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## Serials Review

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### A Comparison of Faculty and Bibliometric Valuation of Serials Subscriptions at an Academic Research Library

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# A Comparison of Faculty and Bibliometric Valuation of Serials Subscriptions at an Academic Research Library

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Despite their professional training and study in the development of research collections in academic settings, librarians often consult with or even defer to faculty in selecting materials. Faculty often use various methods of evaluation that tend to emphasize qualitative data or even anecdotal evidence. Bibliometric analysis offers emerging tools to quantify these decisions, reflecting fundamental principles of library science. This study compares faculty choices of serials subscription cancellations to the choices that would have been predicted using a bibliometric tool, the California Digital Library Weighted Value Algorithm (CDL-WVA). Faculty choices differed significantly from the decisions predicted by CDL-WVA. However, as the bibliometric score increased, so did the rate of match between faculty choice and decisions predicted by CDL-WVA. Implications of these findings for collection development are discussed.

**Keywords:** serials cancellations, bibliometrics, faculty selectors, collection assessment

## INTRODUCTION

In academic libraries, selection of materials by the teaching and research faculty of the university is a common practice. The method has been often questioned and debate centers on whether faculty or librarians are more effective at selecting materials that will prove useful to patrons.<sup>1</sup>

An important part of collection assessment and development is bibliometric analysis, which has been used to evaluate the effectiveness of faculty versus librarians as monograph selectors. However, to the authors' knowledge, no study has yet compared faculty valuations of serials to valuations pro-

duced using bibliometric data. The valuations are a form of ranking journals according to their perceived value to the library's users. Circumstances related to a journal cancellation project at the University of Memphis have provided a ready-made dataset that was used to assess a natural experiment<sup>2</sup> comparing faculty valuations (uninformed by bibliometric data) to valuations produced using the Weighted Value Algorithm (CDL-WVA) developed by the California Digital Library system, part of the University of California system, as applied to local University of Memphis data. The goal of this experiment is to determine to what extent faculty valuations and bibliometric valuations of serials correspond; it is not intended to compare whether faculty or librarians are "better" at selecting materials for the collection. The patterns of correspondence and divergence between the two sets of valuations may be informative about faculty input in developing a serials collection.

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## LITERATURE REVIEW

### Origins and Justification of Faculty Selection in Academic Libraries

In the early days of the modern American research university,<sup>3</sup> librarians performed very little selection of materials, instead relying upon faculty recommendations to determine their acquisitions (Lane, 1968). Librarians only gradually assumed some responsibility for selection, and many academic libraries still rely upon teaching and research faculty for some portion of their materials selection.

The origins of the faculty selector model are conceptual rather than data-driven. The continued reliance upon faculty for selection of library materials has been rooted in mistrust of librarians' subject knowledge. According to Kraft (1967), American librarians were considered not well-enough educated in academic disciplines for effective selection. An alternative explanation is that librarians are required to divide their intellectual energies among several disciplines, and as Dickinson (1981/1989) explains, "are often laboring under more or less severe handicaps and, in fact, have no choice but to rely on the expertise of faculty members when . . . selecting books" (p. 215). Lane (1967) adds that many faculty members believed they had greater awareness of the needs of students relating to the curriculum. A more recent justification for faculty selection comes from Goldsmith (2012), who believes that faculty selection will improve "focus on supporting faculty research" and help resist libraries "being homogenized to become McLibrary" (pp. 5–6).

However, other authors are more skeptical of the value of faculty selection. Referring again to the conceptual basis for faculty selection, Danton (1963) identified numerous disadvantages to faculty selection, mostly related to the presumption that faculty members do not ordinarily take a systematic approach to selection but rather concentrate on their own interests (pp. 69–70).

Another assumption underlying the faculty selector model is that, as Goldsmith notes, faculty have unique research interests. While this is undoubtedly true for those faculty who do research, that number is smaller than many assume. Studies by Ladd and Lipset (1975) and Boice and Jones (1984) indicated that a small minority of faculty are active researchers, and Bok (2006) reports: "Fewer than half of all professors publish as much as one article per year" (p. 31). However, it should be noted that there has been an upward trend in the amount of time that faculty devote to research (Link, Swann, & Bozeman, 2008).

### Studies of Faculty Selection Compared to Librarian Selection

Librarians have pushed the debate beyond the rhetorical by gathering data to test whether faculty or librarians are better selectors. The question of whether faculty selection is effective at building research collections requires some way of

measuring the quality of a collection. As Hannaford (1990) notes,

To say that either faculty or librarians are better selectors is to make one of several claims: first that one or the other group selects books that are much used or, second, selects books that appear often on certain lists or, third, know just which books should be in a college library. (p. 32)

Of these three measures, only the first two are quantifiable. Both measures have been employed in testing faculty selection.

On the measure of judging faculty selectors against a standard bibliography, we find two instances in the literature. Waples and Laswell (1936) found librarians more likely to have selected standard titles, while Vidor and Futas (1988) showed the opposite result. We have not identified any other studies using the criterion of comparison against a standard bibliography.

Circulation studies of faculty selections versus librarian selections are more numerous. Evans (1970), Bingham (1979), Millson-Martula (1985), and Connell (1991) have produced varying results, with half the studies showing that librarian-selected titles have higher circulation rates, and the other half finding that faculty selections circulate more. In their meta-analysis of circulation studies, Tasasad and Maheswarappa (2001) conclude that "political realities of academia suggest that faculty must be an integral part of the library collection development and for this participation to be effective, it should be organized and controlled by library staff" (p. 12).

### Studies of Faculty Selection of Serials

The evaluation of faculty as serials selectors has been given less attention. We have found only one study, that of Hanson and Heidenwolf (2010). The study was a natural experiment: The library had cancelled its Elsevier subscriptions and switched to a pay-per-view model of access for that publisher's titles. Analysis of pay-per-view usage for the year after the cancellations revealed that the titles to which the library had previously subscribed (at the direction of the faculty) were not even a majority of the most heavily used titles. In fact, previously subscribed titles represented only three of the top 10 most-used titles, and only eight of the top 20; furthermore, one-third of the previously subscribed titles were not used at all in a year.

There have been numerous reports on ways for librarians to incorporate faculty opinions during times of journal cancellation, but none of them has been structured as an experiment (Carey, Elfstrand, & Hiljeh, 2005; Clement, Gillespie, Tusa, & Blake, 2008; Srivastava & Harpel-Burke, 2006; Trail, 2013). Therefore, the results of an experiment comparing faculty valuations of serials to valuations produced using bibliometric analysis will be novel in two ways. First, it will

be the initial study to compare faculty and librarian valuations of the exact same title list. Second, the study will be the first to compare faculty choices to values generated by a bibliometric analysis tool that considers multiple data points (rather than the single metric of usage data); that tool is the CDL Weighted Value Algorithm (CDL-WVA).

## PROPOSED MODEL FOR EVALUATION

### Possible Choices of Bibliometric Measures

Like Hanson and Heidenwolf's (2010) institution, our library also created data suitable for a natural experiment: Faculty were required to cancel titles but were not provided bibliometric data (see "Local Context," below). The faculty choices were based on their subjective impressions of the value of a title to themselves, their students, and their colleagues. We sought to compare these choices of faculty regarding the relative value of serials to an "objective" measure of the value as determined by bibliometrics. To the extent that there is correspondence between faculty selections and those titles ranked highly according to bibliometric valuation, we may learn how to incorporate both types of valuation in assessing a serials portfolio.

Our first task was to determine which bibliometric valuation to use. The studies comparing faculty and librarians as monographic selectors relied on circulation data—but as was noted by Hannaford (1990), circulation is only one criterion by which an item's value in the library collection may be measured. Similarly, many libraries rely primarily on usage data to assess the value of a serial. However, usage is a problematic tool for measuring a subscription's value to the library, as Blecic and her colleagues note:

The key COUNTER metric for journal use is the Successful Full-Text Article Request (SFTAR) . . . the basic metrics for analysis are number of SFTARs during a given time period and the cost of the journal, from which one can calculate the cost per SFTAR; SFTARs and cost per SFTAR are the most discussed metrics in the literature. Cost per SFTAR is problematic, however, because the cost is for one given year while the retrievals reported in a year can derive from multiple volumes and years of the journal. (Blecic, Wiberley, Fiscella, Bahnmaier-Blaszczak, & Lowery, 2013, pp. 179–180)

Furthermore, as Ewing (2006) notes, "The term 'usage statistics' is itself misleading. Do these statistics really measure usage? Think of your own browsing habits and ask whether you 'use' all the items on which you click" (p. 1052).

To supplement usage figures, Blecic et al. (2013) suggest several metrics to consider, from local statistics such as interlibrary loan and citation counts to broader metrics such as impact factors and user ratings. They articulate that "the various measures of use might reflect different levels

of engagement with journal content. . . . The counts from any type of study carried weight and offered at least a snapshot of a particular type of use" (p. 179). Although it is best practice to analyze every title on a number of measures, for purposes of ranking journals a single aggregated measurement is most helpful. While Chung (2009) and Dewland and Minihan (2011) offer models of aggregated measurement that may be of interest, we chose to use the CDL Weighted Value Algorithm (CDL-WVA).

### Justifications for Choosing the CDL Weighted Value Algorithm (CDL-WVA)

The CDL-WVA was created in 2008 and is used by the California Digital Library, which manages all the shared electronic resources available to patrons at all campuses of the University of California (Wilson, 2010). CDL-WVA incorporates the data most commonly used to justify inclusion of a serials title in a library collection: local usage, local citations, journal ranking measures (impact factor and SNIP<sup>4</sup>), and cost-effectiveness (cost per use and cost per SNIP). In addition, CDL-WVA is designed to measure the value of a journal for a particular library, not for all users everywhere. For an experiment in which we compare the valuations of local faculty to bibliometric valuations, CDL-WVA's emphasis on local value is an important feature.

Aside from its use by the California Digital Library, CDL-WVA has been adopted by the Canadian Knowledge Research Network (Appavoo, 2013). Additionally, the University of Minnesota and the University of Illinois at Chicago have found it influential in developing their own metrics (Chew, Stemper, Lilyard, & Schoenborn, in press; Blecic et al., 2013).

Each of the elements that are included in the CDL-WVA has been subject to criticism as a tool to measure journal value. However, combining them allows for the strengths of each element to balance the weaknesses of the others. Further, the CDL-WVA has undergone revisions to address earlier concerns about oversimplification of quantitative valuations. Introduced in 2008, the system was reviewed via survey in 2010 "in order to assess the usefulness of the value metrics used in the 2010 journal title review and identify ways to improve the process for 2011" (Wilson, 2010, para. 3). CDL librarians had considered the previous iteration "useful" but "wanted to increase the validity of the metrics" (Wilson, 2010, para. 4).

## LOCAL CONTEXT FOR THE EXPERIMENT

Our experiment was performed using data generated during a serials cancellation project at the University of Memphis. At the University of Memphis, faculty opinion is heavily considered in collection decisions, and our practice is to defer to the faculty as budgets permit. In 2009, the library

faced a projected funding shortfall and was required to cut serials expenditures by one-third. The library asked faculty members to select serials subscriptions to cut. By process of elimination, for this study those titles that faculty chose to retain were considered more desirable by faculty.

Because of historical accounting procedures and a strong desire to include the faculty in the decision-making process, subscriptions at the University of Memphis are assigned fund codes, which correspond to a college, department, or program. The faculty reviewed only titles assigned to their unit's fund code. This itemized review was not greatly affected by commitments to packages. At the time of the review, the only significant package was the Science Direct Freedom Package from Elsevier; those titles were indicated as such on the lists distributed to the faculty and only represented about 11% of our titles (292 out of 2761). Working from the previous year's expenditures, the liaisons were asked to consult with the teaching faculty to cancel subscriptions representing the equivalent of 30% of that year's total expenditure and to identify a ranked list of possible alternatives should unforeseen obstacles prevent cancellation of the first-tier choices (such as a department's desire to keep a title that had previously had payment ascribed to a different department's fund code). Levels of compliance, participation, and buy-in varied greatly between the departments; however, across the board, requests for supporting data were nominal. Questions tended to focus on qualitative issues such as, "Would cancelling print also cancel online access?," rather than requests for data about usage or citation figures. There was also indication of informal quantification: "They (the faculty) had indicated that their use of it was minimal." Faculty assessed the importance of titles based on perceived usefulness, as no evidence was given suggesting they were tracking and reviewing usage or citation numbers to lead to a conclusion of "minimal use." We did provide spreadsheets indicating the amount of online use (including "no use") for titles tracked within EBSCOhost Electronic Journals Service. Whether these quantitative data were considered is unknown because much of the deliberation took place within the departments without library representation or participation. Anecdotally, the conversations with the faculty did focus on perceived usefulness rather than any data review, and those statistical reports were not referenced when departments communicated their decisions.

## METHODS

In order to perform the comparison of faculty valuations to bibliometric valuations, we needed to:

1. Gather data about the faculty valuations of serials.
2. Gather data to calculate the CDL-WVA score of serials.
3. Compare the two sets of scores.

These steps are described in detail in the following.

### Dataset

Titles analyzed for this study include those assigned to departments whose disciplines are well represented in the Web of Knowledge database (WoK), available from Thomson Reuters. Table 1 shows the departments represented, the number of titles assigned to each fund code, and the number of articles published by faculty in those departments. Two types of subscriptions were excluded from this analysis, because they were not subject to the faculty review in 2009: titles included in the single noncancellable package and standing orders.

### Faculty Valuations of Serials

As described in the "Local Context" section, the faculty were required to identify titles to cancel, the cumulative costs of which equaled 30% of the total annual cost of subscriptions assigned to their department's fund code. As a result, we have a set of data in which every journal title was assigned a value of "keep" or "cancel." This ranking served as a binary variable in our study.

### CDL-WVA Score of Serials

We gathered data on local usage, local citations, SNIP, Impact Factor, cost per use, and cost per SNIP according to the methods described in the following.

#### *Local Usage Figures*

We used data generated by Serials Solutions, which manages our link resolver. "Click-through" statistics were

TABLE 1  
Titles Included in the Study

<i>Department</i>	<i>Titles Subscribed</i>	<i>Articles Published</i>
Biological Sciences	152	220
Biomedical Engineering	14	71
School of Business and Economics (all departments together)	67	152
Chemistry	119	171
Civil Engineering	19	31
Computer Science	16	96
Communication Sciences and Disorders	42	42
Counseling, Educational Psychology, and Research	50	54
Earth Sciences	123	48
Electrical and Computer Engineering	34	67
Health and Sport Sciences	52	65
Mathematical Sciences	146	338
Physics	52	77
Psychology	121	286

gathered for every title in our dataset; each time a user opened a full-text article, it was counted as one use.<sup>5</sup>

### Local Citations

Citations were pulled from articles indexed in WoK.<sup>6</sup>

### SNIP Values

SNIP values were gathered from the Centre for Science and Technology Studies Journal Indicators website (<http://www.journalindicators.com/>) and keyed into the spreadsheet. The most recent values were used.

### Impact Factor

Impact Factor values were retrieved from the Journal Citation Reports database (available from Thomson Reuters) and keyed into the spreadsheet. The most recent values were used. Certain titles do not have Impact Factors. For titles in the categories of “Life and Health Sciences” or “Physical Science and Engineering,” not having an Impact Factor results in a score of zero in the calculations because Thomson Reuters purports to comprehensively index publications in these fields, and absence of an impact factor implies that the title lacks importance for researchers in the field. However, for titles in the “Social Sciences” and “Arts and Humanities” categories, not having an Impact Factor doubles the weight of the SNIP; because these fields of study are not comprehensively covered by Thomson Reuters, absence of an impact factor does not imply the same lack of importance.

### Cost per Use and Cost per SNIP

The subscription cost of each journal under analysis was retrieved from our integrated library system (III Millennium) using a query. An Excel formula was applied to divide the cost by the number of uses. The same formula was applied to divide the cost by the SNIP value.

### Calculating CDL-WVA Scores

For each title, the scores assigned in the six categories discussed previously were added to create a total score. The higher the score, the more apparent value the title has for the University of Memphis community of researchers.

### Calculating the CDL-WVA

Using the CDL-WVA to generate a bibliometric value for a serials title requires gathering several data for each title. As its designers explain,

This methodology compares each . . . journal title . . . against other . . . titles within the same subject category according to a variety of objective value indicators, in order to arrive at a comparative value for each journal . . .

TABLE 2  
California Digital Library Weighted Value Algorithm  
(CDL-WVA) \*

Measurement Category	Total Score	Metrics	Scores for Each Metric
Utility	0 to 3	Local usage	0 to 2
		Local citations	0 to 1
Quality	0 to 2	SNIP	0 to 1 or 0 to 2 (depending on subject)
		Impact Factor	0 to 1 or 0 to 2 (depending on subject)
Cost Effectiveness	0 to 2	Cost per Use	0 to 1
		Cost per SNIP	0 to 1

\*Derived from Wilson and Li (2012).

The algorithm takes into account three vectors of value encompassing six data metrics: *Utility* (usage and citations), *Quality* (Impact Factor; SNIP) and *Cost Effectiveness* (cost per use; cost per SNIP). To establish a baseline for comparison, median values are calculated for each of these metrics within . . . different subject categories. (Wilson & Li, 2012, para. 2)

Table 2 shows how each element contributes to the total score generated by CDL-WVA.

The CDL-WVA score for a journal is easily calculated using an Excel spreadsheet. Values gathered as described previously were entered into a spreadsheet. Then, within the journals for a specific discipline, the median for each variable was determined. The score for each journal title was determined based on whether the title was above or below the median for a given variable. Table 3 demonstrates the scoring process. To discuss one example, let us consider *Environmental Technology*.

- For “Local Usage,” the CDL-WVA scale is 0 to 2. A score of 0 is assigned for usage in the bottom quartile, 1 is assigned for usage in the third quartile, and 2 is assigned for usage above the median figure. Usage of *Environmental Technology* for the years 2007–2011 was 4 SFTARs. For all titles within the Civil Engineering fund code, the median usage figure was 14 SFTARs. Because 4 SFTARs is in the second quartile for this category, the score for this category is 1.
- For all other categories, the scale is 0 to 1; 0 is assigned for a figure below the median for Civil Engineering, and 1 is assigned for a figure above the median.
- Adding the scores in six categories together creates a total score of 3 out of a possible 7.

As stated, our experiment compares the faculty valuation of serials to the values determined according to CDL-WVA. The lists of titles chosen by the faculty for cancellation form our dataset. Although faculty did not assign a numerical value

TABLE 3  
Sample Journal Titles With CDL-WVA Scoring

Title	Usage		Cites		SNIP	Impact	IF	Cost	CPU	Cost	Cost per	Total
	Usage	Score	Cites	Score	SNIP	Score	Factor	Score	per Use	Score	per SNIP	SNIP Score
Median Value for Civil Engineering	14		2		0.742		0.547		\$64.40		\$612.65	
<i>Structural Engineer</i>	0	0	0	0	0.224	0	0	0	\$512	0	\$2,288	0
<i>Proc of the Inst of Civil Engineers Civil Engineering</i>	5	1	0	0	0.211	0	0.111	0	\$66	0	\$1,569	0
<i>Waterways J</i>	0	0	0	0	0	0	0	0	\$40	1	\$40	1
Environmental Technology	4	1	7	1	0.487	0	1.007	1	\$516	0	\$4,234	0
<i>Int J of Pavement Engineering</i>	14	1	0	0	1.516	1	0	0	\$66	0	\$612	1
<i>Soils and Foundations</i>	6	1	0	0	0.742	0	0.547	0	\$24	1	\$192	1
<i>PCI Journal</i>	2	1	0	0	0.643	0	0.017	0	\$42	1	\$131	1
<i>Magazine of Concrete Research</i>	20	2	0	0	1.104	1	0.52	0	\$64	1	\$1,167	0
<i>ITE Journal</i>	47	2	0	0	0.158	0	0	0	\$1	1	\$421	1
<i>Water Environment Res</i>	30	2	2	1	0.43	0	0.89	1	\$27	1	\$1,946	0
<i>Geotechnique</i>	28	2	0	0	3.216	1	0.92	1	\$35	1	\$303	1
<i>J Am Water Resources Assn</i>	52	2	0	0	1.242	1	1.373	1	\$11	1	\$467	1

to the serials titles, they were assigning labels of “keep” or “cancel” to each available title. The faculty members were ranking serials into two categories: preferred and nonpreferred. We used those faculty-assigned values within each subject to compare to bibliometric values.

Although faculty rankings (preferred or nonpreferred) had been gathered during the serials cut of 2009, data for CDL-WVA calculations were gathered in the spring of 2012. For the purposes of this comparison, we used data from the period ending in 2011. The justification for this approach is that the faculty valuations were considered predictive; that is, they were ranking as “preferred” those titles that they anticipated would continue to provide value in future years. Therefore, we measured their value with the most recent data available.

### Comparing the Two Sets of Data

We grouped the CDL-WVA scores into the fund-code-derived sets used for the faculty valuations. Within each fund code, titles were ranked highest to lowest according to CDL-WVA scores. Within each group of titles sharing a CDL-WVA score, the titles were ranked by subscription cost.

The faculty in each department had cancelled a certain proportion of their total expenditures; for example, the Department of Counseling, Educational Psychology, and Research cancelled subscriptions costing 26% of their total serials allocation. To match that, we selected the lowest-ranked titles (according to CDL-WVA-based scores) until approximately 26% of the allocation was reached. It was assumed that if titles of the same score would fall above and below the 26% line, then the most expensive titles would be cancelled first. Those titles falling below the cancellation line were assigned the “nonpreferred” value in the bibliometric dataset for the purposes of comparison.

## RESULTS<sup>7</sup>

### Distribution of Data

For the dataset as a whole, the CDL-WVA scores exhibited a bell-shaped distribution, allowing for the calculation of statistics discussed in the following. Figure 1 shows the distribution of CDL-WVA scores.

### Match Rates

We determined how likely it was that a title that was valued as “preferred” by faculty would also be valued as “preferred” according to CDL-WVA-based scores. If faculty valuations matched bibliometric valuations perfectly, there would be a 100% match between the two sets of “preferred” titles; conversely, if values were assigned randomly, then 50% of titles would show a match between the faculty valuation and the bibliometric valuation (Wright & London, 2009, p. 58).

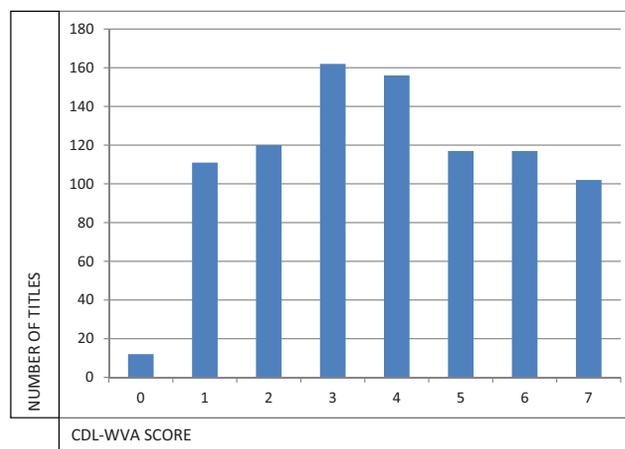


FIGURE 1 Distribution of CDL-WVA scores. (Color figure available online.)

TABLE 4  
Rate of Match Between Faculty Valuation and Bibliometric Valuation

Category	Titles in Category	Titles Cancelled by Faculty	Titles to Be Cancelled per WVA	Percentage of Titles in Which Valuations Match
ALL TITLES	897	381	344	65%
SUBJECT AREA:				
Life and Health Sciences	235	112	75	60%
Physical Sciences and Engineering	438	196	199	66%
Social Sciences	224	73	70	69%
CANCELLATION STATUS:				
Faculty cancelled	381	381	207	54%
Faculty retained	516	0	137	73%
CDL-WVA SCORE:				
0	12	6	12	50%
1	111	64	111	58%
2	120	69	113	57%
3	162	92	77	59%
4	156	70	30	62%
5	117	44	1	63%
6	117	20	0	83%
7	102	16	0	84%
DEPARTMENT:				
Biological Sciences	145	89	48	55%
Biomedical Engineering	14	4	3	64%
Chemistry	76	51	48	80%
Civil Engineering	19	5	13	47%
Communication Sci & Disorders	41	9	12	63%
Computer Science	16	5	2	69%
Counseling, Ed Psych, & Research	48	8	13	60%
Earth Sciences	114	61	60	59%
Electrical & Computer Engineering	14	9	11	57%
Fogelman School of Business	60	23	16	68%
Health & Sport Sciences	49	14	15	69%
Mathematical Sciences	133	41	45	77%
Physics	52	20	17	44%
Psychology	116	42	41	73%

The simplest analysis is by classification rate. This measures the rate of match according to different categories of data. Table 4 and Figure 2 show the percentage of titles in which the faculty valuation matches the CDL-WVA

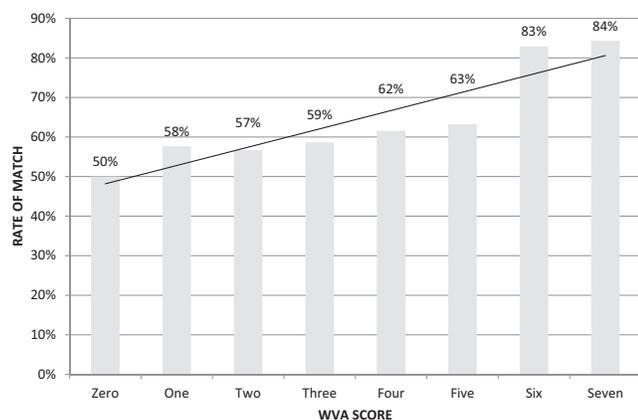


FIGURE 2 Rate of match between faculty valuation and CDL-WVA score.

valuation, according to the categories defined in the first column.

Three findings stand out:

1. The overall match rate between faculty valuations and bibliometric valuations of serials is 65%. This rate is higher than the 50% that would be produced by random association but shows that bibliometric valuations differ significantly from faculty valuations.
2. The match rate for titles selected for retention by faculty (73%) is greater than the match rate for cancelled titles (54%).
3. There is an upward trend in match rate as the CDL-WVA score increases.

#### Odds Ratios

To look at the data in a slightly different way, we estimated an odds ratio; odds ratios are the standard method of quantifying the association of two binary variables (Liao, 2004). The odds of the faculty choosing to keep a title increase by a factor of about 3.3 (95% confidence interval: 2.49–4.36) when the

CDL-WVA score indicates that the title should be kept. The  $p$  value for this result is less than 0.0001, indicating that there is a negligible probability that the results seen here arrived by chance.

### Logistic Regression

We used logistic regression to measure the relationship between the faculty's decision to keep or cancel titles and the CDL-WVA score, treated as a numeric quantity. Logistic regression is the standard method of quantifying associations between numeric and binary variables (Han & Swicegood, 2004). In this model, we do not consider predictions based on the CDL-WVA score but rather the CDL-WVA scores themselves: To what extent do higher CDL-WVA scores associate with the faculty's decision to keep a title? We estimated that for each additional point that the CDL-WVA score increases, there is an associated 41% increase (Confidence Interval: 31%–52%) in the odds that the faculty chose to retain the title. The  $p$  value for this relationship is less than 0.0001, which again indicates that the result cannot be explained by random chance.

To explore our observation that higher CDL-WVA scores are more predictive than lower CDL-WVA scores, we fit an additional logistic regression, allowing the odds (or probability) of the faculty choosing to keep a title to vary with both the CDL-WVA score and the squared-CDL-WVA score. If this “quadratic” model fits the data significantly better than the first “linear” model, then our intuition will be confirmed—the predictive power of the CDL-WVA score changes as the CDL-WVA score gets higher.<sup>8</sup> One way to graphically assess the fit of the model is to plot its predictions against the percentage of titles at each CDL-WVA

score that the faculty chose to keep. The results of this second fit (on the probability scale), plotted alongside both the first fit and the percentages of titles retained at each CDL-WVA score, appear in Figure 3. The quadratic fit, which hews closely to the percentage of titles kept at each CDL-WVA score, follows the pattern that we expected: When the CDL-WVA score is low or medium (0–4), the model estimates that the probability of a title being kept is close to 50%.

In other words, in the range of 0–4, CDL-WVA scores cannot give a very strong prediction of faculty choice one way or the other. However, for higher CDL-WVA scores, the model's estimates diverge increasingly from 50%, giving more confident predictions. The  $p$  value comparing this quadratic model with the first model is 0.0002, which indicates that the quadratic model's better fit cannot be easily explained by random chance. A conditional logistic regression accounting for department gave similar results (data not shown.)

### Scores by Subscription Status

Figure 4 shows the CDL-WVA scores for retained and cancelled titles. The CDL-WVA scores are higher in the retained group, but not dramatically so.

### Findings

We conclude that faculty selection of journals significantly differs from bibliometric valuation.

We also conclude that higher CDL-WVA scores are highly associated with faculty decisions to retain a title, but lower CDL-WVA scores are not highly associated with decisions to cancel.

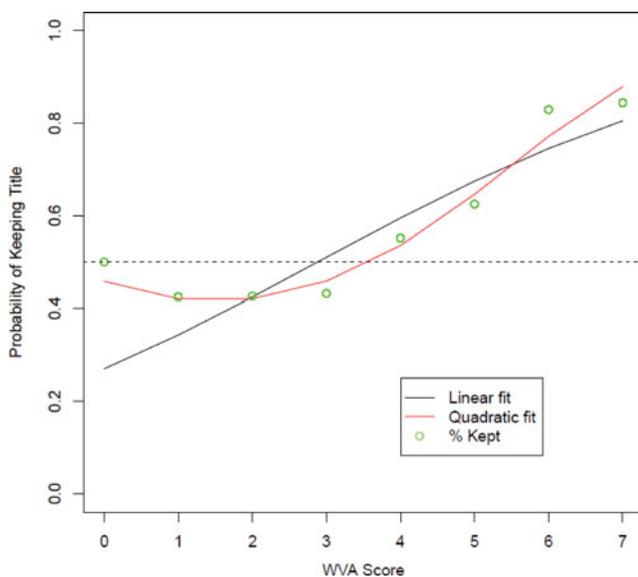


FIGURE 3 Match rate of CDL-WVA predictions of faculty choices, by CDL-WVA score. (Color figure available online.)

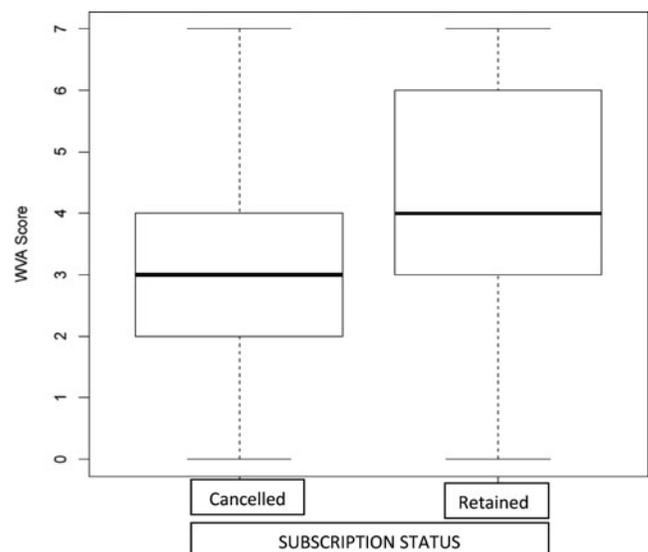


FIGURE 4 CDL-WVA scores for cancelled and retained titles.

## DISCUSSION

## Assumptions Behind the Judgment of the Results

The implications of this research for collection development are related to the earlier discussion of faculty as selectors. It is important to understand how faculty valuations compare to bibliometric assessments of serials. As earlier research on faculty as book selectors had equivocal results, so also does this study.

The studies of book selection assume that circulation or comparison against a list assembled by experts were valid measures of the worth of a selected book to a library's collection. Similarly, the implicit judgment in this study is that a higher CDL-WVA score means that a serial subscription is of more value to the academic community served by the library. This judgment may be faulty, for reasons discussed in the following; however, presuming it is valid, our results do not clearly show whether faculty are skilled at identifying the titles of greatest value to the library's collection, particularly in low-scoring titles that may have niche appeal.

The equivocal results of the study are generated at the lower end of the spectrum of CDL-WVA scores. While it seems that faculty are very likely to identify as "preferred" those titles that score highly in bibliometric valuation, they are not as likely to identify low-scoring titles as "nonpreferred." There are several possible explanations for these phenomena, with implications for collection development practices and avenues for further research.

## Possible Explanations and Implications of High Match Rate in High-Scoring Titles

Our analysis shows a strong association between a title having a high CDL-WVA score (indicating many uses, numerous citations, and high SNIP and Impact Factor values) and faculty choosing to retain it as a subscription. We have not studied the reasoning behind faculty choices, but we can venture the following possible explanations. First, faculty members value highly rated journals for the very reasons that they earn a high score: The faculty use them often, cite them often, and see them cited in the literature they read. Second, faculty members are socialized in their graduate education to respect certain publications, which have acquired a reputation for quality. The reputation is part of a virtuous cycle, as researchers with innovative results to report choose to publish in the journals with good reputations, and the innovative research leads to more uses and citations, thus bolstering the scores. This is part of the explanation for the fact that the match rate for titles selected for retention by faculty is greater than the match rate for cancelled titles.

These findings have implications for the process of serials evaluation in an academic library that relies upon faculty selection. For example, bibliometric decision making about journal titles sometimes encounters resistance among library

patrons, particularly faculty. Such resistance is often countered by offering the opportunity for subjective assessment of serials titles. For instance, Adler, Ewing, and Taylor (2009) write that

Citation data and statistics can provide some valuable information. We recognize that assessment must be practical, and for this reason easily-derived citation statistics almost surely will be part of the process. But citation data provide only a limited and incomplete view of research quality, and the statistics derived from citation data are sometimes poorly understood and misused. (p. 2)

Ewing (2006) adds, "The impact factor gives some information, but so do other statistics. . . . To all these metrics of quality, one must add personal judgment: Scholars, rather than numbers, are frequently the best judges of quality" (p. 1053). Ewing continues:

How should librarians and scholars make tough decisions about journal subscriptions? They can revert to the time-honored method for assessing the value of any product: Ask the people who use it. This is imprecise and subjective; it is frustrating and time-consuming; it is not always easy to balance conflicting advice. But substituting a nonsensical number that bears little relation to the value of the journal, and that likely will promote regressive policies among publishers, surely isn't a way to solve these problems.

Our analysis of bibliometric valuation compared to faculty valuation suggests that the efforts required to gather faculty and user judgments on journal subscriptions as suggested by Ewing could be reserved for assessing the lower-scoring titles. High-scoring titles are also those highly esteemed by patrons, so they do not require deeper scrutiny when deciding upon titles to include in a library's serials portfolio.

## Possible Explanation of Low Match Rate in Low-Scoring Titles

Our finding that faculty decisions about low-scoring titles look similar to random decisions is not easily explained. We posit several possibilities:

- *Special Research Needs:* Faculty may have special research needs that are not widely shared in the university. It is plausible that a particular journal title may not be used by many researchers, but it will still have importance to one or a few researchers with uncommon interests. In these cases, a journal may score low in the CDL-WVA scale but still be important to a particular faculty member. Assuming faculty make selection decisions on this basis is appropriate for libraries seeking to customize their collections to the unique interests of their researchers (Goldsmith, 2012). However, our research has not investigated

whether this type of decision making, in fact, does occur among faculty selectors.

- *Institutional Pressure*: There may be institutional pressures to hold certain titles no matter what their bibliometric value. A number of program-accrediting bodies (such as the American Chemical Society and the National Association of Schools of Music) have as part of their accreditation standards a list of journals to which faculty and students are expected to have access. Journals on these accrediting bodies' lists will be marked for retention by faculty, regardless of their value for research or study. Future researchers may wish to investigate the bibliometric valuation of these accreditation-required titles.
- *Focus on Teaching*: Faculty may be focused on reading the literature to support their teaching and practice, not research, so their preferred journals will not appear as local citations. However, because citations make up only one segment of the CDL-WVA score, this possible cause is only partially explanatory.
- *Arbitrary Selection*: Possibly, when faced with a choice for which there is not a preferred outcome, such as selecting among low-visibility titles, selection decisions were, in fact, made arbitrarily. In our experiment, faculty were given a tight deadline to make choices. They were told that unless faculty made choices of titles to cut, the decisions would be made by others. Trusting their own judgment over that of librarians, and without much time to evaluate titles that do not have prominent reputations, faculty selectors may have acted on hunches about which titles to retain. It has become well known in library research that information seekers apply what Zipf (1949) called "the principle of least effort" (p. 1). As Chrzastowski (1999) describes it, least effort is not laziness, but "achieving the objective while saving time and energy" (p. 317). In the case of journal cuts, faculty may not have formed an opinion of the low-scoring journals. They faced severe constraints of time. A satisfactory outcome could be defined as "intuitively making the best decision possible with little data and a short timeline," and submission of an arbitrary selection of low-scoring journals would achieve that outcome with low expenditure of time.

### Implications of Findings for Collection Development and Future Research

The impact of these observations on collection development choices is multifaceted. For high-scoring journals, the consensus between bibliometric valuation and faculty valuation affirms the notion of a core collection of journals to which most research libraries should subscribe. The lower boundaries of that range of scores remain open to negotiation, depending on a library's particular research and curriculum needs.

For low-scoring journals, alternate explanations lead to conflicting conclusions. If one favors the interpretation that

faculty selections help identify titles of unique interest that are not apparent from bibliometric valuation, then reliance on faculty selection is justified. However, if one favors the interpretation that faculty selections for low-scoring journals are mostly haphazard, then support for "Big Deal" packages may be justified. If faculty cannot identify with any certainty which low-profile journals are most important to them, then the library may best serve its researchers by providing a wide variety of low-visibility titles at a low per-title cost, without the expense of time and effort to review the subscriptions individually, either by faculty members or librarians.

Libraries choosing to rely on faculty for serials selections may wish to attempt to discern the decision-making behavior of faculty for lower-scoring journals. Faculty who are truly choosing titles that cater to unique research needs should easily be able to justify them, while faculty who are poorly informed about low-scoring journals may be given less credence in serials selection.

It is regrettable that our research lends itself to so few actionable conclusions; however, it does suggest future avenues for exploration. Of great interest is the question about which decision-making process is used by faculty in regard to low-scoring titles. Additionally, another experiment could be conducted, in which faculty are informed of the bibliometric values assigned to journals; the resulting selection choices could illuminate in a different way how faculty identify titles of low use but unique interest.

### CONCLUSION

Our experiment revealed that there is, overall, only a moderate degree of association between faculty valuations of serials and bibliometric valuations of the same titles. However, as bibliometric scores increase, so does the rate of match between faculty and bibliometric valuation. The challenge to libraries, then, is to identify in which ways faculty selectors make decisions about low-scoring titles or, perhaps, to consider them suitable for more subjective review. Conceptually, if the higher-scoring titles are likely to correspond with subjective review, then identifying high-scoring titles at the beginning of a serials review should leave time for a more intimate review of the lower-scoring titles. Whether the faculty make informed decisions based on their unique interests, or simply make decisions to get the process completed, is a question of importance to librarians when relying on faculty input about serials selections relative to the mission of the library.

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## NOTES

1. Although some academic librarians are considered members of a university's faculty, for the purposes of this article "librarians" will be contrasted with "faculty," meaning nonlibrarian teaching and research faculty.
2. A natural experiment "makes investigative use of real-life, naturally occurring happenings as they unfold, without the imposition of any control or manipulation on the part of the researcher(s), and usually without any preconceived notions on what the research outcomes will be" (Charlton, 2004).
3. Dating from the adoption of a German-style curriculum by Johns Hopkins University in 1876 (Budd, 2005, p. 23).
4. "Source-Normalized Impact per Paper (SNIP) measures contextual citation impact by weighting citations based on the total number of citations in a subject field. The impact of a single citation is given higher value in subject areas where citations are less likely, and vice versa" (Elsevier, 2012).
5. Although many models of usage data combine data from link resolvers with data from direct access to publishers' interfaces and print usage, we were limited to only link resolver data. Our integrated library system does not have data for the titles that were cancelled in 2009, and we did not collect print usage figures for the period under review. However, De Groote, Blečić, and Martin (2013) have demonstrated that link resolver usage statistics highly correlate to direct access usage statistics, and Gallagher, Bauer, and Dollar (2005) have shown that "print journals are used only a fraction as often as their electronic counterparts (p. 175). Because WVA is scored using relative, not absolute, numbers, we feel confident that these data are informative enough to calculate CDL-WVA rankings.
6. Other citation analysis projects have used the Library Journal Usage Report (LJUR) service (also provided by Thomson Reuters), but our library does not subscribe to LJUR.
7. All statistical analysis was performed by coauthor Sales, a professional statistician.

8. The logistic regression models used in this section are: (a) first model (linear):  $\log\text{-odds}(\text{faculty keep title}) = a + b * \text{WVA}$ ; (b) second model (quadratic):  $\log\text{-odds}(\text{faculty keep title}) = a + b * \text{WVA} + c * \text{WVA}^2$ .

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