in place of traditional commercial textbooks. Faculty received assistance from librarians and instructional designers, who identified learning outcomes for each course, searched and compiled open materials that matched learning outcomes, and helped redesign course pages like Canvas, used to host materials.⁵²

Those we spoke to at Western Washington University, Central Washington University, Open Oregon, and elsewhere suggested that grant programs are important first steps to increasing OER use on campuses. However, to sustain OER use over time, there is a need for ongoing funding.⁵³ We heard that there are many lessons learned when faculty begin using OER. Faculty members may need to teach their course several times to see how students engage with the materials and make adjustments. Additionally, ongoing funding can support institutional infrastructure like funding for librarians and instructional designers who provide key technical support to faculty members.

Implementing OER Results in a Cost Transfer from Students to Institutions

One of the main arguments we heard for using OER is to reduce course material costs for students. However, OER adoption results in a cost transfer from students to the institution because faculty members, librarians, and others can spend a significant amount of time working with OER.⁵⁴

While grants have incentivized OER use, we estimate that stipend amounts do not compensate individuals for the full amount of time they spend working with open materials.

⁵⁰ J. Brown, Instructional Designer, Western Washington University (personal communication, April 25, 2019, and October 01, 2019). Additional information retrieved from Washington Student Achievement Council. Washington. [Open Educational Resources Grant Pilot Program](#).

⁵¹ Western Washington University. [Open educational resources at Western](#).

⁵² M. Valentino, Assistant Professor Library Services and G. Hopkins, Instructional Design Librarian at Central Washington University (personal communication, April 18,

2019, and October 02, 2019). Additional information retrieved from the Washington Student Achievement Council. [Washington open educational resources grant pilot program](#).

⁵³ J. Brown, Instructional Designer, Western Washington University (personal communication, April 25, 2019 and October 01, 2019). A. Hofer, Coordinator, Statewide Open Educational Library Services for Open Oregon Educational Resources (personal communication, September 26, 2019).

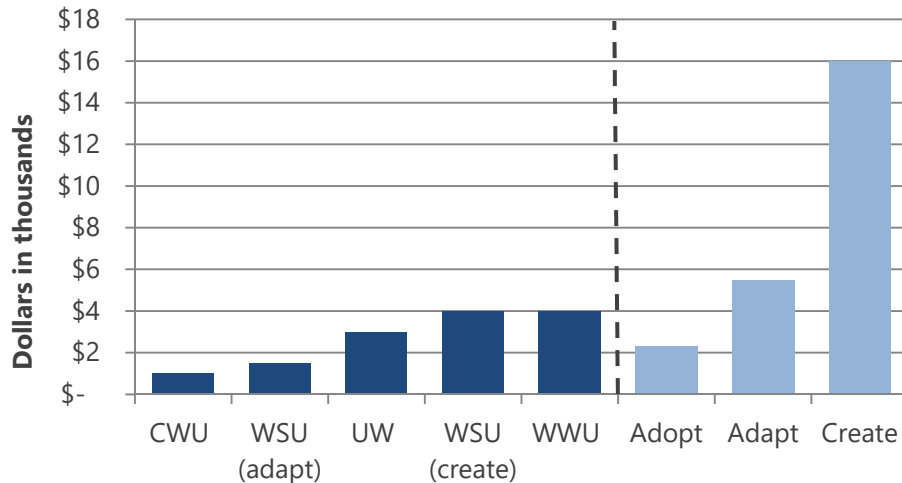
⁵⁴ Lederman, D. (2018). *A community college confronts the costs of open educational resources*. Inside Higher Ed.

As we mentioned earlier, because OER-related activities vary, it is difficult to estimate the actual time it takes faculty, librarians, and other staff to search for, modify, or develop new materials. In order to calculate estimates of how much it may cost to fully compensate faculty and librarians using OER, we used time estimates based on information provided by Ohio's Columbus State Community College and salary information for librarians and associate professors working at Washington's four-year institutions.⁵⁵

Exhibit 15 shows the difference between the stipend amounts that participating faculty members at Central Washington University, Washington State University, University of Washington, and Western Washington University received through institutional and state grant programs (dark blue bars left of dashed line), compared to WSIPP's estimates of the cost to fully compensate faculty who adopt, adapt, or create OERs (light blue bars right of dashed line).

Exhibit 15

Stipends Amounts Compared to Estimated Cost to Adopt, Adapt, or Create OER



Notes:

Dark blue bars: The average stipend amounts that faculty received through institutional and state grants.

Light Blue bars: The estimated costs to compensate faculty who adapt, adopt, and create OER.

For these estimates, we used information from Ohio's Columbus State Community College, which uses a tiered model to provide grants to faculty conducting these activities. The institution's OER Librarian provided us information for how much time faculty are offered to work with OER and the stipend amounts they receive (some activities require more or less time than what is in the tiered model).

We used the average time estimated for each type of activity and multiplied it by the average salary for librarians and associate professors working in Washington's public four-year institutions. Salary information was retrieved from [Chronicle Data for Washington](#).

We assume that librarians spend one-third of the total time searching and compiling materials for faculty and providing technical assistance.

We assume faculty members spend the remaining time vetting materials, modifying content as needed, restructuring curricula, and creating new materials.

⁵⁵ R. Dilley, Open Educational Resources Librarian, Columbus State Community College (personal communication, October 23, 2019). Salary information retrieved from [Chronicle Data](#).

For example, participating faculty at Central Washington University received \$1,000 stipends to redesign general education courses. By our estimates, this stipend amount covers less than half of the estimated cost to adopt OER for one course. At Western Washington University, participating faculty received stipends worth \$4,000 each, which, WSIPP estimates would cover the full cost to adopt materials and 73% of the cost to adapt open materials.

None of the stipend amounts provided to faculty across the institutions would cover the full cost to create a new open textbook.

Faculty and Librarians Need Training

Faculty members and librarians need training to learn about OER, know where to search for materials and how to vet them, modify and create content, and properly license and attribute materials.

OER Awareness is Limited

At each of the four-year universities, it was common for at least a handful of faculty members and or librarians to be aware of OER. However, widespread knowledge varies across campuses. We did not observe systematic tracking of OER awareness or use, but one institution, Washington State University, found that 65% of surveyed faculty were aware of OER.⁵⁶ Additionally, a 2018 survey of higher education institutions found that while awareness of OER has gradually increased, only 30% of surveyed respondents were aware of OER and knew how to use them in the classroom.⁵⁷

⁵⁶ Survey provided to WSIPP by WSU. T. Anderson, Scholarly Communication Librarian, Washington State University (personal communication, April 17, 2019).

⁵⁷ Seaman & Seaman (2018).

We often heard from those at the four-year institutions that awareness and use of OER is high among faculty in departments like math and biology as well as among faculty teaching introductory courses like English 101.⁵⁸ However, adoption across departments and lower- and upper-division courses varied widely across the institutions. We heard from those we interviewed that there is a continued need to provide training to increase awareness of what OER are and how to implement materials in courses.

Searching for and Evaluating Open Materials can be a Challenge

We also heard from individuals we spoke to that it can be challenging to search for OER materials.⁵⁹ For example, faculty working in science disciplines may have an easier time finding “grab-and-go” materials that can be embedded into curricula because course concepts change less frequently and OERs in those disciplines have been available for longer.⁶⁰ However, for other disciplines, like computer science, where concepts change often, faculty may have to spend more time searching for materials and updating them to fit the specific needs of the course.⁶¹

⁵⁸ P. Lucero Chantrill, Associate Professor in Communication Studies Department, Eastern Washington University (personal communication, April 08, 2019). L. Ray, Open Education and Psychology Librarian, University of Washington Seattle Campus (personal communication, April 05, 2019). T. Anderson, Scholarly Communication Librarian, Washington State University (personal communication, April 17, 2019).

⁵⁹ M. Valentino, Assistant Professor Library Services. Geri Hopkins, Instructional Design Librarian at Central Washington University (personal communication, April 18, 2019, and October 02, 2019). A. Hofer, Coordinator, Statewide Open Educational Library Services for Open Oregon Educational Resources (personal communication, September 26, 2019).

⁶⁰ [Openstax at Rice University](#).

⁶¹ Open Oregon. [Educational Resources](#).

In addition to the challenge of finding OERs, some faculty members are also concerned about the quality of materials because they believe that freely-accessible resources mean that materials are lower quality. A 2017 survey found that almost 30% of surveyed faculty members across the country were concerned that open materials were not high quality or regularly updated.⁶²

We learned that librarians across the universities in Washington often supported faculty by helping them search for open materials and teaching them how to evaluate materials. At Central Washington University, Western Washington University, University of Washington, and Eastern Washington University, librarians conducted preliminary searches and compiled what they deemed were high-quality resources first, which faculty then evaluated.

Additionally, librarians and organizations like the Open Textbook Network and Open Oregon have hosted reviewing workshops to increase peer reviews of OER content. For example, using funding through the Affordable Learning Grant, Washington State University Libraries and the Academic Outreach & Innovation department joined the Open Textbook Network, which provides educational materials and workshops to increase OER use in higher education institutions. Through this partnership, Open Textbook Network staff and Washington State University librarians provided workshops where faculty members learned to vet materials in their fields. After writing and posting reviews for others to see online, faculty members received \$200 stipends to compensate for their time.⁶³

⁶² [Opening the textbook 2017](#).

⁶³ Affordable Learning Project: Final Report 2016-2017. Internal document shared with WSIPP. T. Anderson, Scholarly

Awareness of OER Does Not Always Translate to Knowledge of Licensing

Faculty may be familiar with OER but it does not necessarily mean they are aware of the open licensing permissions that define OER materials.⁶⁴

Creative Commons (CC) Licenses are the most well-known licensing frameworks for OER. Depending on the type of CC License, individuals who create open-content remain the original copyright holders of their work but agree to yield some of the rights so that others can freely access, modify, and/or re-share materials like open textbooks, videos, and images. For example, a CC attribution license enables individuals to use, modify, and share content as long as they attribute credit to the original copyright holder.⁶⁵

Librarians and faculty members alike may need additional training to learn about open licenses and how to appropriately use, cite, and share OER. Additionally, faculty members may need more information about how legal permissions through CC Licenses work with their institution's or department's copyright policies before creating and sharing their own materials.⁶⁶

Communication Librarian, Washington State University (personal communication, April 17, 2019).

⁶⁴ C. Green, Interim CEO and Director of Open Education, Creative Commons (personal communication, September 27, 2019).

⁶⁵ Creative Commons. [CC Licenses and Examples](#).

⁶⁶ Cable Green, Interim CEO and Director of Open Education, Creative Commons. (Personal communication, September 2019).

Other Policies that May Support OER Efforts

Through our research and conversations, we identified several other options that individual institutions can consider, should they want to increase the use of OER.

One option is for department leaders to consider OER activities within their promotion and tenure policies.⁶⁷ It was not common for the institutions we spoke with to recognize OER development in promotional policies. In fact, we found only one example, in the College of Sciences at Central Washington University, where writing open textbooks was recognized as meeting requirements for promotion and tenure.⁶⁸ However, some individuals suggested that incorporating OER activities as criteria for meeting promotion and tenure requirements could encourage faculty to use OER and demonstrate broader institutional support.

We also heard about the importance of increasing awareness among students. Students can potentially benefit from OER through reduced course-material costs as well as from access to materials that may be more tailored to their learning needs. Librarians at Central Washington University and Western Washington University have worked with staff within registration offices to develop a system that identifies courses that use low-or-no cost course materials so that students have the option to register for

courses that use OER materials.⁶⁹ A survey of students at Washington State University found that 90% of respondents reported that “if given the choice, they would register for a course using an open textbook over a course using a commercial textbook.”⁷⁰

Finally, in our interviews, we often heard about the need for institutions to establish clear policies around the use and development of OER and the importance of educating staff and faculty about these policies. For example, the Office of the Provost at Washington State University has established an OER policy that outlines faculty’s autonomy to select OER materials, copyright and open licensing requirements when adopting and creating materials, who provides technical support, and how to share materials.⁷¹ Policies endorsed by department and college leaders could help clarify the appropriate use of OER materials across campuses and help define roles for librarians, faculty, and staff using OER.

⁶⁷ A. Hofer, Coordinator, Statewide Open Educational Library Services for Open Oregon Educational Resources (personal communication, September 26, 2019).

⁶⁸ M. Valentino & G. Hopkins, Scholarly Communication Librarian and Instructional Design Librarian, Central Washington University (personal communication, April 18, 2019, and October 02, 2019).

⁶⁹ Ibid and J. Brown, Instructional Designer, Western Washington University (personal communication, April 25, 2019 and October 01, 2019). A. Hofer, Coordinator, Statewide Open Educational Library Services for Open Oregon Educational Resources (personal communication, September 26, 2019).

⁷⁰ *Affordable Learning Project: Final Report 2016-2017*. Internal document shared with WSIPP. T. Anderson, Scholarly Communication Librarian, Washington State University (personal communication, April 17, 2019).

⁷¹ Washington State University. [WSU open education resources \(OER\) policy](#). Office of the Provost.

Student Savings Based on OER Grants

While we estimate that the stipend amounts provided to faculty may not cover the actual cost to use or develop OER (see [Exhibit 15](#)), stipend amounts ranging between \$1,000 and \$4,000 have incentivized some faculty members to begin using OER and present a low-cost option for growing OER adoption across four-year universities.

For courses that have higher student enrollment or require students to purchase higher-priced textbooks, we estimate that the total savings that students experience due to foregone textbook costs can outweigh the cost of a stipend to a faculty member in a single year.

For example, let us say a Biology 101 course has 25 students and each student is required to purchase a textbook that costs \$50. For the course, students will spend a total of \$1,250 on the book. Alternatively, the biology professor is awarded a stipend of \$4,000 to support his or her time searching for OER, modifying the content, and redesigning the course curriculum to replace the course's commercial textbook with OER. Under this scenario, represented in [Exhibit 16](#), it would take three years for the total savings that students experience to equal the cost of the stipend paid to the professor. As course enrollment increases, total student savings will exceed the cost of the stipend even sooner. For a course with 100 students, for example, student savings would outweigh the cost of the \$4,000 stipend in the first year.

[Exhibit 17](#) demonstrates a similar scenario, but one in which the required textbook costs \$100 instead of \$50. As the price of the required textbook increases, total student savings equal or exceed the cost of the stipend in a shorter period of time, particularly as course enrollment increases. For a course with 50 students, total student savings will exceed the cost of the stipend in a single year.

Further, a stipend awarded in one year could facilitate the use of OER for the same course over multiple years, leading to additional student savings over time. We often heard from interviewees that while there are upfront costs associated with creating new OER, once faculty members tailor their courses, there are fewer costs required to maintain materials in the future.

It is important to note that figures in [Exhibits 16](#) and [17](#) do not account for all of the savings or costs experienced by students, faculty, or grant providers when open materials are used to replace traditional textbooks. For example, students may still have to pay to print materials. And as we mentioned before, a \$4,000 stipend may not fully cover the actual cost for faculty to use OER in a single course. However, the examples in [Exhibits 16](#) and [17](#) demonstrate that even though stipend amounts may not fully compensate faculty, similar stipend amounts have incentivized some faculty to adopt OER across Washington's four-year universities and adoption can result in student savings that equal or outweigh stipend amounts in a relatively short period of time.

Exhibit 16

Student Savings Based on Enrollment: Required Textbook is \$50 and Stipend is \$4,000

Years	Book price	Stipend amount	Number of students enrolled in course					
			25	50	75	100	125	150
0	\$50	\$4,000	\$(4,000)	\$(4,000)	\$(4,000)	\$(4,000)	\$(4,000)	\$(4,000)
1	\$50	\$4,000	\$(2,750)	\$(1,500)	\$(250)	\$1,000	\$2,250	\$3,500
2	\$50	\$4,000	\$(1,500)	\$1,000	\$3,500	\$6,000	\$8,500	\$11,000
3	\$50	\$4,000	\$(250)	\$3,500	\$7,250	\$11,000	\$14,750	\$18,500
4	\$50	\$4,000	\$1,000	\$6,000	\$11,000	\$16,000	\$21,000	\$26,000

Exhibit 17

Student Savings Based on Enrollment: Required Textbook is \$100 and Stipend is \$4,000

Years	Book price	Stipend amount	Number of students enrolled in course					
			25	50	75	100	125	150
0	\$100	\$4,000	\$(4,000)	\$(4,000)	\$(4,000)	\$(4,000)	\$(4,000)	\$(4,000)
1	\$100	\$4,000	\$(1,500)	\$1,000	\$3,500	\$6,000	\$8,500	\$11,000
2	\$100	\$4,000	\$1,000	\$6,000	\$11,000	\$16,000	\$21,000	\$26,000
3	\$100	\$4,000	\$3,500	\$11,000	\$18,500	\$26,000	\$33,500	\$41,000
4	\$100	\$4,000	\$6,000	\$16,000	\$26,000	\$36,000	\$46,000	\$56,000

V. Summary

This study examines the costs of required course materials and the use of open educational resources at public four-year universities in Washington.

The price of new textbooks has been increasing at several times the rate of inflation, but trends in student expenditures are unclear. Surveys administered by the National Association of Campus Stores have found a downward trend in student spending on course materials, but surveys from the Washington Financial Aid Association during an overlapping period showed an increase in spending. The divergence in student spending and textbook prices could be attributable to more students foregoing purchase due to higher prices, fewer professors assigning new textbooks, or other challenges inherent to survey research.

Based on WSIPP's approach for estimating the cost of required course materials, as of the 2018-19 academic year, the cost of required materials in Washington is around \$60 per course on average, with higher costs in business and STEM fields and lower costs in the humanities. On average,

students completing a bachelor's degree at public universities in Washington were expected to spend approximately \$2,734 on required textbooks and course materials. Students who do not anticipate using course materials again after the course term can potentially lower the cost further by renting. Book buy-back programs operated by campus stores appeared unlikely to decrease the cost of required course materials substantially, at least in their current position.

In Washington, modest investments in OER have been sufficient to support faculty adoption of OER. In courses with relatively high enrollments or high textbook costs and a predisposed faculty member, an OER grant program can reduce textbook costs for students by more than the grant cost in a single year and provide additional savings for students if open materials are used in subsequent years. However, it is important to note that OER adoption can be time-consuming and resource-intensive. To increase OER use, staff and faculty would need ongoing financial support and training.

Appendices

Open Educational Resources and the Cost of Required Course Materials at Four-Year Universities

Appendices

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I. Methodology

Overview

The focus of this study was to calculate the average cost of required textbooks and course materials necessary for bachelor’s degree completion on a per-student basis, at each public four-year institution in Washington, and in specific degree programs. From a disaggregated dataset, where each row is a unique student-course-term-item combination, calculating means and variances is straightforward (this includes conditional means and variances by major, course type, item type, and/or institution). The key methodological challenges in this study were constructing a suitable dataset and defining a suitable quantity of interest given limitations of available data. Hypothetical rows from our target dataset (each item required for each student) and the underlying datasets necessary to construct it are displayed in [Exhibit A1](#).

Exhibit A1

Target Dataset: Person-by-Item

Academic year	Student ID	Institution ID	Program	Course ID	Course CIP	Item	Item cost
Fall – 2013	ID_012345	UW_SEATTLE	English	Eng_101a	23	Book	\$21.99
Fall – 2013	ID_012345	UW_SEATTLE	English	Eng_101a	23	Book	\$12.34
Fall – 2013	ID_012345	UW_SEATTLE	English	Eng_101a	23	Code	\$70
Spring – 2018	ID_013579	EWU	Math	Math_400	27	Book	\$57.99

In order to construct our target dataset, we requested the following data for every four-year institution in our sample:

- 1) [From Campus Bookstores](#). For academic year 2018-19, an item-by-course file ([Exhibit A2](#)). Each row in the file is one item (e.g., book) required in one course, along with corresponding type/cost information.

Exhibit A2

Item-by-Course File

Academic year	Course ID	Item (ISBN)	Description	Item cost (new)
Fall – 2018	Eng_101a	978-0521671880	Book	\$21.99
Fall – 2018	Eng_101a	978-1642810059	Book	\$12.34
Fall – 2018	Eng_101a		Access Code	\$70

- 2) From the Education Resource Data Center (ERDC). A file containing all 2017-18 public four-year university graduates, graduates' major(s), and the courses they completed (Exhibit A3 & A4).

Exhibit A3

Degree Completer File: 2017-18 Graduates

Academic year	Student ID	Institution ID	Degree1	Degree2	Program1	Program2
Spring – 2018	ID_012345	UW_SEATTLE	BS		English	
Spring – 2018	ID_067890	UW_TACOMA	BA	BA	English	History
Spring – 2018	ID_013579	EWU	BS		Math	

Exhibit A4

Course Files: Examples for 2011 and 2018

Academic year	Course ID	Course CIP	Institution ID	Student ID
Fall – 2011	Eng_101a	23	UW_SEATTLE	ID_012345
Fall – 2011	Mat_101a	27	UW_SEATTLE	ID_012345
Fall – 2011	Bio_101a	26	UW_SEATTLE	ID_012345
Fall – 2011	CS_101	11	EWU	ID_013579

Academic year	Course ID	Course CIP	Institution ID	Student ID
Spring – 2018	Eng_401	23	UW_SEATTLE	ID_012345
Spring – 2018	Eng_451	23	UW_SEATTLE	ID_012345
Spring – 2018	Phil_201	38	UW_SEATTLE	ID_012345
Spring – 2018	Math_400	27	EWU	ID_013579

Note that the final dataset included completion data (from ERDC), course-level data (from ERDC), and data on course material cost (from campus bookstores). To calculate cost across all courses, we matched previous year course numbers to current year (or available year/time) textbook costs. The merge was at the institution-by-course level.

Combining the 2018-2019 costs of required materials with historical course enrollments will not consistently estimate what students were *actually* required to spend on course materials. Essentially, this approach changed the quantity of interest from what a 2018 graduate—who attended college between 2011 and 2018—would have *actually* been required to spend on what a similar current student would *hypothetically* be required to spend today. In other words, the focus is on what current students would be required to spend on course materials today if they took similar courses as other students from their same major in the past. Using current costs, rather than historical costs, is likely a better approximation of the cost of degree completion for present-day students.

Conceptually, the approach is straightforward. With information on the courses that graduates took and the cost of items required for each course, one can estimate the total cost of degree completion by summing the individual item costs. In practice, there are many details that need to be addressed.

Methodological Details

If all campus stores reported data on item costs, in the same way, course offerings at universities never changed, undergraduate students never took graduate-level courses, and all students earning a bachelor's degree completed in exactly four years, then matching 2018-2019 item prices to 2011-2018 course-taking patterns would be straightforward. In reality, many issues require resolution.

Standardizing Cost Data Across Campus Stores

We initially contacted campus stores in March 2019, and we received raw data files from campus stores in the late spring and summer of 2019. Upon receipt, we reviewed the data received and followed up with questions or concerns. Key issues included confirming the following:

- Courses in which no text was required were included in the dataset.
- Whether courses in which no text was required could be differentiated from courses in which faculty never submitted information on required textbooks to the campus store.
 - Our steps for investigating this issue included asking the staff to double-check our interpretation, searching for course syllabi on the web, checking the course materials requirements for the same course offered in a different term, and, in the fall of 2019, checking the course requirements for the most recent (current) offerings of the course.
- The dataset only included, or reliably flagged, required items.
 - In some courses, students could choose among several options for satisfying requirements. In these cases, to be consistent with other assumptions in our analysis, we determined the “required” items by assuming that students would select the least expensive items necessary to satisfy the course requirements. More expensive, alternative items were excluded from the data.
- The data could be taken at face value, or, if not, how it should be interpreted.
 - An example was that one campus store flagged books that were only available via rental as having an unrealistically high retail price (e.g., \$999).
 - We found many instances in which the data could not be taken at face value, and we made adjustments to the raw data when it seemed difficult to defend *not* doing so. In general, we wanted to make as few adjustments to the raw data as possible. An example of a change to the raw data was an instance in which the same course apparently required multiple, similar, expensive course bundles. By comparing the requirements for materials offered in different sections of the same course or in a different term, we confirmed that this was unusual and more likely to be an error. Consequently, we removed the more expensive bundle requirement, which led to expectations that aligned with other instances in which the same course was offered.

Using the raw data files received from each campus store, our first objective was to construct a file for each university containing every academic course for the 2018-2019 academic year and the required items for the course. Separate sections within a course were initially treated as separate “courses,” because not all sections required the same items.

Next, we addressed the missing price data. The price of items was rarely missing (far less than 1% of the time) and we chose to impute values for missing price data. To do so, we fit a linear regression model to our dataset of item cost data.

$$(1) \quad Price_{ij} = \alpha + \gamma_j + \epsilon_{ij}$$

where γ_j is a fixed effect for each unique combination of university, academic department, course division (upper/lower, where upper-division was a course numbered 300 or higher), and item type. We estimated the cost of a missing item as the sum of α and γ_j . This means that if we were missing data on a paper textbook for Psychology 311 offered by Central Washington University, we estimated its cost by finding the mean cost of paper textbooks for upper-division psychology textbooks at Central Washington University. The above equation is equivalent to imputation using the mean of all items that shared the same university, department, division, and type.

Next, because section identifiers change over time (e.g., a course that offered sections A-F in 2013 may instead offer sections A-C in 2018), we selected one section per course (within a school and academic term). That is, after selection, the combination of university, department, course number, and academic term uniquely identified courses. In the case of multiple sections, we chose the median section with respect to cost. The main reason we chose the median section instead of the mean section cost is that we wanted to be able to de-duplicate item purchases.⁷² If a student needed the same Spanish textbook for three consecutive courses, we did not want to charge the students for three used textbook purchases. When calculating a mean, the information on the distinct items is lost, because the mean is a composite of item costs. When there was an even number of sections for a course and the two middle values were not identical, we chose the less expensive section. We preferred the lower value because it captured that students have some discretion in selecting a section and that cost is a potential consideration, and because throughout the study we preferred to estimate the minimum required cost of materials.

Lastly, as much as possible, we standardized item types across campus stores. Not all stores provided directly comparable information about item type, but we used the information received to create the categories discussed in [Section II](#). In addition to combining similar categories, we relied on clues from the item name or description field. For example, some items did not initially contain a type category but did include a title, such as, “The History of American – ebook.”

⁷² Additionally, after calculating descriptive statistics on each campus store’s data, we found that not all campus stores were “counting” sections in the same way. For example, it appeared that universities did not all use the same approach for determining whether two sections of the same course were separate. The key question is: If a course had multiple students taking independent studies, would all students be considered part of the same section of the same course (e.g. Business 495, section A), or would each student be counted as having their own section (e.g. Business 495, Section A for student 1, Section B for student 2, etc.)? As reflected in data from campus stores, the answer varied across universities. Because special upper-division courses often required no materials, counting multiple sections as multiple courses would substantially affect our estimates of the prevalence of zero-cost courses.

Items with the same International Standard Book Number (ISBN) were occasionally categorized differently by different campus stores. We retained these items in our analyses in all cases except for our comparison of prices across campus stores. Because the purpose of our analysis of pricing across campus stores assumed identical items across campus stores, we did not want to assume that identical ISBNs meant identical items when we had other information from campus stores indicating otherwise. Our analysis of pricing across campus stores used regression analysis to estimate the difference in item prices attributable to campus store discretion. Our regression analysis used a fixed-effects research design. A fixed-effect research design is often called “within” group research designs because they seek to account for relationships that persist within groups. In this case, we were analyzing variation in prices *within ISBNs*. Our reasoning was that, for the same ISBN, higher or lower prices for identical items would be strong evidence of discretionary pricing differences across campus stores. Our statistical model can be expressed as follows:

$$(2) \quad Price_{ijk} = \alpha + \mu_j + \delta_k + \epsilon_{ijk},$$

where μ_j is a set of indicators for each campus store (omitting an indicator for the university chosen as the point of comparison), and δ_k is an ISBN fixed effect. The coefficients of interest were the μ_j coefficients associated with each university. They capture the average dollar difference in prices for the same ISBN attributable to a specific campus store. Colloquially, one can think of this coefficient as the average mark-up on an individual item offered by multiple universities. The results are below (Exhibit A5).

Exhibit A5

ISBN Fixed Effect Estimates of School-Level Differences in Item Price

Variable	(Model 1) Low cost			(Model 2) Retail cost		
	Coefficient	SE	Sig.	Coefficient	SE	Sig.
CWU	-1.016	(0.899)		-3.360	(1.016)	**
EWU	8.677	(1.261)	***	10.074	(1.438)	***
TESC	1.632	(0.679)	*	2.376	(0.914)	**
UW-B	-0.184	(1.385)		-0.404	(1.483)	
UW-T	1.288	(0.571)	*	0.830	(0.561)	
WSU	0.841	(1.046)		-0.077	(1.140)	
WWU	-0.116	(0.826)		-1.49	(0.941)	
Reference category: UW-S	54.98	(0.485)	***	73.43	(0.543)	***
# of ISBNs (groups)	11,654			11,654		
# of observations	27,221			27,221		

Notes:

Heteroscedasticity robust standard errors clustered by item in parentheses.

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In the regression above, the University of Washington (Seattle campus) was the reference category, and each coefficient is an estimate of the average within-ISBN price difference for each university relative to UW-S. In the first model, the dependent variable was the lowest available price from the campus store. In the second model, the dependent variable was the new (retail) price. The estimated average used price at UW-S for items included in our analysis was \$54.98. The estimate of the average price difference for Eastern Washington University was \$8.68, which means that, on average, we estimated that prices for

comparable items are \$8.68 more expensive at Eastern Washington University compared to the University of Washington (Seattle campus), or 15.8% more expensive than the baseline average cost of \$54.98. For new prices, similar items are 13.5% more expensive at the Eastern Washington University campus store compared to the University of Washington-Seattle campus store. Exhibit A5 also showed that the lowest cost available for used materials at The Evergreen State College and the University of Washington (Tacoma campus) were somewhat higher than the prices at the University of Washington (Seattle campus), but these differences were relatively small.

Course-Taking Data for Degree Completers

We received data on student course enrollment and degree completion from ERDC. Our population of interest was all public, four-year university bachelor's degree completers from the most recent academic year. For this population, we asked for the following:

- University where the degree was completed;
- Student major/program of study (or majors/programs of study for students who completed multiple);
- All courses taken at any four-year university, where information on courses included academic year, term, department, course number, and details about which university and campus offered the course;
- Total number of credits earned from university where students completed their degree; and
- Whether a student entered the university immediately after high school or as a transfer student.

Data on student course enrollment offered a straightforward way to identify which courses graduates of specific degree programs tended to take. An alternative approach would have been to rely on lists of course requirements published in academic handbooks or on campus web sites. However, a significant limitation of relying on written requirements is that written degree requirements still provide students considerable discretion. Not all degree programs require the same number of courses, which could lead to majors that require more courses being identified as more expensive, even if average per-course costs were relatively low. All students need to earn a minimum number of credits in total in order to graduate, and course choices for elective study can be indirectly related to choice of major. Also, within a major, it made more sense to think about courses taken by an average graduate, not a student who selected courses strategically to minimize the cost of course materials. Physics majors may be required *on paper* to take mathematics courses through linear algebra, but physics majors *in reality* may take additional math courses, because of informal expectations or practical necessity. While we were comfortable with analyses that relied on the strong assumption that students would seek to minimize costs of materials within a course (e.g., by selecting used whenever available), we were not comfortable assuming that a desire for the least expensive course materials available would dictate *which courses* they ultimately took.

Our focus on having reasonable estimates of "typical" course-taking patterns for graduates is why we were comfortable excluding non-completers from our analysis. Course-taking patterns of non-completers would not be informative about the course-taking patterns of completers. Additionally, non-completers tend to take fewer courses than completers, because they were enrolled for fewer terms, which limits the usefulness of information on average costs for non-completers. Whether the cost of course materials affects which courses students take and whether it affects rates of completion are important questions, but they were beyond the scope of our study.

From the data we received on completers, we excluded graduates who

- Transferred in, unless they were transferring into one UW campus from another UW campus;
- Took most of their courses from the same campus where they completed their degree; and
- Were in the bottom 2%-5% of graduates from the same university with respect to the number of courses they took.

Similar to previous analytical decisions, the goal of these sample restrictions was to identify course-taking patterns for a hypothetical, “typical” graduate. We wanted to answer the question, “*How much is a student majoring in X program from university Y required to spend on course materials?*” To answer this question, we relied on data from students who conformed to this expectation.

We did not omit transfer students because we were uninterested in potential costs for students who transferred to a four-year university from a community college. Instead, it was because we would not be able to estimate costs accurately for those students and because our assignment focused on the costs of course materials at four-year universities. For a student who transferred to Washington State University after earning their associate’s degree at a community college, we could only observe the courses they took after transferring. Comparing total expenditures for students who only completed some of their courses at a given university to another student who completed all of their courses at a given university would be misleading. With respect to our focus on costs of course materials at four-year universities, we did not want to conflate costs of courses offered at four-year universities with costs of courses at the community colleges from which students transferred.

Overall, the total cost of required materials *conditional on completing the kinds of courses that graduates typically complete* can be estimated in many ways. Excluding students whose course-taking we could not observe, such as transfer students, was for statistical simplicity. While we use information from students who conformed to the criteria above, our estimates are relevant to a broader population of students.

Methodological Limitations

Our main methodological concerns were related to changes over time in department names, changes over time in department course numbers, errors in the data received from campus stores, and the imputation of missing cost data for courses that existed in student course enrollment files but not in data files received from a campus store (i.e., courses that recent degree-completers took but for which we had no price data from campus stores).

Department Names and Course Numbers. When a department name occurred in a course enrollment file but not in a campus store file, we manually mapped the course enrollment file department to an existing campus store file department name. To determine the best matching, we used information available from university or academic department web sites. For example, at Western Washington University, the prefix ESTU in the course enrollment file corresponded to Environmental Studies, but the prefix ESTU did not exist in the data received on item costs from campus stores. The prefix ENVS did exist in the data received from campus stores, so each instance of the ESTU prefix was changed to ENVS. We kept records of each change. We left course numbers the same unless we found that they indicated recreational physical education classes or other classes we wanted to exclude from our analyses.

Imputation of Course Cost. We did not have data on item costs for every course where we observed students enrolling. This is mainly because we had item cost data for 2018-2019 and course enrollment

data from 2011-2017. When a department-course number combination existed in a course enrollment file but not in a campus store file, we needed to estimate the cost of materials for the course. Our approach was similar to the approach we used for imputing missing item prices. After restricting our dataset to the median section of a course with respect to cost, we fit a linear-regression model to a course-level dataset that contained the average cost of all items for the course.

$$Course_Price_{ij} = \alpha + \delta_j + \epsilon_{ij}, \quad (3)$$

where δ_j is a fixed effect for each unique combination of university, academic department, and course division (upper/lower, where upper-division was a course numbered 300 or higher). We estimated the cost of a missing item as the sum of α and δ_j . This means that if we were missing data on Psychology 311 offered by Central Washington University, we estimated its cost by finding the mean cost of upper-division psychology courses at Central Washington University. The equation is equivalent to imputation using the mean of all courses in the data that shared the same university, department, and division.

Our main concern with our imputation methodology was the potential for bias when estimating the cost of degree completion. For course-level analyses in [Section II](#), bias arising from imputing costs using averages from similar courses was not a major concern. Practically, bias from imputation would affect the weights used for estimating frequency-weighted averages, and it was not clear ex-ante what the ideal weights would be, especially after restricting to the median-cost section within a course. To give a specific example, consider imputation for low-credit courses offered in music for aspiring music educators who want to teach band or orchestra. These music educators are expected to have exposure to a wide variety of instruments, and they often take short courses devoted to specific types of instruments. For illustrative purposes, assume all low-credit courses in music were missing data on cost from campus stores, but we could observe them in student course-taking files. If we ignored these low-credit courses and calculated the average cost of music courses from non-missing observations, we would estimate the average cost for music courses excluding low-credit courses. Alternatively, if we substituted the standard music course average in place of the missing value for all low-credit courses and then calculated the average over all the music courses (low-credit and standard), we would recover the standard music course average.

In contrast, for [Section III](#), bias arising from replacing missing values for low-credit courses with the standard music course average would be very consequential. If the true value for low-credit courses of instruction were zero, the imputed value were \$50 (i.e., the standard music course average), and students took five of these courses, we would over-estimate the cost of required materials for bachelor's degree completion by \$250 (= 5 * 50). Ideally, we would like our estimates of cost—by university or degree program—to be relatively insensitive to decisions about how to estimate costs for courses for which we did not have bookstore data. One way to test the sensitivity of our estimates is to include the proportion of courses we needed to include for individual students as a covariate in a linear regression model. If differences in the proportion of imputed courses substantially changed key results (e.g., average cost differences between universities), we would be concerned about the credibility of results. We explore this concern below.

Our concerns about visual and performing arts led us to exclude it from [Section III](#). Note that the federal government's survey of institutions about the cost of required course materials instructs them to exclude special groups of students, such as art majors, "unless they constitute the majority of students at an institution."⁷³

⁷³ Integrated Postsecondary Education Data System (IPEDS). (2020). [Glossary for "books and supplies."](#)

Sensitivity Analyses

To test whether our results about differences between universities in average costs were related to differences in types of degrees offered or our imputation strategy, we fit a taxonomy of linear regression models. The first was a baseline model, which reproduced the results from [Exhibit 11](#). The second added the proportion of courses that were imputed for an individual student as a covariate. The third excluded the proportion of imputed courses but included a set of indicator variables for two-digit CIP code. The final model included the proportion of imputed courses and the set of two-digit CIP code indicators. The final model was our preferred specification for estimating whether universities systematically vary in the cost of required course materials. The final model can be expressed as follows:

$$Degree_Cost_{ijk} = \alpha + \mu_j + \delta_k + \beta(PCT_IMPURED_{ijk}) + \epsilon_{ijk}, \quad (2)$$

where μ_j is a set of indicators for each university (omitting an indicator for the university chosen as the point of comparison), and δ_k is a two-digit CIP code fixed effect. The coefficients of interest were the μ_j coefficients associated with each university. They capture the average “same degree type” cost difference in required course materials for each university compared to the baseline university. The results are shown in [Exhibit A6](#).

Exhibit A6

Estimates of School-Level Differences in the Cost of Four-Year Degree Completion

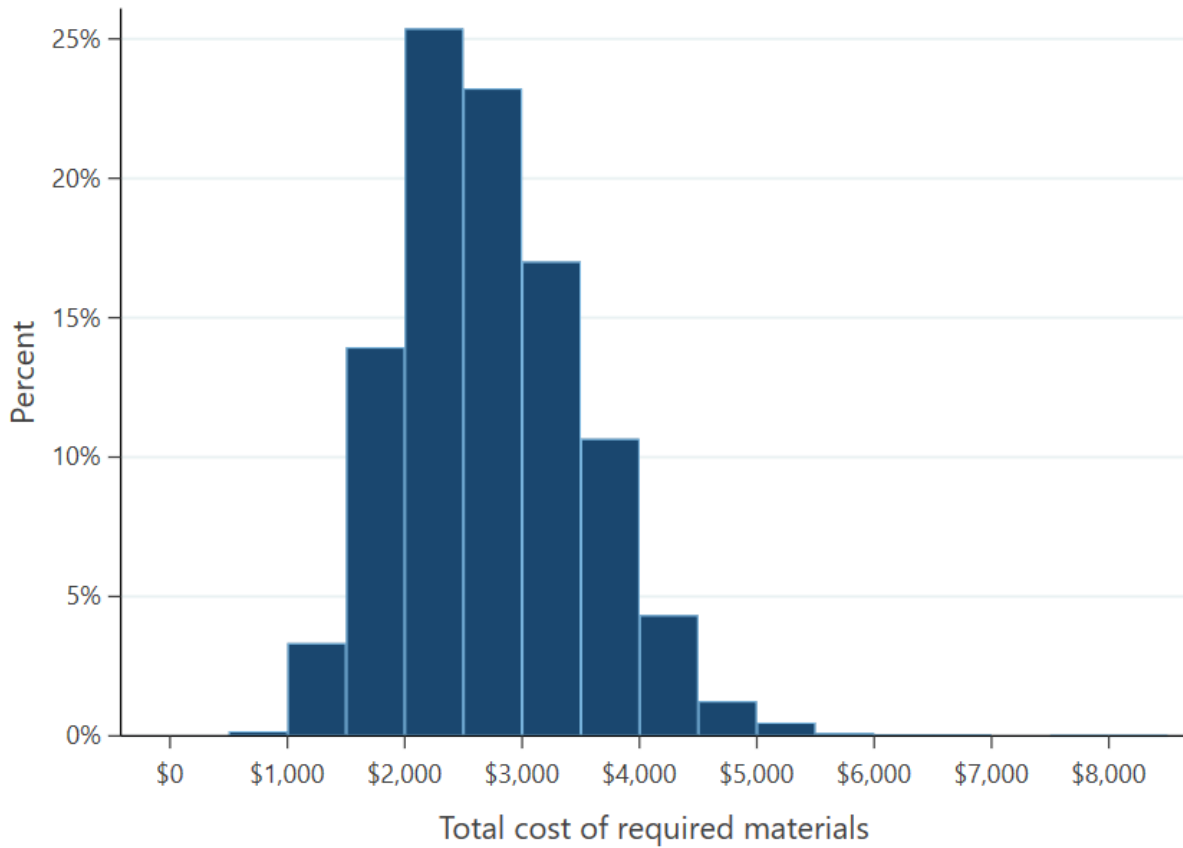
Variable	Model 1	Model 2	Model 3	Model 4
CWU	798	686	893	815
EWU	862	719	905	803
UW-B	-264	-84	-306	-164
UW-T	-187	-160	-63	-39
WSU	543	380	524	406
WWU	426	334	566	499
Reference category: UW-S	2,433	2,497	2,363	2388
Percent imputed		-899		-668
CIP code dummies included?	No	No	Yes	Yes
# of observations	9,304	9,304	9,304	9,304

Notes:

Heteroscedasticity robust standard errors clustered by item in parentheses. The only coefficient that is not statistically different from zero across all specifications is the indicator variable for UW-T.

Exhibit A7 shows the distribution of costs for four-year degree completers assuming students purchase new materials whenever available.

Exhibit A7
Cost of Four-Year Degree Completion:
Assuming Students Purchase Used Materials When Available



II. Item-Level Statistics

Exhibit A8 shows the average per-item cost of required course materials, new (and used if available), across institutions.

Exhibit A8
Unadjusted Item-Level Statistics
New and [Used] Prices

Item type	CWU	EWU	TESC	UWB	UWS	UWT	WSU	WWU
Access code	108	106.4	30.4					94
[Used]		94.3	27.2					70.5
Book	71.7	91.7	40.3				64.7	
[Used]	53.5	67.4	28.1				48.4	
Bundle	170.8	134.9	120	200.7	130.4	96.2	130.9	131.5
[Used]	125.8	100.9	57.5	150.5	99.8	72.2	98.2	98.6
Coursepack	27.3			32.2	29.2		23.3	21.2
[Used]							17.4	15.9
Ebook	60.1	76.1		106.5	89.6	102.6	97.3	
[Used]		132.2		106.5	89.6	102.6	65	
Hardback				152.4	141	134.2		
[Used]				111	101	99.6		
Hardcover								125.1
[Used]								94
Inclusive access	83.6				78			101.6
[Used]					78			80
Other	41.8	90.8	14.4	155.3	84.7	142.7	106.7	64.6
[Used]	31.3	81.5	9.8	116.3	59.9	107.1	80	48.5
Paper								53.1
[Used]								39.8
Paperback				56.3	45.6	52.9		
[Used]				41.5	33.7	39.5		
Unknown			0	23.1	25.6	17	73.4	44.8
[Used]			0	17.4	19.1	12.8	26.7	33.5

Exhibit A9 shows the average per-item cost of required course materials, assuming the lowest price available, and includes the number of observations for each item across institutions.

Exhibit A9
Final Item-Level Statistics
Low Prices and [Count]

Item type	CWU	EWU	TESC	UWB	UWS	UWT	WSU	WWU
Access code	108.7	90	26					67.6
[n]	469	9	3		0			62
Book	54.1	66.4	27.9	58.6	40	48	47	56.9
[n]	4,002	2,895	1,256	941	5,219	1,468	1,763	5,058
Bundle	127.3	101	41.7	97	81.4	88.9	98	69
[n]	424	406	20	32	348	30	233	57
Coursepack	27.2			35.8	27.7		15.3	16
[n]	256			11	192	0	4	204
Ebook	60.1	90		106.5	88.5	101.5	96.9	
[n]	15	8		45	192	127	97	
Hardback				152.4	141	134.2		
[n]				111	101	99.6		
Hardcover								125.1
[n]								94
Inclusive access	83.7	100.6			78			80
[n]	250	152		0	5	0		11
OER								10.8
[n]								23
Other	59.1	126.8	9.8	113.8	57.2	116.3	79	55.5
[n]	42	27	3	85	480	164	125	62
No text required	0	0	0	0	0	0	0	0
[n]	1,269	821	106	215	1,084	249	1,543	979
Unknown			0	17.4	14.3	12	10.9	33.5
[n]			1	6	100	1	2	1

III. Savings from Rental, Buy-Back, and Third-Party Purchase

Estimating Potential Savings from Textbook Rental

To estimate the average savings from renting textbooks rather than purchasing used, we analyzed item prices from UW-B, UW-S, UW-T, WSU, and WWU. In order to minimize administrative burden for campus stores, WSIPP did not insist that all campus stores provide data on rental prices, which is why we focused only on a subset of campus stores for comparing rental prices to other purchasing options.

We defined the quantity of interest as the average savings that students could realize during four-year degree completion by choosing to rent whenever it was the least expensive option available for a required item. The key point of comparison for our analysis was “used purchase from campus store” compared to “rental from campus store.” More precisely, the key variables were defined as the following:

- Used: the least expensive price to purchase the item (new or used) from the campus store.
- Rental: the least expensive price for renting an item for at least 90 days from the campus store.
 - This includes digital item rental and used item rental.

The two measures we ultimately compared for estimating the average discount were:

- Used = $\min(\text{new}, \text{used})$
- Rental = $\min(\text{new}, \text{used}, \text{rental_new}, \text{rental_used}, \text{digital_rental})$

Hypothetically, one can think of “used” as the amount of money that one would expect a student to spend who visited the campus store and purchased new items when it was the only (or cheapest) option and purchased used items when it was the only (or cheapest) option. One can think of “rental” as the amount of money that one would expect a student to spend who visited the campus store and purchased the cheapest option available, where their options included various rental options in addition to new or used purchase.

The objective was to estimate savings over the duration of degree completion, rather than only focusing on the instances where an item was available to rent. In order to weight items by the number of students who were required to purchase them, we began with the dataset discussed at the beginning of [Section III](#). After restricting our sample to the universities above, excluding courses where no text was required, and excluding courses where we had to impute costs (and therefore had no item costs), we estimated that 33.9% of items could be rented (116,753 / 344,048). Note that the number 344,048 counts items multiple times if they would be required to be purchased by multiple students. When the same item was available for purchase and rental, it was cheaper to rent the item in 83.9% of instances.

To calculate the average savings that students could realize by renting, one can compare the average item cost for “rental” (as defined above) for the 344,048 items to the average item cost for “used” (as defined above) for the same 344,048 items. Students who were willing to rent would have spent an average of \$50.81 per item, and students who were unwilling to consider renting would have spent an average of \$59.36 per item. This means that students could potentially save 14.4% over the duration of their bachelor’s degree by renting (compared to purchasing used from the campus store). These results are reflected in [Exhibit 10](#), where the bar for “Rent: campus store” is 85.6% of the height of the bar for “Buy used: campus store.”

Estimating Potential Savings from Textbook Buy-back Programs

Campus stores in Washington offer book buy-back programs that purchase used textbooks from students. The objective of this analysis is to estimate the average percentage of dollars that could be recovered by students who chose to sell back their required books after using them for a course. This information is helpful because empirical analyses of textbook “cost” typically focus only on the initial cost. Additionally, comparing the savings from “used purchase and sell back” to the savings from “rental” is helpful for understanding which options are most likely to lead to cost savings for students.

Target Quantity of Interest

Percentage of expenditures recovered across all students who sold back every item that they could. When we think about expenditures on required course materials, we could assume that students only need their course materials while they are in school. Note that one might find a different answer if they calculated the average used price percentage. We focused on the percentage of dollars saved in the aggregate, not the average percentage.

To estimate the amount of savings attainable to students by selling their textbooks back to bookstores through buy-back programs, we used data from the University of Washington’s and Eastern Washington University’s campus stores. We selected these two campus stores based on the availability of data at the time when we needed to conduct our analysis. WSIPP eventually received data on required course materials from each campus store, but we received data from UW and EWU relatively early, in late spring 2019, and we had sufficient time to validate the data before the end of the academic year. We wanted to estimate potential savings to students near the very end of the academic term, not later in the summer, because prices offered to students are subject to change due to market forces. Ultimately, EWU and UW potentially offered the most realistic estimates of savings for students who sought to sell their materials to the campus store at the end of the academic year, a time when buy-back programs are most active.

From UW and EWU, we selected three samples of items:

- 1) A random sample of 100 items from EWU;
- 2) The most expensive 100 items from EWU; and
- 3) The most expensive 100 items from UW.

We began with a random sample of items from EWU. The average new and used prices of the randomly selected items were \$97 and \$73. Next, we entered the ISBN of each item into the web site available through EWU’s campus store. For each ISBN, the web site provided a sell-back price (i.e., the amount of money a student would receive for their used book). Of the 100 items, 72 items could not be re-sold. The buy-back program was not willing to buy back the book. For the remaining 28 items, the average price offered was \$17.13.

$$\begin{aligned} \$17.13 * 28 &= \$479.64 \\ 100 * \$73.3716 &= \$7,337.16 \\ \$479.64 / \$7,337.16 &= 0.0653 \end{aligned}$$

We estimated that 6.5% of dollars spent on used textbooks can be received through book buy-back programs. On average, prices offered were 23.3% of the used price that a student paid to the campus store during the academic year ($1 / 0.28 * 0.0653$).

Estimating Potential Savings from Purchasing Textbooks through a Third-Party

The objective of this analysis is to estimate the average discount available to the student by purchasing used textbooks online through a third-party retailer. Ultimately, for a representative set of courses at four-year universities in Washington, we need two columns of data: (1) campus store used prices for all fall 2019 required items and (2) third-party retailer used prices for the same set of required items, if available. From these two columns of information, we can calculate a percentage discount that students would realize by purchasing their required items from a third-party retailer rather than the campus store. This percentage discount could be applied to the total cost of *all* required materials in order to estimate potential cost savings during the entirety of degree completion.

We randomly selected the items from 150 courses offered in fall 2018. From those courses, numbered 1-150, a spreadsheet was constructed with two tabs. The first tab listed all items for the first 125 courses, and the second listed all items for 126-150. Our goal was a randomly selected sample of at least 100 courses, and we anticipated that some courses that were offered in fall 2018 would not be offered in fall 2019. Courses 126-150 were included out of an abundance of caution, but we did not need them to reach a sample size of 100. Only six of the randomly selected 125 courses offered in fall 2018 were not also offered in fall 2019.

The key columns added to the data extracted from fall 2018 were: (1) campus store used prices for all fall 2019 required items, (2) third-party retailer used prices for the same set of required items, if available, and (3) third-party retailer shipping costs, if applicable.

We manually looked up individual item prices on campus store web sites and then used the ISBN to search for an equivalent item from a third-party retailer. Because student time and effort has non-trivial value, the goal of the search for a third-party item was not to scour every potential web site on the internet for a price, but rather to simulate the behavior of a reasonable student shopper, who would spend a few minutes searching for a cheaper equivalent item, but not long, given the potential inconvenience relative to purchase through a campus store. In terms of used item quality, we focused on items whose quality was listed as good, excellent, "like new," or new.

Once the dataset was complete, we calculated several statistics. Because our focus was estimating the average savings over the duration of four-year degree completion available via third-party retailer purchase, we generally retained items where no discount was available and counted such items as instances of zero discount.

The analytical dataset has 154 observations from 119 courses. A non-missing course is one where campus store data was available for fall 2019. Of the 154 observations, 49 were missing prices for the campus store and third party retailer. If these are zeros, then their inclusion/exclusion will not affect estimates of percent discount at the degree level.

We estimated that the discount over the purchase of all items was 23%.

- 1) Sum of all campus used prices across all items
- 2) Sum of all minimum used prices across all items in the spreadsheet, where the minimum is the smaller value of (campus_used, third_party_used_with_shipping).
- 3) Calculate: $(a-b) / (a)$

IV. The Evergreen State College

This section analyzes Evergreen's course material cost data and discusses potential comparisons to the rest of the public four-year universities.

The information we have from Evergreen's online catalog indicates that courses are rarely repeated and ones that are, like Algebra or Audio Recording, are offered as stand-alone evening courses or integrated full-time courses. Much of the interdisciplinary curriculum is updated annually and the course structure means that we cannot use the same analytic strategy for analyzing Evergreen's course material data as we can for the rest of the public four-year universities.

For about 1,200 items, we found an average new price around \$40, and an average used price of around \$28. The max price for a new item was \$388, and the max price for a used item was \$291.

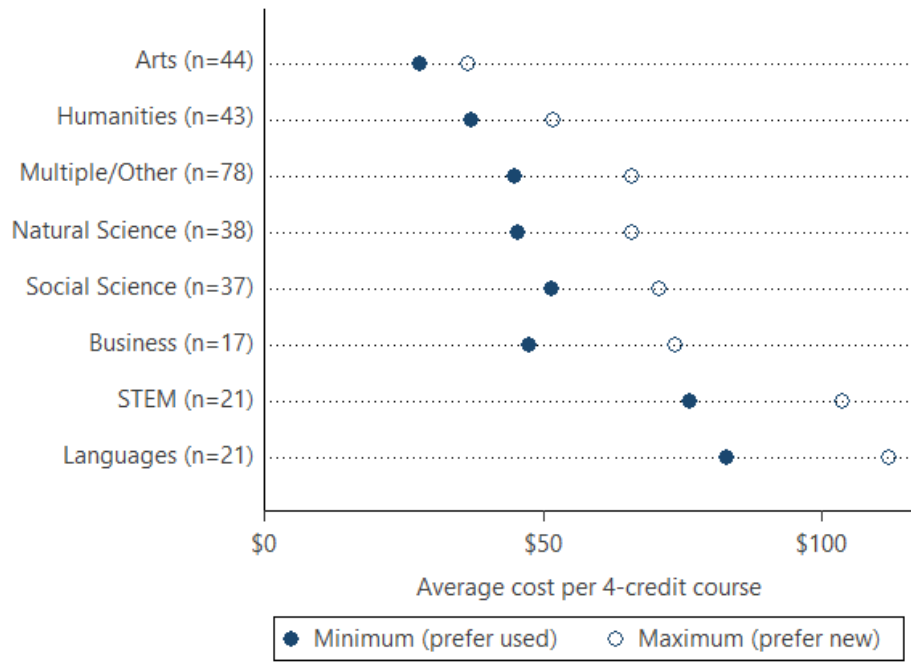
For 337 courses, we found an average of \$143 assuming all new materials and an average of \$100 assuming all used materials. The max cost range was \$765-\$1,029 (used/new). Note that these estimates did not account for some courses essentially counting as *multiple* standard courses in terms of credits awarded.

We conducted a principal components analysis on the subjects to see which ones tended to co-occur. Note that this analysis was not about what students like to take; it addressed how subjects tend to be nested within courses. Mainly, it showed that many Evergreen courses are difficult to categorize as belonging to one discipline or another. The clearest categories that emerged appeared to be arts, social sciences, humanities, and natural sciences. Looking at individual subject codes, we added categories for business, STEM, languages, and multiple disciplines/other (i.e., not readily able to categorize—this was the largest single category). Ultimately, assignments to categories were made based on the combination of the first two subject codes reported by faculty members for the course.

We converted costs to a per-credit basis and then calculated estimates per four-credit course to facilitate comparability with other universities. The results are shown in [Exhibit A10](#). We found that arts courses tended to be the cheapest, and STEM/Language courses tended to be the most expensive. The rank order was basically the same whether using new or used. However, a key caveat for art courses is that we were reliant on data available from campus stores, and art courses are especially likely to require the purchase of additional supplies beyond the campus store. Additionally, STEM and language courses may have higher-than-average rates of course material re-use due to the prevalence of sequential courses. In this respect, these statistics are accurate for courses within subjects, but material re-use would need to be addressed to generalize to student-level costs across the degree program.

Exhibit A10

Average Course Cost by Subject at The Evergreen State College



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