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**MEASURING THE EFFECTIVENESS OF STEM BOOK
PURCHASING: A PRINT-FOCUSED COST-PER-USE ANALYSIS
OF FIVE PUBLISHERS**

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3 *This study considers the cost-per-use of recently purchased print books on STEM subjects. The*
4 *aim was to find out whether books published by certain STEM publishers were more or less*
5 *likely to circulate than their subject areas would lead one to expect. This would indicate the*
6 *presence of a “publisher effect,” related to content, format, or other non-subject criteria, that*
7 *influences how often a book will be used. The findings indicate that there may be a positive*
8 *publisher effect in the case of Wiley; however, the other publishers in the study did not seem to*
9 *vary significantly in this regard.*

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20 *Keywords: STEM, circulation, assessment, cost-per-use, publishers, print books*
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22 INTRODUCTION

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28 Cost-per-use analyses are commonly accepted as one way to help determine how much value an
29 academic library may be getting from its journal subscriptions. To get this figure, one divides the
30 number of “uses” a journal receives, by the cost of one year’s subscription. A “use” can be
31 defined in several ways for this purpose – the most common way is to define it as a PDF
32 download of an article.
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40 While this sort of analysis is standard protocol for assessing academic journal usage, it is
41 more difficult to do a cost-per-use analysis for books. Looking solely at how many checkouts or
42 e-book uses a single book has received tells one almost nothing about how justifiable it may have
43 been to purchase it. Describing a book purchase as “justifiable” seems to make little sense, in
44 fact – for several reasons.
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52 First, books feature very niche coverage, so, unlike with a journal subscription, where
53 many articles will cover a broad range of topics, it is impossible to say how many patrons should
54 be expected to use a single book. Second, even a book on a popular topic may not have received
55 any uses, if other recent books on the same topic are also available for use on the shelf. Third,
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3 unlike journals, books vary in length and format type (e.g., textbooks, conference proceedings,
4 monographs, collections of articles, manuals, etc.), and these differences might have some effect
5 on whether or not they get checked out. Other significant factors might include the availability of
6 good catalog records, and broader literacy trends in the library's community.
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12 In many ways, measuring library users' interest in journal subscriptions is easier than
13 measuring the level of interest in books. Journals have by now established the "impact factor"
14 metric, as well as other emerging altmetrics that can provide more granular insights into
15 journals' quality and level of community interest. Additionally, many journals are grouped under
16 the heading of established publishers who often offer libraries subscriptions at the package level.
17 This often reduces or in some cases even eliminates the need to pick and choose titles.
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22 Unless a library is using some form of Patron Driven Acquisitions (PDA), a book selector
23 has to use some degree of guesswork when making purchases, even if he or she has tried to learn
24 as much as possible about usage trends and local areas of research interest in the library's
25 community. Indeed, the inherent difficulty of book selection is one reason why PDA is now
26 widely regarded as a helpful tool for this process, at least as it pertains to e-books.
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31 While it is impossible to do a meaningful cost-per-use assessment of a single book, or
32 even for a handful of them, there are articles that demonstrate how it is possible to perform a
33 cost-per-use analysis of books in larger groupings, according to various criteria. By broadening
34 the scope to focus on a large number of titles, we can begin to consider books in a way that is
35 more akin to the way we think about journal subscriptions. As book-buying budgets come under
36 pressure in the digital age, it is important for libraries to have ways of measuring how much
37 value our book-buying dollars actually create. If book-buying comes under closer budget
38 scrutiny, selectors will tend to be asked whether they can provide evidence to justify these
39 purchases.
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3 This article therefore describes a recent analysis of print book usage trends in STEM
4 (Science, Technology, Engineering and Mathematics) subjects at Florida Atlantic University
5 (FAU), located in Boca Raton, FL.
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LITERATURE REVIEW

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15 Circulation analyses are useful as ways to measure the usefulness of book selection. Denise
16 Brush (2007) writes: “This approach can analyze either the length of time since last circulation
17 or the frequency of circulation. The former is usually used when weeding a collection, whereas
18 frequency is more commonly used when assessing usage of new titles” (60). The current study
19 assesses the usage of new titles.
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27 George S. Bonn (1974), as cited in Jennifer E. Knievel, et al. (2006), described a method
28 of assessing circulation of titles, called the “use factor”: “the number of circulations in a given
29 subject area is compared to the number of holdings in the same subject area” (37). This is the
30 method used in the current study. Another possible method is to compare the number of titles
31 with the number of titles that had at least one circulation. Bonn’s use factor, however, is arguably
32 more fine-tuned to measure demand, as it views a circulation event for one book no differently
33 than a circulation event for any other book. In other words, this view states that the library
34 should see as much value in one book that circulated three times, as in three books that were
35 each checked out once. There is, of course, no way by which we could objectively measure such
36 a notion of “value,” but the use factor does provide perhaps the best possible working definition,
37 for the purpose of our study.
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53 Joe Crotts (1999) measured and analyzed by subject the interrelationships among
54 circulation, expenditure, and enrollment. One of his findings was that circulation was “the single
55 empirically supported parameter upon which the demand for monographs by subject may be
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measured” (261). The amount of money spent on books is not correlated with how often those books will get used. Likewise, the amount of students enrolled in a certain degree program does not necessarily have a direct relationship with how often those books will get used. All else being equal, Crotts found, the only empirically supported way to determine book demand is to measure past circulation, which is tied to subject area: “Demand represents an inherent quality of the subject” (268). The allocation and expenditure of new funds should reflect past behavior, therefore. This is a guiding principle of the current study.

Crotts’s findings are important to consider, as they contradict one’s common-sense assumptions about how book usage might be predicted. One would hope that spending more money on certain books would lead to more usage of them. As this study confirms, however, this is not necessarily the case.

While there are few studies that have looked at cost-per-use of print books as it specifically relates to publishers, articles by Brian Adams and Bob Noel (2008) and Robert Alan, et al. (2010) feature studies that are similar to the current study.

Adams and Noel measured a four-year period of circulation of books that were acquired in a single year by the Swain Hall science library at Indiana University Bloomington. The authors then analyzed circulation by publisher, publication date, and subject. The key statistics used by the authors to measure circulation were the average number of checkouts and the percentage of items that circulated. The authors found that circulation averages amongst publishers showed considerable variation.

Alan et al. evaluated the monograph acquisition approval plan profiles of two ARL member libraries, by determining use, cost effectiveness and coverage. To do this, the authors collected in tandem reports from vendors and local online systems. One year of purchasing data was considered, and the period used to measure circulation of these books was the three years

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3 that ensued after the purchases were made. Circulation of books from the top ten publishers in
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5 the trade and university press areas, respectively, was measured, and, as in Adams and Noel
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7 (2008), there was considerable variation in the percentage of titles circulated amongst the
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9 different publishers. Alan et al. (2010) went a step beyond Adams and Noel by determining the
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11 cost-per-use by publisher, and this figure also was shown to considerably vary amongst the
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13 publishers.
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17 The present study therefore uses these two past studies as starting points. While our study
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19 is intended as an addition to the body of research on print circulation and cost-per-use by
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21 academic publisher, this study goes further by trying to determine whether there is a “publisher
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23 effect” that can be isolated from the subject area effect on circulation. In looking for a publisher
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25 effect, we are asking, “Is a publisher’s use factor higher or lower solely due to the fact that they
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27 publish books in subject areas that are more or less popular? Or might there be other factors
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29 specific to the publisher that influence the use factor of their books?” My hypothesis was that the
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31 “publisher effect” can be measured by comparing the use factor of a publisher’s newly-added
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33 books with the use factor of all newly-added books in the publisher’s call number range(s).
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35 Measuring this would show whether a publisher’s cost-per-use is or is not solely determined by
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37 the call number range, and whether the choice of publisher might have some effect on how often
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39 a book gets checked out.
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METHODODOLOGY

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49 FAU is a public state university that had 30,808 students enrolled as of Fall 2013 (“Quick Facts”
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51 2014). About 15% of these were graduate students, and 80% of them were enrolled at the main
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53 campus in Boca Raton, where the library that the current study covers is located. As of Fall 2013,
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55 a combined total of 26% of the enrolled students at FAU were enrolled in the College of Science
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3 and the College of Engineering and Computer Science. Therefore, as a large state university with
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5 a significant portion of its students majoring in STEM subjects, FAU is comparable to many
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7 similar institutions across the country.
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10 Books purchased during the library's fiscal years between July 2010 and June 2013 were
11 considered. Each fiscal year runs from July of one year, to June of the next, so a total of three
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13 fiscal years' worth of STEM book purchases was studied in this case. Since the study was
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15 conducted in December 2014, the last books purchased during the period under consideration
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17 had a year and a half in which they might have circulated. Although some in academia currently
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19 interpret the "M" in STEM to refer to Medicine, here the alternative (Mathematics) is used; this
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21 is also part of common usage (U.S. DOE 2015). Books on psychology were included in this
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23 study, for two reasons. First, although psychology is "often excluded from the list of core
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25 disciplines responsible for scientific and technological progress," the American Psychological
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27 Association argues that psychology should still be considered a STEM subject because of its
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29 "direct scientific and technological innovations, as well as its indirect contributions to education
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31 and learning in science and technology" ("STEM: Psychology as a Core Science, Technology,
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33 Engineering, & Mathematics Discipline" 2015). Secondly, the department of Psychology is part
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35 of the College of Science at FAU.
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43 Books on medical topics were not included in the current study, unless they happened to
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45 fall into one of the call number ranges we considered. Only books published in the following call
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47 number ranges were considered: BF (psychology); G - GF (geography); Q (sciences, including
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49 computer science); and T (engineering). Although we also purchase some science books in the S
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51 ranges (agriculture), these were not felt to be of such a large amount that their inclusion in the
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53 study would be warranted.
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This study considered the print output of five major STEM publishers: Wiley, Springer, Oxford University Press, Cambridge University Press, and CRC Press. Although the university presses are not usually considered to be STEM publishers per se, they are described as such for the purposes of this study, as they do both publish a significant amount of STEM books. Non-STEM subjects were not included in this study. Although there are some other significant STEM publishers (such as Elsevier/Academic Press) that were not included in the study, the five that were chosen constitute a large share of the STEM books that we purchased overall during the study period.

To gather ordering data, reports were collected from YBP's GOBI3 site, which is where FAU's selectors place most of their orders for individual books. The books studied here were selected by designated subject selector librarians in the majority of cases; in some other cases, faculty recommendations/requests would also have been involved. GOBI3's approval slips are used at FAU to discover new titles, but these titles were not purchased automatically through approval. The FAU libraries first began using GOBI3 at the start of the 2010-2011 fiscal year, so this was the starting point used for the time period under consideration. To find out which publishers we purchased the most STEM books from, a one-year sample was obtained by running GOBI3 reports for STEM purchases made during the 2012-13 fiscal year. As Figures 1 and 2 show, these five publishers were at the top of our results.

As Figure 2 shows, 43% of our STEM book funds in 2012-13 was spent on books from these five publishers. A total of 844 STEM books from the 5 publishers was purchased during the three-year period of our study, with 247 of them selected in 2012-13, which is 29% of the total. Therefore, it is reasonable to conclude that each of the 2010-2012 fiscal years featured a similar proportion of publishers as was seen in 2012-13. These five publishers must have been at or near the top 5 during all three years under consideration.

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Looking at 844 books purchased over three years provides a decent sample size for the purpose of analyzing usage data and reaching meaningful conclusions about it. The books' page number totals, cost, and call number ranges, amongst other data, were also included in the GOBI3 reports.

Next, circulation reports were run on the Florida Virtual Campus (FLVC) website. This statewide site provides automated ARROW reports featuring data on many aspects of library services. Only the book circulation at FAU's main library at the Boca Raton campus was considered. The vast majority of titles in the university libraries' collections are held at this main library, although a possible similar type of study in the future that looks at usage at our satellite campuses would also be helpful. The ARROW reports provided a list of all print titles held in the STEM call number ranges, as well as: how many times the books have ever circulated; the books' publication dates; the dates when they were added to the library's collections; and the date when they were last returned after having been checked out.

The ARROW reports were used to analyze usage trends across those call number ranges that were considered. Analysis of these spreadsheet reports was conducted by using basic Excel techniques, such as sorting columns and finding the sums and averages in the columns. I was not just interested in seeing how the newly-purchased books from our five publishers fared; I also wanted to see how often all newly-added print books in the STEM call number ranges tended to circulate during 2009-2014, as this would provide a baseline against which to measure circulation of the newly-added titles from our five publishers. The publication dates for this general group of new STEM books fell between 2009 and 2014, so that the element of donated books (of which our library receives many, usually with older publication dates) would not prevent an apples-to-apples comparison. To get this comparison, Bonn's use factor was applied: the number of checkouts that have occurred in a call number range, or by a given publisher,

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3 divided by the number of new STEM books held in that range, or from that publisher. The use
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5 factor here is thus a ratio.
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8 There were two use factors, therefore: one for each of our top 5 STEM publishers, and
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10 one for each of the call number ranges in the STEM subject areas. Only the use factor of newly-
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12 added books in these two categories was measured. Comparing these two figures allows one to
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14 determine how popular the books from the Top 5 STEM publishers were, in comparison to the
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16 popularity of new STEM books from all publishers, thereby providing us with a possible look at
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18 a “publisher effect.” The formula can be shown as:
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$$\text{Publisher effect} = (\text{Use factor for new STEM books by a Publisher}) - (\text{Use factor for all new STEM books in the Publisher's call number ranges})$$

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29 This is a similar methodology to that used by Denise Brush (2007), who compared the
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31 circulation of books purchased during one year through an approval plan, with the circulation of
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33 all books in the same call number range during the same year. Like Brush, the present study
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35 compares a smaller subset of new titles (from the 5 STEM publishers) against a larger set of
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37 titles (all new STEM books added between 2009 and 2014), as a way to determine how popular
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39 the books in the subset were. Brush’s comparison group is larger than the one used here. While
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41 that provided her with a larger sample size, our smaller comparison group is limited to newer
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43 books, so that it is more of an “apples to apples” comparison.
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48 What about books that may have been used but not checked out? Although it is true that
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50 books in the general circulating collection presumably sometimes get used in-house, this factor is
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52 not significant enough to undermine the general relevance of the circulation use factor. For one,
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54 FAU Libraries have a separate purchasing fund code for reference books, which can only be used
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56 in-house at our library. Books on reserve do get checked out. The fund code used to purchase the
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books in this study was the one designated for books that in the vast majority of cases would be placed in the general circulating collection. The overwhelming majority of new book purchases covered by the study, therefore, were for books that we envisioned to be checked out. Secondly, although (non-Reserve) in-house use of our circulating books was not counted in the present study, there is no reason to think that in-house use of these books is either significant enough, or different enough among the various publishers, for the general relevance of the use factor analysis to be undermined. The circulation use factor cannot completely account for all instances of a book's use. However, unless there is some reason to suspect that, for example, Springer's books are used more often in-house than Wiley's books, there is no reason to think that in-house use would skew the apples-to-apples comparison of publisher popularity that this paper features.

RESULTS

Table 1 summarizes some general information we gathered from our sources of data.

Table 1's "Publisher Effect" column shows the difference between the two use factors mentioned above - the difference between a publisher's use factor and the use factor for all new STEM books that were added between 2009 and 2014. This indication of a "publisher effect" is seen here at its broadest level. The figure of "checkouts" refers to the total number of times that all books were loaned. So, the data reflects the fact that some books received multiple checkouts, while some received no checkouts. Also, the "cents per page read" figure is of course not meant to imply that all pages of the checked-out books were actually read. It is merely a way of comparing the cost-per-page totals for the checked-out books. The cost-per-checkout column is analogous to the cost-per-use figure that is commonly used for assessments of journal subscriptions.

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Table 2 shows a more granular comparison of how each publisher's books fared. To get this data, the use factor for a publisher within a certain subject – for example, Wiley's performance in Biology – was compared with the use factor of all new books within that same subject area. For example, if 20 Wiley Biology books circulated 49 times, I then took the numerator (20) and determined how many times those 20 books would have circulated if they had followed the subject area's use factor for new books (in this case, they would have circulated only 20 times). The difference between these two denominators (+29) was then credited to Wiley. All of these subject difference totals were then added up for a publisher, and divided by the number of books purchased overall from that publisher. This number is thus a percentage difference between actual and expected checkouts, based on subject area use factors.

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These findings do not differ significantly from what was seen in Table 1's broader comparison of a publisher's use factor with the overall use factor for new STEM books. However, OUP did a bit worse in this second, more granular view, and CUP did a bit better.

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One finding from our study is the comparatively excellent performance of Wiley's books, usage of which exceeded expectations (however, some qualifications are mentioned later). Another important take-away here is that, considering that the library spent such a large share of its STEM monograph dollars on Springer's books, their under-performance of expectations is an area of concern. This issue will be discussed in more detail below.

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Table 3 shows the difference between the two use factors as seen in the individual STEM subject areas. This table looks at the performance of all the Top 5 publishers' new STEM books together. It is noteworthy that the circulation ratios for all new books on Computer Science and Psychology are significantly higher than those for Engineering or the other sciences in the Q range, while the ratio for Geology (QE) is very low. Also interesting is that Chemistry and Engineering seem to be areas where books tend to do significantly better if they are from a Top 5

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3 publisher, while in Computer Science, books from the Top 5 publishers actually do worse than
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5 books from other publishers.
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8 Figure 3 shows the Top 5 publishers' use factors broken out by call number range. Wiley
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10 out-performed each subject use factor, except in the case of Geology, where only 8 of their books
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12 were purchased (4% of the total). In contrast, 84% of the newly-purchased Springer books were
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14 added to call number ranges in which Springer under-performed the subjects' use factors.
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17 I wondered whether Wiley's books might be an outlier because they tend to publish more
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19 monographs and textbooks than edited volumes, while CRC and Springer tend to publish more
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21 of the latter than Wiley does. While the difference between edited and authored books was
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23 probably a small factor in Wiley's case, it doesn't seem to have been very significant. 35% of the
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25 total purchased volumes from all five publishers consisted of edited volumes, and 27% of the
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27 total checkouts involved edited volumes. So there is a bit of a lag in interest in edited volumes,
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29 but the lag is similar across the publishers. 30% of the purchased Wiley titles were edited
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31 volumes (only five points fewer than the overall percentage of edited volumes), and 20% of the
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33 Wiley checkouts involved edited volumes.
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39 However, the issue of textbooks and trade books versus other monographs does seem to
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41 be a significant factor in Wiley's case. It is well-known that Wiley publishes more undergraduate
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43 STEM textbooks than the other four publishers. FAU purchased more of these than they did from
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45 the other publishers – indeed, a few of them may have gone onto the reserve shelf. This
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47 technically goes against FAU's collection development policy, but sometimes it is justifiable to
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49 bend broad policies in certain situations, such as when a faculty member has a persuasive need
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51 for such a purchase. (It should also be noted that not all of these purchased textbooks – probably
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53 not even the vast majority of them – have been adopted in FAU courses). 30 of the Wiley books
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55 that circulated at least once (23%) were either from the popular "For Dummies" trade book
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3 series, or were classified in GOBI as undergraduate textbooks. Those 30 books combined to
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5 circulate 117 times. If we take these books (and their checkouts) out of the larger pool of Wiley
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7 books, then Wiley's publisher use factor (see column in Table 1) drops from 1.514 to 1.15, and
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9 their "publisher effect" drops from +.636 to +.272. Wiley's granular percentage difference
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11 between actual and expected checkouts based on subject area (see Table 2) would then drop from
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13 +57% to +19%. Some may feel that it is important to make this adjustment, because the
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15 Dummies books and the undergraduate textbooks arguably contribute less to the library's
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17 academic STEM mission than the other monographs do. However, even these reduced numbers
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19 for Wiley are significantly higher than the other publishers' numbers, and that is without
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21 considering that occasionally some undergraduate textbooks here and there were purchased from
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23 the other publishers as well. For example, 9 CRC Press books (18% of those that circulated at
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25 least once) were undergraduate textbooks. So this qualification should also be kept in mind when
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27 considering these alternate Wiley statistics.
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34 The issue of edited versus authored titles does seem to be a significant factor in
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36 Springer's case. 46% of the purchased Springer titles were edited volumes (11 percentage points
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38 more than the overall percentage, and twice as many as were purchased from Wiley), and 33% of
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40 the Springer checkouts were for edited volumes. Thus, while Wiley does not seem to publish a
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42 significantly smaller percentage of edited works than the norm, Springer clearly does publish a
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44 higher percentage of edited works than the norm. Considering the lag in interest in edited
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46 volumes, it is quite possible that this is negatively impacting the use factor for Springer's STEM
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48 books. See Table 4 for a full comparison of edited volumes among the publishers.
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53 It is relevant to consider what percentage of these titles were checked out at least once.
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55 Table 1 shows this comparison. If Wiley's Dummies books and undergraduate textbooks are
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57 taken out of consideration, their percentage here would drop here from 60% to 53%, which is the
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MEASURING STEM BOOK PURCHASING EFFECTIVENESS

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3 same as CRC's percentage. This is more evidence that, while Wiley's books fared well no matter
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5 how one looks at it, in some respects they weren't too different from the other publishers.
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8 It is also relevant to consider how many new STEM books these publishers release on a
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10 regular basis, as the library might be more likely to buy new books from more prolific
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12 publishers. To find this out, GOBI reports were run for the period between June and November
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14 2014, to determine how many new GOBI approval slips we received from our top five STEM
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16 publishers each month, on average. The results are shown in Table 5. This table shows that, as
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18 one would expect, the university presses devote a much smaller proportion of their catalogs to
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20 STEM books. It also demonstrates just how many new STEM books Springer regularly
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22 publishes. They publish over five times as many as Wiley, their closest competitor.
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DISCUSSION

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31 Following Joe Crofts (1999), a subject area's use factor should tend to correlate with the number
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33 of expected new checkouts. When a publisher's use factor differs from their subjects' use factor,
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35 it means that their books are being checked out either more or less often than one would expect,
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37 given the subject areas they cover. Books might have some other, non-subject-related factor or
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39 factors, inherent to their content or formats, that is boosting (or decreasing) their checkout rate.
40
41 An obvious example is if the library purchases a textbook that is adopted in a course. The book
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43 will tend to get a lot of checkouts because inevitably, at least one student per semester will find
44
45 out about it and check it out so that they can avoid purchasing the textbook.
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50 As noted above, Wiley's books appeared to over-perform expectations, although some
51
52 caveats apply. As shown in Table 1, Wiley's cost-per-checkout and cost-per-page-read were
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54 almost three times smaller than those of Springer, even though the cost difference between books
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56 from these publishers was only \$8.45. Wiley also out-performed the university press's books on
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MEASURING STEM BOOK PURCHASING EFFECTIVENESS

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3 these measures, even though list prices of university press books are much cheaper, on average.
4
5 Furthermore, it wasn't just the popular topics of computer science and psychology that were
6
7 driving Wiley's high usage rate – only 12 percent of the Wiley books were purchased in those
8
9 two subjects. In fact, 40% of the Wiley titles were on engineering subjects, which we would
10
11 expect to have lower checkout rates than books in the sciences. Although the factor of trade
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13 books and undergraduate textbooks somewhat reduces the impressiveness of Wiley's
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15 performance, it still would appear that these books are more popular than books from the other
16
17 four STEM publishers. The difference might have something to do with the content, name
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19 recognition, or format of these books, compared to those published by the other four publishers,
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21 although this would be very hard to determine. A previous article is of possible interest in this
22
23 regard. Yuening Zhang and Roger Beckman (2011) sent a survey to faculty and graduate
24
25 students at Indiana University Bloomington. The survey showed that Wiley was the most in-
26
27 demand e-book publisher in Biology and Chemistry. Wiley is clearly a well-respected STEM
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29 publisher, then, but how big of a role that plays in their books' use factor would have to be
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31 analyzed by future studies.
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39 The under-performance of the Springer titles is troubling, not just because we would have
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41 expected them to be checked out more often than they were, but also because we spent by far the
42
43 largest amount of money on Springer books, as a proportion of money spent altogether on books
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45 from these five publishers (see Figure 4). We also bought more titles from Springer than from
46
47 anyone else (see Figure 1). Spending all of that money resulted in only 95 books that were
48
49 checked out at least once.
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52
53 While it is true that Springer under-performed expectations, it is important to note that
54
55 their broad-level "publisher effect" (-.17) was not that much different than Cambridge's (-.125)
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57 (see Table 1). Also, in the more granular view seen in Table 2, Springer's books only accounted
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MEASURING STEM BOOK PURCHASING EFFECTIVENESS

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3 for a 3% difference in comparison to Oxford's. Therefore, it would be unfair to single Springer's
4 content out for the low checkouts of their books. These are all very highly-respected publishers.
5
6 However, Cambridge's and Oxford's use factors do not present as much of a dilemma as
7
8 Springer's does, because Springer's books are almost twice as expensive, on average. The issue
9
10 here is not with the content of Springer's books – it is with the cost, volume, and format
11
12 differences of their print titles, which combined to create a relatively poorer investment value for
13
14 our library.
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20 It is likely that Springer's high cost-per-use has something to do with the fact that
21
22 Springer simply publishes by far the largest amount of STEM books (see Table 5). Having more
23
24 books to choose from probably makes it harder for selectors to choose the ones that patrons may
25
26 be interested in. Hence, the general difficulty of print book selection is exacerbated in Springer's
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28 case.
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32 The studies by Alan et al., and Adams and Noel, came to similar conclusions about how
33
34 these publishers fared with regard to cost-per-use and circulation per title. Figure 5 shows how
35
36 these studies, as well as our own, measured circulation-per-title amongst CRC Press, Springer,
37
38 and Wiley (OUP and CUP don't publish enough STEM books to be considered in this
39
40 comparison with the other studies). Note that these averages are so disparate because they reflect
41
42 studies that covered different timespans and user groups.
43
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46 In all four libraries studied in Figure 5, Springer's books had the lowest circulation-per-
47
48 title. Yet, as Figure 6 shows, three of these four libraries purchased *more* Springer books than
49
50 books by CRC Press or Wiley. Figure 7 shows a comparison of the present study and that by
51
52 Alan, et al., with regard to cost-per-use among CRC Press, Springer, and Wiley (OUP and CUP
53
54 are again excluded here due to the low percentage of their titles that relate to STEM; also, note
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56 that Alan et al. did not solely look at STEM titles from these two publishers, as the current study
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MEASURING STEM BOOK PURCHASING EFFECTIVENESS

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3 does). In all three of these libraries, Wiley's books achieved the lowest cost-per-use amongst the
4
5 three publishers considered.
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8 These comparisons of our results with those of Adams and Noel, and Alan et al., as
9
10 imperfect as they are, show that our results are perhaps not anomalous. In most of these cases,
11
12 Wiley's books tended to have comparatively high circulation-per-title and low cost-per-use,
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14 while Springer tended to have comparatively low circulation-per-title, high cost-per-use, and
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16 high amounts of books purchased overall. The performance of Springer's books might reflect the
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18 fact that Springer simply publishes so many STEM books, which leads libraries to tend to
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20 purchase more of them, accordingly. The comparatively higher number of edited volumes in
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22 Springer's catalog may also be affecting the performance of their titles.
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32 CONCLUSION

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34 It is important to note that, while this sort of cost-per-use analysis could also be performed on e-
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36 books, none of the analysis in this paper has any bearing on e-books, as these were not
37
38 considered. E-book access and use are different in many ways from print book access and use.
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40 To just mention two of many differences that could cause radically different findings, were one
41
42 to apply an e-book focus to a similar study – Springer's e-books are assigned metadata at the
43
44 chapter level, which facilitates chapter access in web scale discovery services such as Summon.
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46 Also, Springer only sells their e-books as part of large subject-centered or yearly packages, not
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48 individually – and the package costs represent a significant savings on a per-title basis, in
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50 comparison to their respective titles' print costs. These factors might result in considerably
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52 different cost-per-use findings regarding Springer e-books than we find with their print versions.
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MEASURING STEM BOOK PURCHASING EFFECTIVENESS

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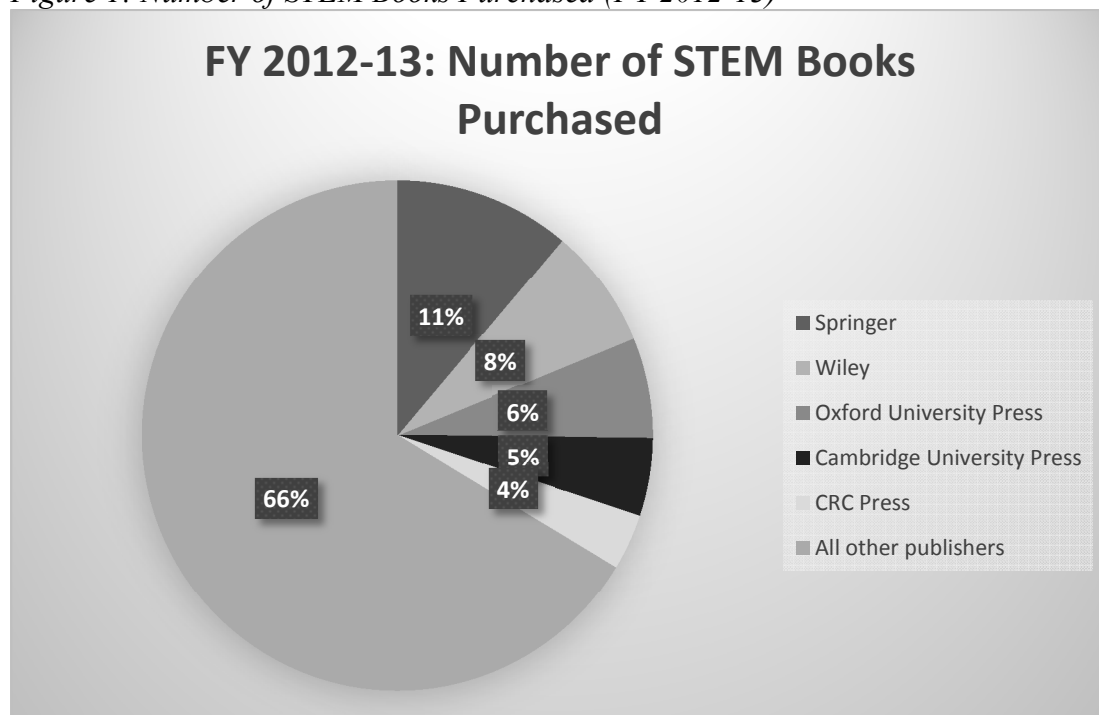
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3 Indeed, preliminary research into the cost-per-use of FAU's Springer e-books indicates a
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5 significantly better dollar value for us than their print counterparts have provided.
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8 Relying on the selection of individual titles when presented with a large volume of new
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10 books becomes more problematic as that volume gets larger, and accordingly, more specialized.
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12 As more and more patrons continue to gravitate towards accessing STEM information online,
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14 often in the form of journal articles, traditional library selection processes become increasingly
15
16 important to analyze. A look at the historical trends in the research literature on print book cost-
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18 per-use shows a continued process of diminishing returns in the STEM subjects. We as librarians
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20 should question our almost instinctive adherence to the traditional methods of selection criteria
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22 that have been our profession's bread and butter for centuries. However, it is also true that patron
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24 feedback and recent user studies indicate that the future needs of library patrons will likely
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26 involve a mix of print books and e-books, so STEM book selection will most likely continue to
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28 have some role at most academic libraries. However, that role will be diminished from what it
29
30 once was, as the ease of journal searching provides so many more avenues for accessing
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32 scientific information. Other access methods that pertain to e-books, such as Patron Driven
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34 Acquisitions, the purchasing of discounted bundled collections (such as Springer's), and
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36 subscriptions, will also increasingly be considered as ways to supplement, or in some cases even
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38 substitute for, the selection of individual print STEM titles.
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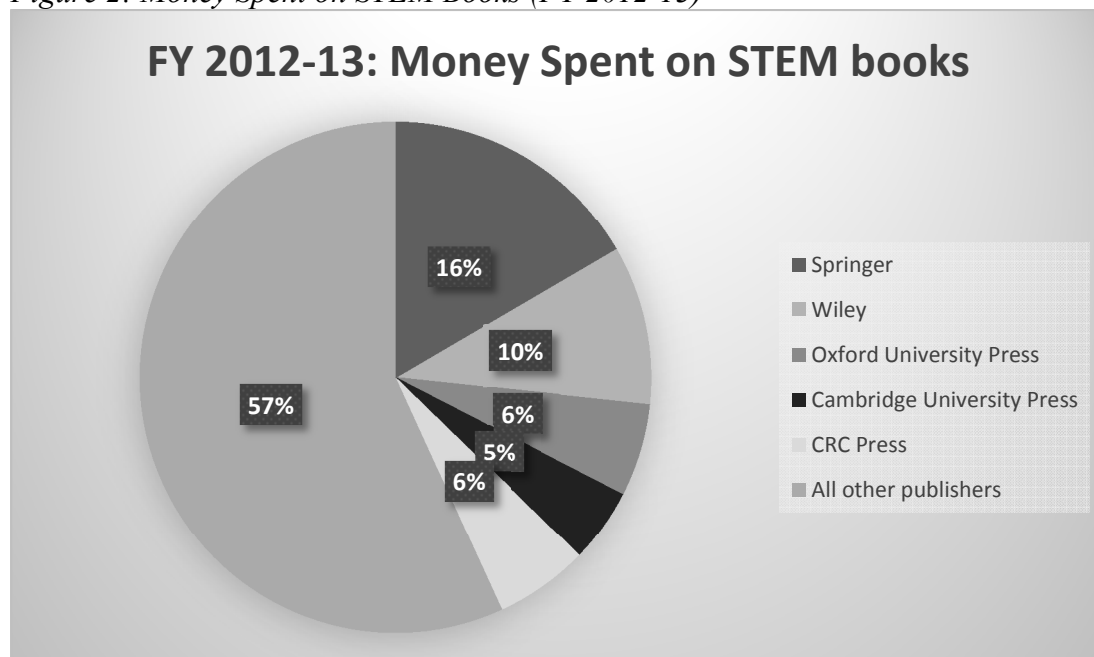
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Figure 1: Number of STEM Books Purchased (FY 2012-13)



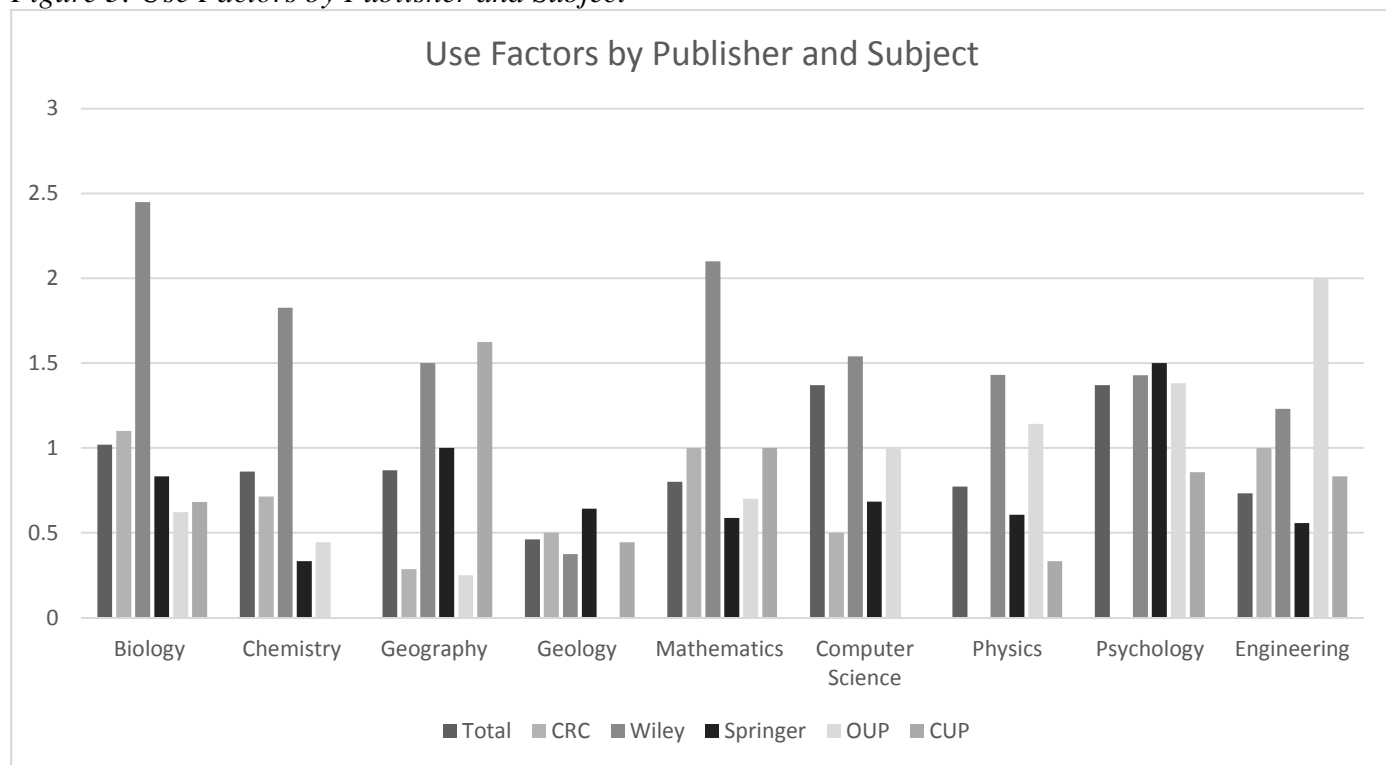
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Figure 2: Money Spent on STEM Books (FY 2012-13)



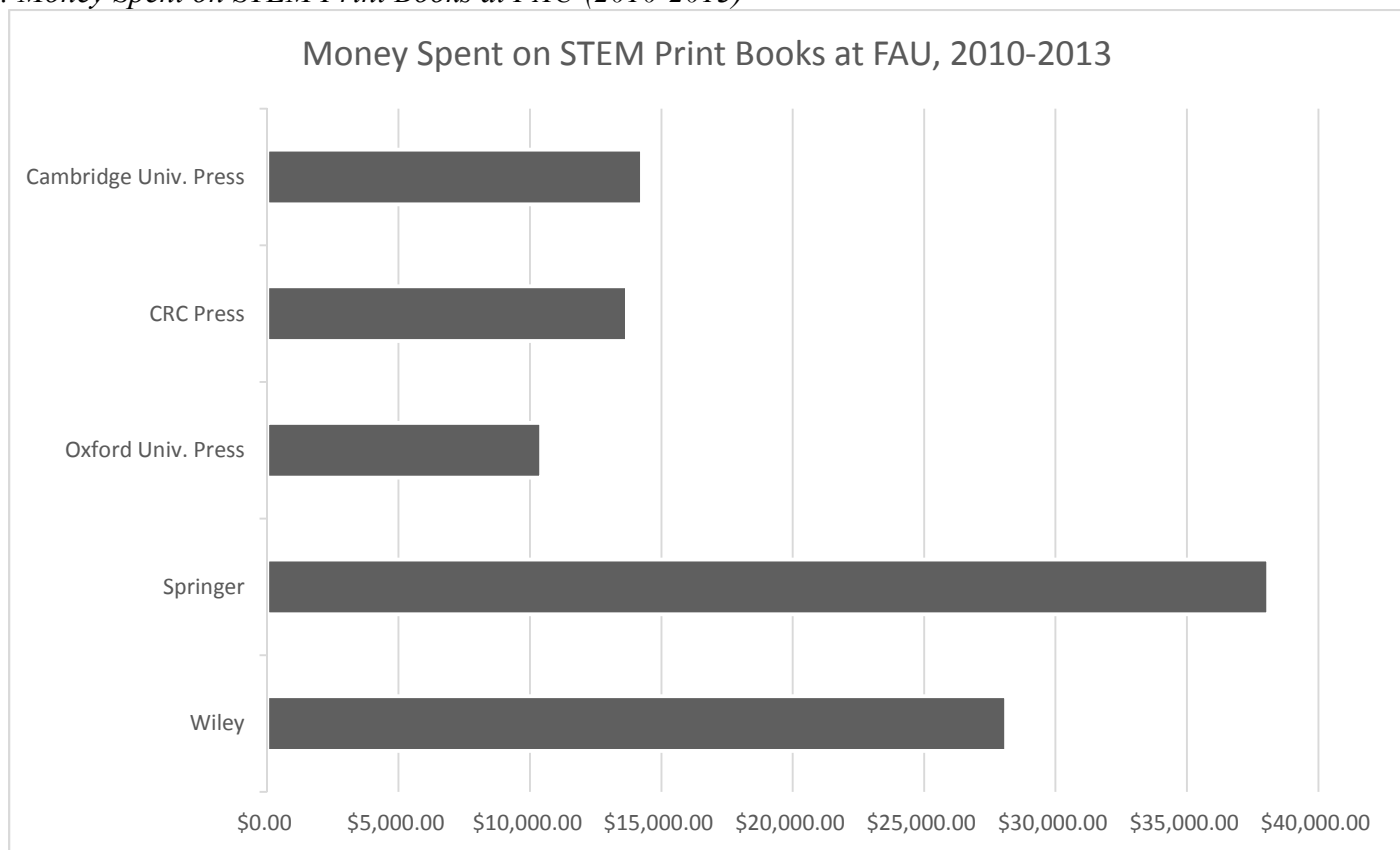
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Figure 3: Use Factors by Publisher and Subject



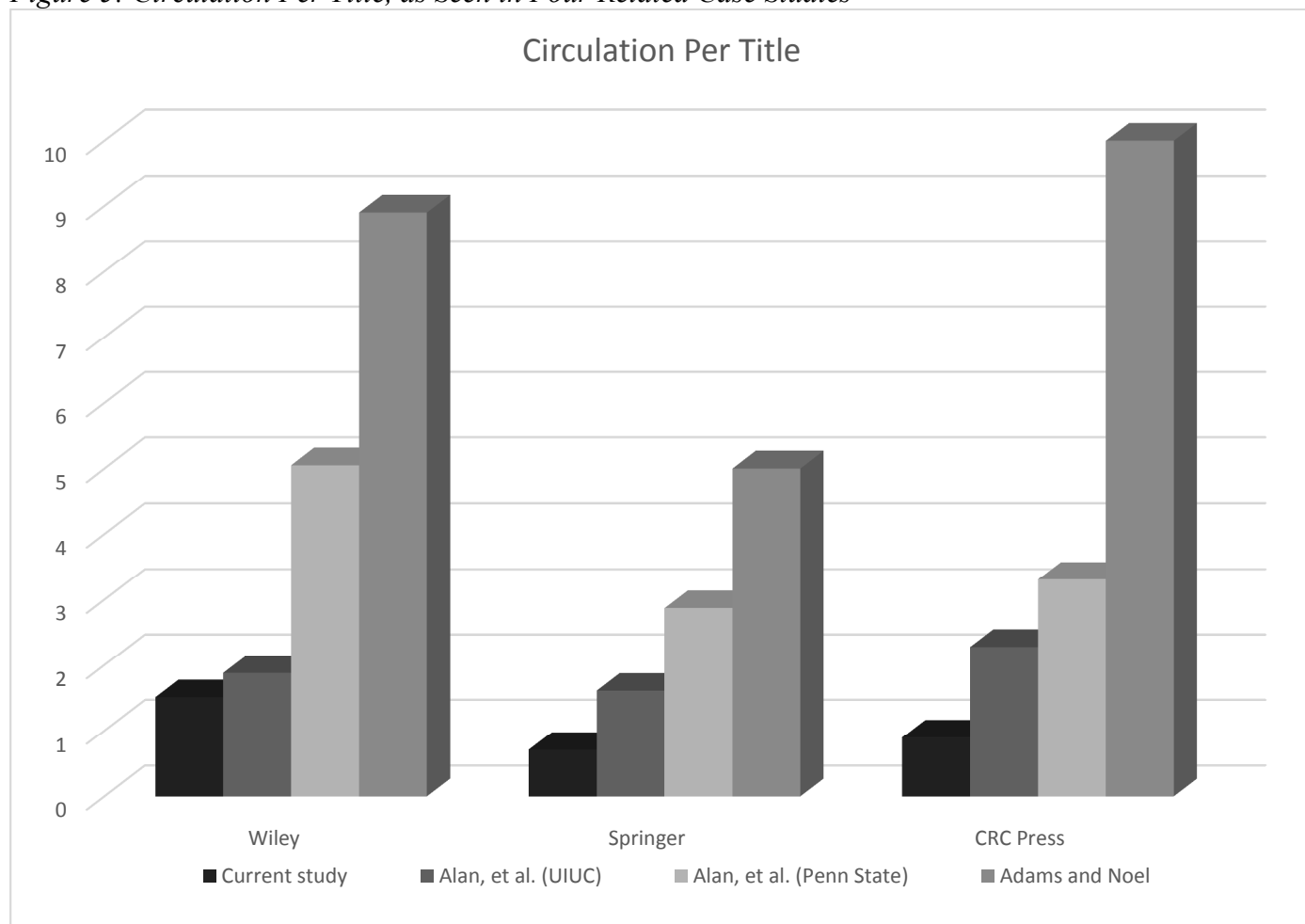
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Figure 4: Money Spent on STEM Print Books at FAU (2010-2013)



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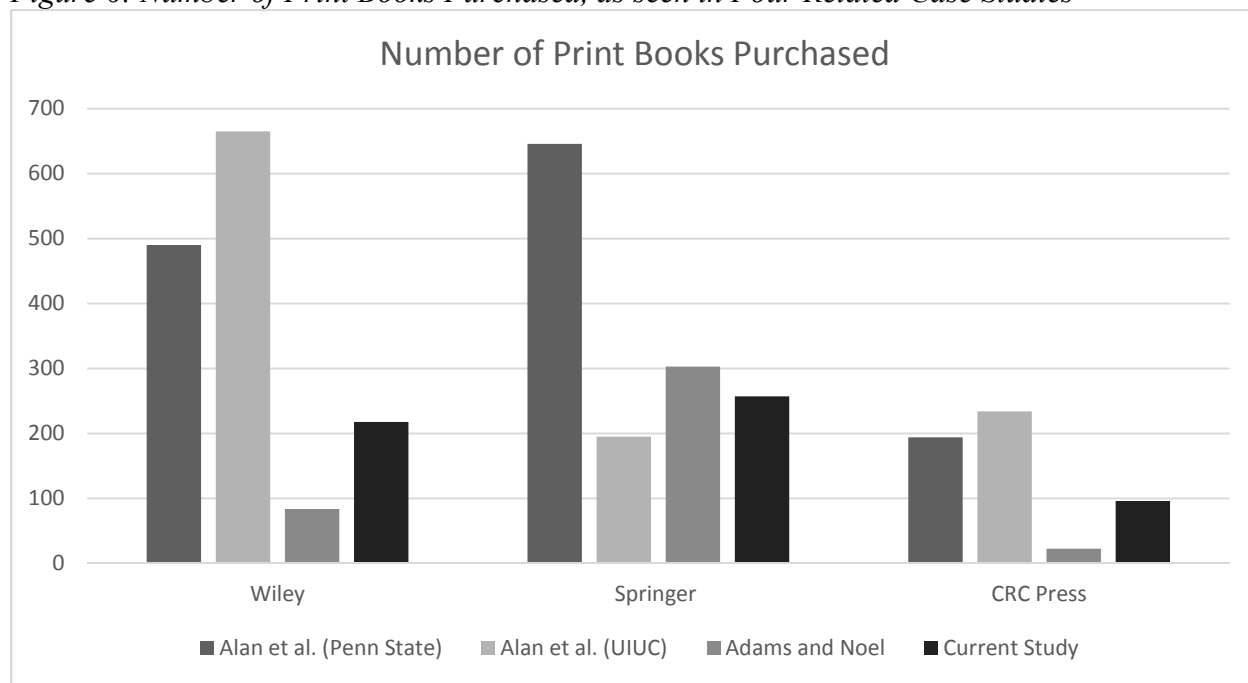
Figure 5: Circulation Per Title, as Seen in Four Related Case Studies



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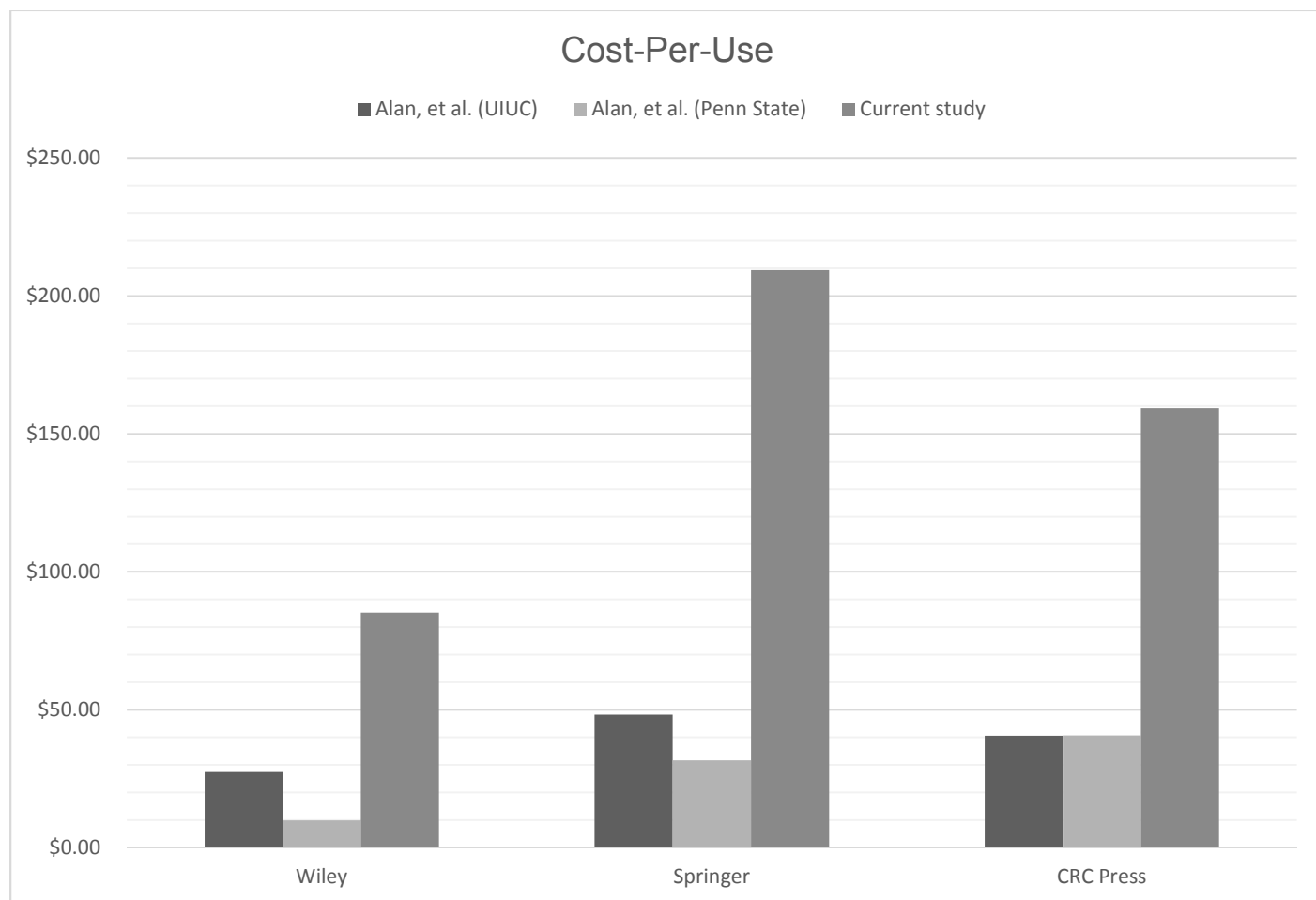
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Figure 6: Number of Print Books Purchased, as seen in Four Related Case Studies



Review Only

Figure 7: Cost-Per-Use, as seen in Three Related Case Studies



Publisher	# of Titles Purchased	Average cost per book	Number of checkouts (2010 – 12/2014)	Average amount of pages per book	Total amount spent on publisher’s books (FY11 – FY13)	Cost per-page-read	Cost per checkout	Publisher Use Factor (2010 – Dec. 2014)	<i>Publisher Effect: Publisher Use Factor (2010 – 12/2014) minus New STEM Use Factor (2009 – 12/2014)</i>	Percentage of Titles that Circulated at least Once
Wiley	218	\$132.41	330	382	\$28,118.10	22 cents	\$85.21	1.514	+ .636	60%
Springer	257	\$140.86	182	338	\$38,091.21	62 cents	\$209.29	.708	- .17	42%
Oxford University Press	127	\$77.95	110	365	\$10,425.15	26 cents	\$94.77	.866	- .012	51%
CRC Press	96	\$164.47	86	462	\$13,695.20	34 cents	\$159.25	.896	+ .018	53%
Cambridge University Press	146	\$78.54	110	396	\$14,257.22	33 cents	\$129.61	.753	- .125	40%

Table 1: Summary of Findings

Publisher	Percentage Difference Between Number of Checkouts and Expected Number of Checkouts, when Compared with Subject Areas' Use Factors
Wiley	+57%
Cambridge University Press	-9%
Springer	-18%
Oxford University Press	-15%
CRC Press	+6%

Table 2: A Closer Look at Subject Areas' Use Factors

Subject	Use Factor for All New Books (2009-2014)	Use Factor for New Books from Top 5 Publishers (2010 – 2014)
Biology (QH – QR)	1.02	1
Chemistry (QD)	.862	1.125
Geography (G – GF)	.869	1
Geology (QE)	.461	.444
Mathematics (QA, except QA76)	.8	.887
Computer Science (QA76)	1.37	.9
Physics (QB – QC)	.773	.73
Psychology (BF)	1.37	1.28
Engineering (T)	.733	1

Table 3: Comparison of Use Factors for All New STEM Books and New STEM Books from Top 5 Publishers

Publisher	Authored Titles Purchased	Edited Volumes Purchased	Percentage of Checkouts Involving Edited Volumes
Wiley	148	63	20%
Oxford Univ. Press	89	43	46%
Springer	149	126	33%
Cambridge Univ. Press	115	34	18%
CRC Press	58	40	24%

Table 4: A Comparison of the Edited and Authored STEM Titles Purchased (2010 – 2013)

Publisher	Avg. # of Slips Received by FAU per Month on Any Subject	Avg. # of STEM-related Slips Received per Month	Percentage of Publisher's Catalog Comprised of New STEM Books
Wiley	120	49	41%
Oxford Univ. Press	178	28	16%
Springer	381	248	65%
Cambridge Univ. Press	104	25	24%
CRC Press	59	47	80%

Table 5: Comparison of the Volume of New STEM Books Published by Leading Publishers

For Peer Review Only