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The Socioeconomic Profile of Well-Funded Public Libraries: A Regression Analysis

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INTRODUCTION

I once noticed staggeringly high circulation numbers coming from a particular public library and pointed it out to a senior library director I knew. The notable library served a population almost identical to my own as well as the director's, roughly 22,000 residents. Yet this library circulated over 173 items per hour open in contrast to my library (64) and his (112). I asked the director why he thought this library circulated such volume.

This was his verbatim email reply: "$$$$$$$$$$$$$$$$$$$$$$$$$$$$$"

The light-hearted response turned out to be well-grounded: all three circulation totals corresponded to our ranking in municipal funding. More generally, the Pew Research Center's survey data suggest that wealth correlates with library usage (Rainie, 2016). These data were corroborated by the Institute of Museum and Library Services' (IMLS) Fiscal Year 2011 report, which used statistical modeling to show that in "most cases . . . when investment increases, [library] use increases, and when investment decreases, use decreases" (Swan et al., 2014, p. 1). A subsequent IMLS (2016) report drew similar conclusions, supporting what librarians had long suspected: libraries succeed with financial commitment.

But these analyses cannot determine the extent to which financial investment impacts library usage. IMLS's multilevel growth models, for instance, showed that library use corresponded to differences in fi-

nancial investment. Yet financial investment might merely measure the size and scope of a library's service population; larger libraries receive more funding to support larger communities. Financial investment also might just reflect a community's socioeconomic profile. The Pew Research Center's surveys consistently find that wealthier and more educated people use libraries more often than those with lower income and education levels (Geiger, 2017; Rainie, 2016). Thus, library funding and usage might both be effects of the community's overall characteristics.

To try to address these concerns, I analyzed library data from 280 public libraries and confirmed that municipal appropriation strongly correlated with direct circulation. I then included socioeconomic factors for the communities of these libraries to find that the number of a community's "educated residents" significantly affected a library's municipal appropriation, far more than any other socioeconomic factor. However, enough variation existed within the data to reject any "demographics are destiny" arguments—library funding and library usage are not necessarily governed by uncontrollable, socioeconomic factors.

LITERATURE REVIEW

Around the turn of the century, library researchers sharpened focus on library-based assessments. Dugan and Hernon (2002) attribute the change in academic libraries to a shift in priorities as the traditional role of libraries was to "meet the needs of the academic community's information needs" (p. 377). For example, traditional assessment measures (outputs) concerned operating hours and collection space. Given the increase in information literacy demands, however, Dugan and Hernon argue that traditional outputs could not capture the scope, or even existence of, student learning and were even misaligned with assessments; they argue that traditional outputs belong to an evaluative, not assessment, framework. Thus were born library-based outcomes, which focused on the measurable results of library-based participation (e.g., information literacy gain scores on a pre/post-test).

Public library outcomes tend to focus not so much on learning as on economics. Considerable research has attempted to approximate these economic benefits, with consensus reaching a cost-benefit ratio of around $4 to $1 USD (Aabø, 2009; Bureau

of Business Research, 2017; Howard Fleeter & Associates, 2016; Ward, 2008). Similar benefits were found internationally as well (Bundy, 2009). Of course, such a narrow view of "value" cannot capture all of the public library's benefits. Jaeger et al. (2011) summarize several alternative ways to assess value, and McMenemy (2007) argues that an explicitly economic focus ignores the public library's other cultural and societal contributions.

Public libraries in the United States report data either directly to the IMLS's Public Libraries Survey (PLS) or to their state agencies, themselves collectors of data in formats very similar to the PLS. The PLS collects outputs such as a library's circulation, visitations, reference transactions, computer usage, collection size, staffing levels, financial expenditures, and operating hours. These outputs only indirectly measure value; as Holt and Elliott (2003) argue, they "do not represent equal consumption of services or equal value to the library customer" (p. 425). Nevertheless, as Holt and Elliott acknowledge, politicians and stakeholders tend to regard libraries with greater numbers of these outputs as "the best libraries" (p. 425). Much library research, then, focuses on these outputs. The IMLS's own research analyzes circulation, visitations, staffing, financial expenditures, collection size, computer usage, programming, and reference transactions (IMLS, 2016; Swan et al., 2014). Economic analyses of public libraries use the same outputs (e.g., Bureau of Business Research, 2017).

Some research has established a strong correlation between a library's activity, as approximated by the above outputs, and a library's financial investment (Swan et al., 2014). Although academic researchers avoid inferring causation from correlation, non-researchers might not be so prudent, as in Meyer (2016), who argued from an IMLS report that "if libraries receive more public funds, more people use them. . . . If the public wants to reverse the [downward usage] trend and make the local library more useful, it should do the one thing evidence supports: Fund it better" (para. 12). This is a reasonable inference since financial investment facilitates service. As libraries receive more funding they "can have more staff, more classes, more copies of the latest bestseller, and—maybe most importantly—longer hours" (Meyers, 2016, para. 14). McQuillan (2003) drew a similar observation: "more money means more librarians, more

books, more magazines, and more open hours" (p. 46).

On the other hand, the theory of public choice, especially Tiebout's model, might posit that library funding reflects community demand rather than causal relationships. Developed by Charles Tiebout (1956), this model imagines "consumer-voters" who choose "the community which best satisfies [their] preference pattern for public goods" (p. 418). The model attempts to explain the economics of public goods by arguing that this "preference pattern" leads to people voting with their feet. While little attention has been given to the theory of public choice in the library literature, Bryce (2003) describes the Tiebout model as allowing for residents to "decide the kind of community they want to live in" (p. 416). Residents who want, for example, excellent library services may vote to raise taxes to support such services. Research in Massachusetts (e.g., Snow, Gianakis,& Haughton, 2015) shows that this effect occurs at the local level. Tiebout's model reflects population shifting; as public expenditure decisions occur, "populations shift and property prices reflect the public choice of the community" (Bryce, 2003, p. 416).

In the Tiebout model, then, financial investments do not necessarily boost library outputs. Instead, higher outputs reflect the desires and voting patterns of specific communities. Residents who disagree with raising taxes to support public libraries will, in theory, oppose such raises or, if they occur, move elsewhere. Bryce (2003) studied this subject in the context of public libraries, surveying American adults about their attitudes toward public library services and attempting to connect these responses to library funding through respondents' zip codes. He found "modest levels of association between demand for library services and library funding support" (p. 422) but largely rejected Tiebout's model. Despite this rejection, Bryce's research has been used to make bold claims regarding the theory of public choice; based on Bryce's work, Stenstrom and Haycock (2015) claim that "the theory of public choice has shown increased use does not correlate to increased funding" (para. 6).

One way to further previous research would be to examine community dynamics directly alongside library activity. The IMLS's reports omit "population demographics, poverty, and community characteristics" (Swan et al., 2013, p. 13). These characteris-

tics might offer insights on library funding and activity. Education level, defined often and in this paper as "the percentage of residents with a Bachelor's degree or higher," shows particular promise. Survey data from the Pew Research Center suggest a connection between education and library usage (Rainie, 2016); college graduates were significantly more likely to report using libraries than non-college graduates by a difference of 17 percentage points (Geiger, 2017).

Political affiliation may also be a useful characteristic, but it shares a complicated relationship with wealth. Gelman et al.'s (2007) multilevel analysis in America, for example, shows that "richer states" support liberal candidates while "richer voters" support conservative candidates, i.e. wealthier voters within states, *regardless of those states*, tend to vote conservatively. What about voters within local communities? Brett Benson (2012) analyzed and collated the voting patterns of every municipality in Massachusetts from 2006 to 2012 and generated an average margin of victory for liberal or conservative candidates. A score of zero means that the community demonstrated no preference for liberal or conservative candidates across 2006 to 2012. Positive scores indicate a "more liberal" preference and negative scores a "more conservative" preference. In Provincetown, for example, the average score of +73% means that, on average, liberal candidates received 73% more of the vote (not 73% of the vote) over conservative candidates. Lynnfield, in contrast, scored -28%, indicating that conservative candidates received 28% more of the vote, on average, over liberal candidates.

Data provided by a state-level agency can help further current research lines. Entering community data for individual states creates both a manageable dataset and a simplified analysis, as multilevel modeling will not be necessary to control for unique statewide dynamics. Community data, then, may validate other measures such as the Pew Research Center's surveys. Because state-level library agencies use the IMLS's Public Libraries Survey, intrastate analysis may generalize across at least the United States, if not internationally. As Holt and Elliott (2003) indicate, states hire "staff whose principal tasks . . . are to collect library input and output statistics" (p. 425). The Massachusetts Board of Library Commissioners (MBLC) is one such state-level agency. Turning to the MBLC's dataset, I asked the following research questions:

1. To what extent does a library's funding, specifically its municipal appropriation, account for variation among direct circulation after controlling for library-related variables?
2. To what extent do these library-related variables explain variation among direct circulation?
3. To what extent do community variables used as proxies of library usage (income, education level, age, and political affiliation) correlate with library activity and funding?

METHODS
Data Collection
To analyze the relationship between financial investment and library outputs, I relied on data from the Massachusetts Board of Library Commissioners' Fiscal Year 2015 report. Every year, the MBLC releases an extensive report on all Massachusetts public libraries. The data come from Annual Report Information Surveys (ARIS), which library directors must submit to qualify for the statewide certification program. For the MBLC's FY 2015 dataset, 369 separate ARIS reports were released.

Based on the IMLS's Public Libraries Survey, the MBLC's dataset includes all of the usual outputs, e.g., circulation, visitations, and operating hours. Data include financial information such as the library's total operating income, its expenditures, and its Total Appropriated Municipal Income (TAMI), which is the amount of municipal funding received. Overwhelmingly, Massachusetts' public libraries in FY 15 operated from municipal income, as represented by the TAMI as a percent of total operating income (median = 91.8%; mean = 86.2%). This mean closely resembled the national average of 85.7% as reported in the IMLS's FY 13 report.

To represent the library's financial variable, I chose municipal appropriation over total operating income for several reasons. First, municipal appropriation contains fewer potential errors; it is the amount of funding that a municipality apportions its library, appearing in public documents as the library's "line-item" funding. Total operating income, by contrast, is more of an estimate, meant to include all of a library's income as generated from small donations to large bequests and requires consideration of all grants, donations, and miscellaneous funds bestowed during the fiscal year. Second, within the MBLC's dataset, operating income did not correlate as strongly as mu-

nicipal appropriation with direct circulation; operating income's $r = .76$ whereas municipal appropriation's $r = .93$. Third, the appropriation represents a municipality's financial commitment irrespective of a library's good fortune, i.e. which libraries have generous individual donors, deep endowments, or vigorous fundraising groups. Appropriation ostensibly measures overall community support better than total operating income.

Not all data reported by the MBLC were used in this analysis. Roughly 80% of public libraries in Massachusetts serve between 2,000 and 99,999 residents. This analysis examined only these libraries because very small and very large libraries skewed results or bore non-generalizable community dynamics. Consider that the average municipal allotment in the entire dataset was $707,882 (median = $368,152) and then consider the Boston Public Library's municipal allotment ($33,416,127). This astronomically high figure would skew the dataset. Furthermore, tiny communities may feature high socioeconomic measures because they are populated by wealthy residents ostensibly uninterested in social services. Alford's population of 474, for instance, has a median household income of $95,313, but with a median age of 57 years, Alford does not represent a typical community. I removed some other libraries from the original dataset because they were presented as independent libraries in a larger municipality. I also removed one municipality, a college town, for its abnormally low median age. The final number of public libraries (N) was 280.

MODELS
I built two linear regression models to analyze the impacts of (1) library outputs on direct circulation and (2) community variables on municipal funding. Regression models are presented alongside their coefficient of determination (R^2) and standard error of the estimate. R^2 refers to the amount of variation within the data explained by the model. All reported R^2 values are the adjusted figures so as to minimize the impact of adding variables. The standard error of the estimate refers to the average amount a model's predictions are "off," or the average distance from an actual value to its estimated value on the regression line.

Selecting independent variables for linear regression model 1 (dependent variable = direct circulation) required some consideration. I could not select variables

based solely on the strength of correlation because virtually all library outputs correlated strongly with direct circulation (Pearson's zero-order correlations). This was largely because of confounding variables and collinearity. For example, director's salary correlated with circulation ($r = .63$) despite having no logical connection to it. When controlling for municipal allotment, i.e. adding it into the model, director's salary becomes nonsignificant ($p = .47$), and its *partial* correlation—so named because the impact of municipal appropriation is "partialled out"—becomes .001.

Collinearity refers to the correlation between predictors in a model, not between predictors and dependent variables. With high collinearity between variables, the contribution of each variable becomes unclear. One way to measure collinearity is the variance inflation factor (VIF), which estimates the increase in a coefficient's variance from collinearity, where a VIF value of one means "no collinearity." Some collinearity, especially with observational data, is unavoidable. But how much is too much? Convention suggests that VIF values up to five indicate a small-modest level of collinearity but higher values are more problematic (Stine, 1995). Given the nature of these data, however, modest-high collinearity is unavoidable; an increase in one measure tends to indicate an increase in another. This makes sense. As libraries receive more funding they add more staff, field more reference questions, circulate more items, pay their directors higher wages—essentially, they do more of everything, as both Meyer (2016) and McQuillan (2003) noticed.

I selected variables, then, which were used by the IMLS and other researchers, were logically linked with circulation, and which had low collinearity. These variables represented activities that might realistically affect circulation. The final list of variables for model 1, which met the above criteria, included programs offered (adult and children, annually), total visitors (annually), staff hours (total annually), and physical holdings (total). I did not include electronic holdings since, in Massachusetts, these are often managed at the consortium level.

Despite having a logical connection to circulation and being included in previous research, operating hours were excluded from this model because of their non-linear relationship to circulation. The MBLC awards state aid partially in proportion to the number of hours opened, but state aid is capped.
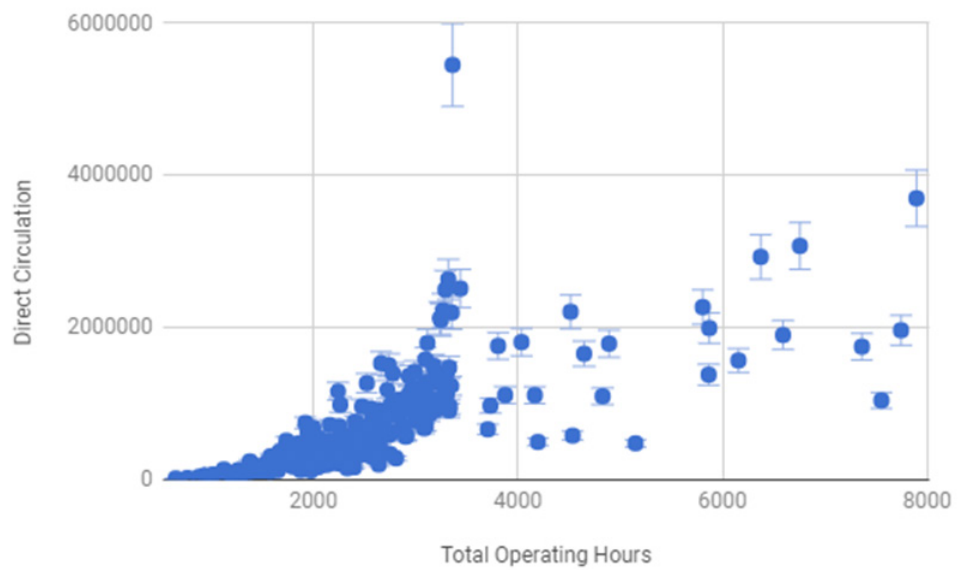
Hours on Direct Circulation

Figure 1: Total operating hours on direct circulation. Note the "wall" created as most libraries reach the threshold to receive the maximum amount of state aid.

For example, libraries with service populations between 15,000 and 24,999 must open 50 hours per week for maximum state aid, with additional hours yielding no more aid. Libraries lack financial incentive, then, to open more hours than this threshold as suggested by **Figure 1**.

Linear regression model 2 examined the impact of community characteristics on municipal appropriation (dependent variable), following Swan et al.'s (2014) suggestion that "more could be learned by incorporating other contextual data, such as information on poverty and community characteristics" (p. 13). I added data on these community characteristics based on the latest available census data, either the 2010 U.S. Census or the 2011 or later American Community Survey (ACS), from the American Fact Finder online. Age is represented by the community's median age. Population is the latest available estimate from the ACS. I estimated political affiliation using Benson's (2012) dataset on municipal Massachusetts' voting trends. I chose median family income over median household income because they measured essentially the same construct but median family income correlated better with both municipal allotment and direct circulation; per capita income correlated poorly with both measures.

Education level requires some explanation. Education level (percentage of residents with a Bachelor's degree or higher) and population shared an interaction effect. A model of just population and education

level yielded an R^2 of .60, with moderate partial correlations to municipal funding (population $r = .77$ and education $r = .32$). I suspected, however, that population interacted with education, i.e. gains from population differed depending on education levels. I first centered these two variables around their means and then subtracted the mean from each value to avoid complications from collinearity (Afshartous& Preston, 2011). I then multiplied population by education level to create the interaction term. With the interaction term in the model, substantially more variance was explained ($R^2 = .82$). To simplify model 2, I measured education level by generating a statistic called the "number of educated residents," calculated by multiplying a community's estimated population by its estimated educational attainment (percentage of residents with a Bachelor's degree or higher). This statistic alone explained almost as much variance as the above model ($R^2 = 0.80$), and I used it for model simplicity.

RESULTS
As previous research had suggested might happen, municipal appropriation strongly correlated with direct circulation ($r = .93$), by far the strongest individual effect of any variable. **Table 1** presents the results of Model 1: library outputs (total visitors, physical holdings, staff hours, number of total programs offered) on direct circulation. **Table 2** presents a correlation matrix.

This model explained a considerable

amount of variance (R^2 = .87) with a modest standard error of the estimate (69,066). Visitors, staff hours, and holdings were all significant predictors. Programs offered was the only nonsignificant predictor on circulation (p = .13). It is possible, however, that the effect of programming is so slight that a larger sample size would be required to detect significance. This make sense, as a library's programs reasonably cannot be expected to influence circulation as much as, say, the number of visitors.

The largest effect on direct circulation was the number of staff hours worked (partial r = .41). The total number of annual visitors came close (partial r = .37). Municipal appropriation and total staff hours correlate extremely well and have high collinearity (r = .97; VIF = 15.6), suggesting that they measure a similar construct, although when in the same model, municipal appropriation retains a higher partial correlation (r = .48) than staffing (r = .12). That may be because staff hours have an empirical limit whereas appropriation does not; even very large libraries eventually reach a critical mass of staff members.

Table 3 presents results from model 2, and **Table 4** presents a correlation matrix on the effects of community dynamics on municipal appropriation. This model explained considerable variance (R^2 = .85) but contained a relatively high standard error of the estimate ($259,768). The number of educated residents had the strongest impact by far (partial r = .85); for every additional "educated resident," the model predicted a $73.15 increase in municipal appropriation. The 95% confidence interval was also fairly narrow, ranging from $67.72 to $78.57.

As with population, I suspected that age might have interacted with education level. Without the interaction effect, age was negatively correlated with appropriation (r = -.30), suggesting that older communities were not as generous as younger ones. (The effect was nonsignificant with other variables in the model, however.) But with the interaction effect in the model, age retained a significant and positive effect (partial r = .15). This measure was not precise, however, with a very wide 95% CI. Income level was insignificant (p = .52) after controlling for education.

Political affiliation was also a significant (p = .03) but with a very wide 95% CI. It did not have a clear interaction effect with education or any other variable. Such imprecision might suggest problems with the

Table 1
Output Variables on Direct Circulation

	Unstandardized B	P Value	95% Confidence Interval	Partial Correlation
Constant	-45860	<.01	-62434 – -29286	--
Visitors	.53	<.01	.36 – .71	.37
Holdings	.28	.03	.03 – .53	.14
Programs	35.35	.13	-10.94 – 81.65	.10
Staff Hours	279.67	<.01	205.88 – 353.46	.44

M = 176,544. N = 236. Some libraries were removed for not having submitted data for all included variables.

Table 2
Correlation Matrix of Output Variables and Direct Circulation

	Circulation	Staff Hours	Programs	Holdings	Visitors
Circulation	1.0	.92	.67	.83	.89
Staff Hours	.92	1.0	.69	.87	.89
Programs	.67	.69	1.0	.59	.64
Holdings	.83	.87	.59	1.0	.80
Visitors	.89	.89	.64	.80	1.0

Table 3
Socioeconomic Variables on a Library's Municipal Appropriation

	Unstandardized B	P Value	95% Confidence Interval	Partial Correlation
Constant	-23098.23	.23	-607048 – 145093	--
Family Income	.44	.52	-.90 – 1.77	.04
Education	73.15	<.01	67.72 – 78.57	.85
Political	2111.38	.03	213.52 – 4009.24	.13
Age	7446.46	.01	765 – 15658	.15

M = $700,428. N = 280.

Table 4
Correlation Matrix of Socioeconomic Variable and Municipal Appropriation

	TAMI	Education	Family Income	Age	Political
TAMI	1.0	.89	.23	-.30	.28
Education	.89	1.0	.26	-.39	.25
Family Income	.23	.26	1.0	.01	-.26
Age	-.30	-.39	.01	1.0	-.08
Political	.28	.25	-.26	-.08	1.0

dataset. Although Benson's (2012) dataset was extensive, it was not necessarily rigorous; it simply averaged margins of victory across several elections. This might not be a valid way to approximate voting patterns.

DISCUSSION
Previous research has demonstrated a strong correlation between funding and library activity, at least as measured through the variables of circulation and annual visitations. As Swan et al. (2013) found, "[Li-brary] revenue was a positive predictor for visitation, circulation, and program attendance" (p. 13). Drawing on the MBLC's data, I analyzed library usage statistics, extending previous research by including community characteristics. This analysis aimed to learn what municipal allotment might actually measure, for example, a community's income or education level.

In terms of library outputs, direct circulation strongly correlated with both staffing and visitations. Other variables previously

studied by the IMLS (e.g., reference transactions and programs offered) indicated little to no correlation after controlling for municipal appropriation or other variables. But this insight, unfortunately, lacks utility. The high VIF (15.6) between staffing and municipal allotment suggests that they may measure the same construct. Advising library administrators to add more staff provides neither clarity nor guidance. We can reasonably infer that libraries hire more staff in reaction to financial increases, something already well known. And, like staffing, visitations are uninformative. We are interested in why people visit libraries not that they do. Obviously, visitations correlate with circulation totals—as more people visit libraries, more materials circulate.

As the strongest effect on a library's activity was its municipal appropriation, it makes sense to determine what affects this appropriation. This analysis suggests that a library's municipal allotment stems largely from its community's education level; about 80% of the data's variation could be explained by the number of a community's educated residents alone, even after controlling for other influences. Model 2 predicted that each additional educated resident might be expected to increase library funding by about $73 while holding other variables constant. Interestingly, median family income was found to be nonsignificant when controlling for education level. This may relate to the fact that the examined state was Massachusetts, which is historically the highest-ranking state in terms of educational attainment (Ogunwole et al., 2012). Older or liberal communities were also more likely to receive library funding. These effects were slight, however, and, at least in the case of age, related to education level. Political affiliation may also interact with education level, but this analysis may not have been able to pick it up due to methodological issues (e.g., sample size and limitations of Benson's dataset).

That education influences municipal allotment so strongly suggests that municipal allotment reflects the community's demand for library services, lending indirect and admittedly strictly correlative support for the theory of public choice. Had an income measure been the dominant influence instead of education level, then another explanation may have been more plausible, i.e. public libraries simply benefit from the largesse of their communities. Yet, when controlling for education, median family income did not predict direct circulation. Even without controlling for education, income was a relatively weak predictor (r = .23). Many wealthy communities appeared to fund their libraries (relatively) poorly and vice versa. Simply put, the more educated people in a community (in this dataset at least), the higher its public library's funding tended to be, corroborating survey data from the Pew Research Center (Geiger, 2017; Rainie, 2016).
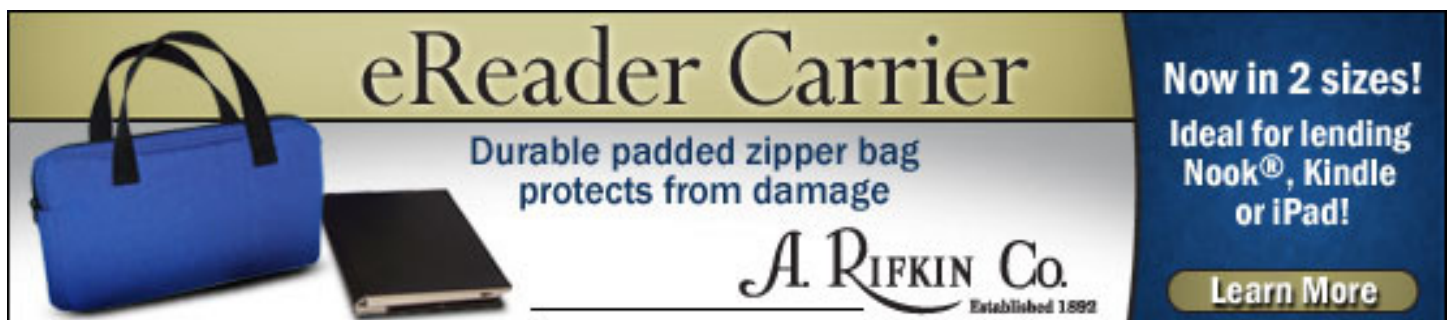
LIMITATIONS AND FUTURE RESEARCH

It should be noted that this analysis relied exclusively on data from one Northeastern, highly educated state. As Swan et al. (2013) indicated, interstate analyses should use multilevel models to consider dynamics unique to each state. Such dynamics may affect the generalizability of these findings. Other researchers could apply socioeconomic analysis to other states and countries. Furthermore, this research analyzed correlations and thus cannot establish causation. While the data suggest that educated communities drive library funding, this conclusion cannot be drawn and further research would have to examine its feasibility. Previous research by Bryce (2003) found a lack of support for the theory of public choice in public libraries, although Bryce labels his findings as "too preliminary in nature" (p. 423). To further this research line, one might be interested in examining within-subject funding and circulation levels across several years.

Furthermore, the seemingly high R^2

values in these models obscure the correspondingly high standard errors of the estimate. Just because two values correlate does not mean that individual predictions based on the regression line will be accurate. This is a well-documented shortcoming of R^2; Hahn (1973), for example, noted that "unlike the standard error of the estimate . . . R^2 alone does not provide direct information as to how well the regression equation can be used for prediction" (p. 611). Indeed, when the socioeconomic regression model predicted municipal appropriation, the average estimate was off by $259,768. That is a very high standard error considering that the average value in this dataset was $700,428. Circulation values similarly had high standard errors of the estimate; in the model of only library outputs, the error was 69,066. Of course, these are average values—some estimates were way off and others were almost perfect—but given that the average circulation total was 176,544, this error comes across as quite high.

However, these high standard errors may matter only insofar as we interpret the data continuously, when perhaps it should be understood as ordinal, similar to a Likert scale. In continuous data, all unit increases are treated equally, justifying the calculation of an average. But this approach may be inappropriate here. To illustrate this concern, consider a public library in Massachusetts with a service population of 23,000 residents. A funding increase from $200,000 to $400,000 would essentially create a viable public library; $200,000 cannot satisfy statewide certification requirements for a service population of that size. An increase from $400,000 to $600,000, while improving services, would not have the same level of impact as the initial increase from $200,000. And an increase from $1,700,000 to $1,900,000 means even less, given diminishing returns. The high standard errors of the estimate may be deceptive; perhaps what matters is that libraries hit a certain threshold of funding and any variation

above that level matters less than variation below that level. Therefore, libraries may be better understood as belonging to certain categories. For example, the difference between $676,076 and $2,127,001 is certainly numerically large, but the former library can likely deliver an effective level of public service in a way that even a $400,000 library might not. Further research could explore this relationship in detail.

Nevertheless, all of the data's variation demonstrates the idiosyncrasies of public libraries. In spite of the strong correlations found here, these regression models leave considerable "wiggle room" for librarians, administration, and advocates to impact their communities. Regarding municipal appropriation, community characteristics could not explain almost 15% of the variance—and that 15% appears significant. Swan et al. (2013) reached similar conclusions when arguing that "although revenue is an important piece of the puzzle, it is by no means the only investment that explains changes in library use" (p. 13). These data reaffirm their claim. Poorly funded libraries may try comparing their own communities to communities of similar educational levels and reach out to those libraries to understand how they develop, promote, and deliver services. For instance, two libraries in this dataset have an almost identical number of educated residents (16,453 to 16,936) yet extremely divergent municipal appropriations ($676,076 to $2,127,001). The poorer library could try to discover any notable systemic differences (e.g., a form of government), and if the poorer library finds nothing substantive, it could contact the wealthier library to try to understand its good fortune and perhaps implement some of the wealthier library's services or approaches.

CONCLUSION

Municipal allotment appears to operate as a sort of proxy variable, i.e. a variable that approximates some real phenomenon such as a community's interest in its library. This proxy variable is likely the result of many idiosyncratic factors, but the strongest factor was the number of a community's educated residents. More educated communities were more likely to have greater municipal allotments and, in turn, to circulate more materials. However, library advocates should take heart knowing that enough variation existed within the data to allow libraries an opportunity to escape any "demographics

are destiny" conclusions. Financial investment appears to be just one part of a large, mysterious puzzle. ∎

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Collaboration at the Center

» Librarian, Faculty, and Students Partner to Revive Their Curriculum Lab

BY MELISSA CORRELL & JODI BORNSTEIN

INTRODUCTION

Arcadia University houses a curriculum materials center (CMC) to support students, faculty, and staff in the School of Education. Referred to as the Curriculum Lab, this one-room space houses a collection of fiction and nonfiction literature for children in pre-kindergarten (preK) through high school as well as teachers' materials for lesson and curriculum planning, including a small number of textbooks. These materials supplement the larger circulating collection of books on education. However, students in the School of Education seemed largely unaware of the space, and students from other disciplines used the Curriculum Lab as just another study room. Old, faded posters clung to the windows and walls, and the space itself projected a general air of neglect. Clearly, something needed to be done to improve the situation.

Looking into the history of the space offered a way to begin to think about its future. Unfortunately, the provenance of the space and collection was unclear and the context had shifted so much that what little documentation existed was largely irrelevant. The library director revealed that the previous education librarian and an education professor had worked together to revitalize the space. While the initial project yielded some useful observations and ideas, any real change was thwarted by staffing changes, life events, and the passage of time. A librarian, Melissa Correll, reached out to that education professor, Jodi Bornstein, about the possibilities of collaboration, and together we reignited the project as a collaboration to meet shared goals.

LITERATURE REVIEW

Best Practices for Curriculum Materials Centers

Some common themes in literature on CMCs is that the literature is sparse (Locke, 2007) and can be difficult to find due to

Figure 1. Before the ED411 students' project, the Curriculum Lab looked cluttered and neglected.

the variety of terms used to refer to these collections (Gelber & Uhl, 2013; Kohrman, 2015). Gelber & Uhl (2013) lamented "...a lack of recent comprehensive case studies that address the practical aspects of curriculum materials collections access and maintenance" (p. 52). Their article described practical aspects of managing a CMC collection as well as redesigning the center's space to make it more inviting and useful. In the current article, we detail a collaborative process in which education students used a project-based learning (PBL) approach to envision and implement improvements.

The Curriculum Materials Committee, part of the Education and Behavioral Sciences Section of the Association of College & Research Libraries (ACRL), produced two guiding documents that informed our approach to the Curriculum Lab, the Guidelines for Curriculum Materials Centers and A Guide to Writing CMC Collection Development Policies. Both documents emphasized collaboration between librarians and education faculty, especially in developing policies for a CMC, and recommended developing a mission statement early in the process to

focus its purpose and goals and to use as a foundation for making decisions (Association of College & Research Libraries [ACRL], 2017; Fabbi, Bressler, & Earp, 2007). When librarians consult with education faculty and students while writing the mission statement, that statement will reflect their values and can become a powerful tool to promote the CMC and rally stakeholders (Miller & Meyer, 2008). In her 2007 article, O'Neill Uhl wrote that student needs are the "essential question [that] determines the core collection and mission of a CMC" (p. 44). The mission statement can be crafted to invite preservice teachers to take ownership of the space and collection and help them understand the role that the CMC, and the library as a whole, plays in their professional development (Miller & Meyer, 2012).

A strong mission statement can also guide policies and decisions about both collections and space. As Gelber and Uhl (2013) pointed out, these collections differ from general circulating collections due to their focus on current materials, which would likely be used in schools. Locke (2007) reported that librarians found faculty input

in collection development vital to keeping materials current and that space is a priority, particularly redesigning the CMC to accommodate group work and facilitate engagement with technology. In her case study of a redesign project, Teel (2013) echoed the need for more group work areas and enhanced technology and explained that CMC stakeholders should make design choices with the purposes of that space in mind (Teel, 2013). ACRL (2017) recommended that the space be able to accommodate both individual and group work and have the capacity to serve as a classroom. In this project, the Curriculum Lab served as a classroom for a particular class in the School of Education in the sense of being both a meeting space and learning experience.

Project-Based Learning & the Curriculum Lab

PBL is "a teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging and complex question, problem, or challenge" (Full Circle Nature School, n.d.). This approach to teaching and learning is rooted in constructivist theories where "a core assumption of constructivist theory is that learners actively construct knowledge through activity, and the goal of the learning experiences designed by teachers is to promote a deep understanding rather than superficial (and short-lived) memorization" (Hernández-Ramos & De La Paz, 2009, p. 152). PBL challenges the traditional lecture or "banking" model of education, in which students are passive receivers, rather than meaning-makers, of information (Freire, 2000). PBL has a long history as an innovative approach to teaching and learning and is currently regarded as an innovation in K-12 schooling contexts. Importantly, less research is available on how PBL is integrated into college and university teaching. Yet, PBL is an important contribution to the "pedagogies of engagement" in college teaching: "the real challenge in college teaching is not covering the material for the students; it's uncovering the material with the students." (Smith, Sheppard, Johnson, & Johnson, 2005, p. 88). Buck Institute for Education (2015), a leader in PBL, identified seven essential project design elements: "challenging problem or question, sustained inquiry, authenticity, student voice and choice, reflection, critique and revision, and a public product." The Curriculum Lab project worked to include all of these design elements.
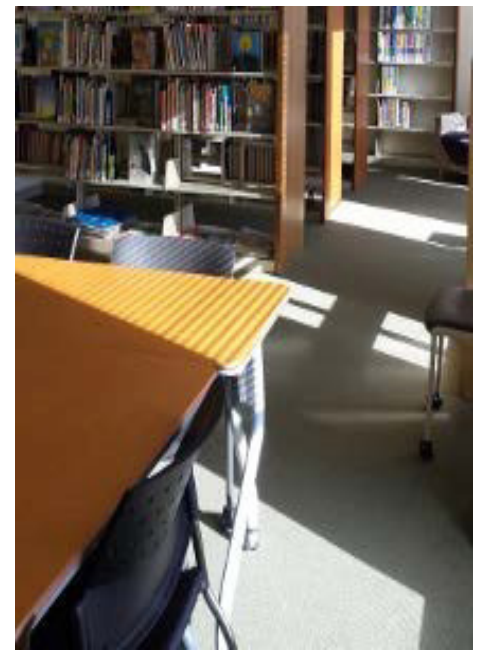

Figure 2. After implementing ED411 students' and CLAG's suggestions, the Curriculum Lab appears more useful and inviting.

SETTING THE STAGE FOR THE "PROBLEM:" COLLABORATIVELY PLANNING TO REDESIGN THE CURRICULUM LAB

Designing Learning Environments (ED411) is an undergraduate course with a primary focus for middle and high school teacher education students to learn about the ways that space, in addition to teachers and other students, is a "third teacher" in the classroom (Cannon Design, VS Furniture, & Bruce Mau Design, 2010). This third teacher creates the possibilities and/or limitations for learning and teaching. Importantly, space as a third teacher pushes teachers to think about design as more than simply decorating the classroom. As Carter (2007) stated, "We must ask ourselves what values we want to communicate through our environments…. What does this environment 'teach' those who are in it? How is it shaping the identity of those who spend long days there?" (p. 22).

Students in ED411 imagined ideal learning environments for their classrooms, investigated school structures, and considered how they as teachers can limit or enact those visions. The class focused on principles of design for collaboration and inquiry at the heart of instructional practices. Redesigning the Curriculum Lab became the primary, authentic, and challenging project-based question for the class, since it is a real space of practical importance on campus for the teacher candidates, and it created a perfect way to support meaningful transfer and application of ideas. Before

proposing changes to the lab, students read various texts, watched videos of classroom and school design, and began to envision the kinds of spaces they wanted to create in their own classrooms. The students were excited for this opportunity, and the underused Curriculum Lab became their home twice a week for class sessions.

During the students' first visit to the Curriculum Lab, they used a See/Think/Wonder activity (Visible Thinking, n.d.) to ignite their thinking about the space. They made observations about the space, recorded their thoughts about what they saw, and then posed questions that their observations inspired. This exercise provided valuable insight into students' perceptions and revealed that they thought the space felt claustrophobic, appeared cluttered with unused furniture and outdated material, and seemed oriented toward elementary educators, excluding middle and high school teachers. These observations and questions became the basis for the next weeks of work, in which students posed possibilities for transformation, guided by the academic content of the class. The class realized that before any changes could be implemented, one overarching question had to be addressed: What is the purpose of the Curriculum Lab?

Informed by the literature on best practices for CMCs, we tasked the ED411 students with articulating the mission statement in order to build intentionality into the design process and encourage student

> **» At the end of the semester, the students summarized their vision with a blueprint and a narrative, which they used to collaboratively present their work and hopes for the future of the Curriculum Lab to the deans.**

ownership of the space. First, they examined a few example mission statements to get an idea of what a mission statement generally does. Then, they individually drafted their vision for the Curriculum Lab, sharing their work in a subsequent class meeting. The librarian collected the individual students' work and used it to create a word cloud, revealing commonalities that could serve as a springboard for a collaborative draft. The final version reflected ideas that reverberated throughout the time that we had been working on the project — a flexible space that provides relevant print materials and technologies and accommodates both individual and collaborative study as well as teaching practices — and reads:

> *Our mission for the Arcadia University Curriculum Lab is to provide an intentional, functional, and inclusive space for the community of preservice and current educators to explore print and technological pedagogical resources for curriculum development. By purposefully designing both individual and collaborative work areas, we hope to cultivate an active and diverse atmosphere to enhance teaching preparation, practice, and instruction.*

With their mission in mind, the students were ready to make design choices. The librarian supported the students' work in several ways. She reviewed the literature to identify best practices and shared her findings with the class. She visited nearby university libraries to talk with librarians responsible for their CMCs. She also met with campus Academic Technology Services to discuss potentially adding tech capabilities to the Curriculum Lab and met with the county intermediate unit to learn about tech trends in local school districts.

The class formed working groups based on their interests within the space, and, equipped with tape measures and oversized paper, began to draft a blueprint of their visions of the future Curriculum Lab. In order to allow for more flexibility of use, students proposed creating more open

space, which required removing furniture, including empty filing cabinets, a large and immovable table in the center of the room, a built-in counter along one wall, and an entire range of shelving. The students also wanted to install technology in the room. Adding computers would facilitate access to electronic resources such as teaching certification practice exams in a dedicated space, away from the busy main computer area. A SMART Board would allow students to practice designing and delivering lessons with technology tools they could use for instruction in preK-12 classrooms. Technology would be expensive, so we decided to pitch the students' plans to the Dean of the Library and the Dean of the School of Education in an effort to secure support and finances for the project.

PRESENTING THE CLASS'S WORK TO UNIVERSITY ADMINISTRATORS

At the end of the semester, the students summarized their vision with a blueprint and a narrative, which they used to collaboratively present their work and hopes for the future of the Curriculum Lab to the deans. Gaining real-world experience in imagining, articulating, and presenting a vision for change to stakeholders in an attempt to secure funding for a project will serve the students well in future professional settings. Their experience made the coursework meaningful and relevant and also aligned with PBL best practices that calls for students to create a public project to share with stakeholders. The deans met the presentation with enthusiasm and pledged $1,500 in total to be applied to making the students' vision a reality. The deans had one condition: Students had to demonstrate momentum and not let work on the project fall to the wayside.

CONTINUING THE WORK AFTER ED411: THE CURRICULUM LAB ADVISORY GROUP

When the course ended, there was a danger that students would move on to other courses and projects, leaving the Curriculum Lab to languish. The course was not offered in the following academic year, so it was

not possible to pass the project to the next cohort of students. The project needed to carry on even in the absence of the class, so we invited students and faculty from the School of Education to volunteer to join the Curriculum Lab Advisory Group (CLAG). Some ED411 students joined CLAG and shared their experience with new members. The group created a Google group to facilitate communication and met in the Curriculum Lab to keep in touch about the space and imagine ways to improve it while building on ED411's previous work.

The class had expressed concern about the number of outdated materials in the collection, so CLAG thought about which books should be removed. This task prompted the librarian to draft a collection development policy specifically for the Curriculum Lab, which would serve as a guide for both adding and removing titles. Using this policy, the librarian created a handout for CLAG members explaining why weeding is an important aspect of collection maintenance and including a short list of weeding criteria, as recommended by Fabbi, Bressler, and Earp (2007). Using these bullet points, CLAG had a weeding party, during which members used brightly colored stickers to flag items for the librarian to consider removing from the collection. This party was an excellent way for CLAG to take ownership of the collection, see what was on the shelves, and identify areas that needed further development, while allowing the librarian to make the final decision about individual items. After flagging books for removal, CLAG started a collaborative spreadsheet to collect titles to recommend for acquisition.

IMPLEMENTING CHANGES
Removing Unused Furniture and Outdated Items
We deferred the process of removing books until the summer, when there would be fewer students on campus. Although we wanted to demonstrate visible progress, some changes that ED411 and CLAG requested would cause noise, mess, and disruption, so it made sense to complete these

tasks when traffic on campus would be low. Over the summer, the librarian evaluated the items CLAG had marked for review, checking circulation statistics and weighing the value of each title. Outdated items were discarded, and damaged items that had value for the collection were replaced. After weeding, the librarian shifted the books, and campus facilities staff removed the shelving range nearest the door. Following the ED411 students' recommendation, the empty filing cabinets and bookshelves, the built-in counter, and the large, immovable table were also removed. We brought wheeled, adjustable tables and chairs into the newly created space.

Installing a SMART Board

After the summer projects of weeding and removing furniture were complete, it was time to use the funds pledged by the deans to add technology to the Curriculum Lab. While there was not enough funding from the Information Technology department to add new computers to the lab, we were able to arrange for the installation of one computer and a SMART Board.

With a small budget of $1,500, these additions were possible only because Academic Technology Services had an extra SMART Board in storage, which had been delivered with minor cosmetic damage. The board has a small dent at the top left corner but is otherwise fully functional. Academic Technology Services provided the board to the library free of charge. After securing the SMART Board itself, we still needed a projector and installation service.

In the small Curriculum Lab, there is a little over 30 feet between the front wall where the SMART Board would hang and the first range of shelving; therefore, Academic Technology Services recommended using a shortthrow projector. Luckily, one of these was also in storage on campus and made available to the library at no cost. Only the installation fee for the SMART Board and projector remained, which amounted to $1,905. The library's general budget was able to cover the portion of the cost exceeding the Curriculum Lab's pledged funds.

Developing and Implementing a New Organization System for Children's Literature

Students in both ED411 and CLAG indicated that they discovered items in the Curriculum Lab collection by browsing more often than by using the catalog and that they wished the children's books were separated

into age categories or reading levels to make it easier to find books for a particular grade level. There are a number of systems for leveling books, including Lexile, Accelerated Reader, Scholastic's Reading Counts, and Fountas and Pinnell's Text Level Gradient and A to Z systems. A cursory investigation revealed that there could be inconsistencies in how these systems level the same title. Pennsylvania has adopted the Common Core State Standards (CCSS), which caution that quantitative measures such as reading levels "...cannot (at least at present) capture all of the elements that make a text easy or challenging to read..." (Common Core, n.d., p. 5). Fountas and Pinnell, creators of two leveling schemes, told School Library Journal that their systems were meant as a book selection tool for teachers, and "...have no place in classroom libraries, in school libraries, in public libraries, or on report cards" (Parrott, 2017, p. 15). In light of this, it seemed prudent to come up with another system that would facilitate browsing.

Using broader strokes to organize children's books could help avoid the controversial granularity of reading levels while still creating sections of relevant resources for our student teachers to browse. The librarian worked with the cataloger to develop a plan to separate the children's fiction collection into two sections: picture books for younger children, and books designed for children and adolescents to read independently. These sections would be easier to browse for early childhood, elementary, middle school, and high school preservice teachers.

First, we identified picture books aimed at young children, which we distinguished by adding a PIC indicator to the call number. This addition required changes in the catalog, a new spine label, and a physical relocation of the entire collection of picture

books. Though this collection is relatively small, this multi-step task required many hours of work. For the sake of efficiency, we decided to limit the cataloging and spine label changes to picture books, and simply relocated the fiction books catering to upper elementary, middle, and high school readers. This choice allowed us to complete the entire reorganization project over the summer. New books added to the collection follow the new scheme. As of the time of writing, all of the nonfiction children's literature is shelved together according to Library of Congress classification. Deciding which, if any, changes will be made to this classification scheme is a potential future project for CLAG.

DISCUSSION AND FUTURE OF THE PROJECT

The physical transformation of the Curriculum Lab is remarkable. The room looks much more inviting, useful, and relevant to our education students. After the collection was updated, children's fiction and nonfiction circulation rates for both the fall 2017 and spring 2018 semesters were higher than the previous fall and spring. Observations of the space indicate that the education students use the room more often now.

The project also had a dramatic impact on the ED411 students. Not only did they get a chance to apply the theories and principles they learned in class to an active PBL experience, but they also understood the effectiveness of such a pedagogical technique. One student reflected:

I learned the impact the design of a space really has on how you learn. The curriculum lab before the redesign was clunky, crowded, dated, and overall uninviting. No one wanted to be in the lab, if they even knew about it, before the redesign. I also learned the importance, and sometimes

difficult side of collaboration on a project. We had to work together to make real decisions with an impact. ... The work with the Curriculum Lab will guide me in my teaching to ensure that my students' learning feels important and relevant to their lives. I want my students to feel like their work and learning is relevant and meaningful too. I want them to experience the pride in their own work, as I did with the Curriculum Lab.

Another student was struck by how important student voice was to this project: "I'd love to bring student voice input on how my classroom should be designed. It's their space to learn, and they should have a voice, as well as the opportunity, to be heard." Considering the application of pedagogical theory in the project provided the students with an opportunity to see how they might use project-based learning in their own classrooms.

This project confirmed the literature that asserts faculty/librarian collaboration is essential to the success of a CMC (ACRL, 2017; Fabbi, Bressler, & Earp, 2007; Locke, 2007; Miller & Meyer, 2012). ED411 served as a catalyst for an ongoing partnership that has yielded tangible improvements to collections and space. Furthermore, the class provided an opportunity to collaborate with students on a project designed to improve a resource that serves them. One student described the impact of the project: "You could have told me that the design of a space is important to learning a million times, but to experience it first-hand was true learning. I was able to selfreflect on my own feelings and excitement about doing something that was actually making a difference. The feeling of knowing you are relevant in a project, represented within a space is beyond words."

Although much progress has been made, the project is not complete. The Curriculum Lab requires more work to satisfy its mission to "...cultivate an active and diverse atmosphere to enhance teaching preparation, practice, and instruction." One of the most important tasks is publicizing the transformation of the Curriculum Lab's space, collection, and technology to all of the stakeholders in the School of Education. Some students and faculty are still unaware of how they can use the Curriculum Lab; reaching them is a perennial goal. One strategy we plan to use is hosting events in the Curriculum Lab such as a movie series, make and take events,

read-aloud nights, and education-related presentations or discussions.

An imminent challenge is that many of the student members of CLAG are seniors who will be graduating at the end of this semester, so we must recruit students to step into their roles as project participants and advisors. Because the Curriculum Lab exists primarily to support the education students, it is vital that they have a role in decisions about it. Their voices shaped the mission of the space, and their voices will determine our goals for the future of this project. This student-centered approach will be a primary focus of CLAG as the work continues. ∎

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How Important Are Data Curation Activities to Researchers?

» Gaps and Opportunities for Academic Libraries

BY LISA R. JOHNSTON, JACOB CARLSON, CYNTHIA HUDSON-VITALE, HEIDI IMKER, WENDY KOZLOWSKI. ROBERT OLENDORF, AND CLAIRE STEWART

INTRODUCTION

In the fall of 2016 the authors held six focus group sessions across six academic institutions to determine what data curation activities were important for researchers, what activities they were currently applying themselves, and how satisfied they were with the results of those efforts. In short, our research aimed to identify the challenges faced by researchers with regard to data curation. As an outcome of these focus group sessions, the process uncovered several "gaps" in highly valued data curation activities in which researchers do not currently engage for their data (or do not engage as satisfactorily as they would like to). These findings represent opportunities for academic libraries to focus their data curation services to more effectively meet researcher needs.

This research was performed as part of the Data Curation Network (DCN) project funded by the Alfred P. Sloan Foundation aimed at developing a shared staffing model for curating research data. A white paper reporting the full results of this research was first published on our project website with all DCN project outputs (Johnston et al., 2017).

LITERATURE REVIEW

The role of data curation is still an emerging topic within the library science, archival, and information sciences disciplines. Just a few years ago, very few academic libraries were successfully engaging in any kind of data curation services, according to a study by Tenopir, Birch, and Allard (2012) on research data services in academic libraries. More recently, Kouper, Fear, Ishida, Kollen, and Williams (2017) provided an empirical analysis of research data services at North American research libraries, finding that data curation services were available in less than 15% of institutions surveyed and were typically viewed as an "advanced" library service.

While studies of researcher attitudes toward data curation and management are not new, many focus on high-level curation services and data management needs (McLure, Level, Cranston, Oehlerts, & Culbertson 2014; Parham, Bodnar, & Fuchs, 2012) or data sharing (Tenopir et al., 2011), without going into great detail on specific treatments and activities for curating digital assets. Many of these surveys use existing tools and frameworks for assessing faculty needs, such as the Data Curation Profiles (Witt, Carlson, Brandt, & Cragin, 2009) or the Data Asset Framework (Jones, Ball, & Ekmekcioglu, 2008). While useful tools for assessing needs for institutional research data services, they lack a mechanism to collect feedback on researchers' current practices for these treatments and assessment of their satisfaction for these treatments. A scoping review of 310 articles by Perrier et al. (2017) found that most research data management studies performed by academic institutions do not include direct interaction with data producers but instead rely on indirect methods such as self-reporting surveys and case studies by a third-party observer. Jahnke, Asher, and Keralis's 2012 CLIR study, however, does approach researcher attitudes directly via their method of ethnographic interviews with social sciences researchers at five institutions. Bardyn, Resnick, and Camina (2012) also provide a useful methodology from

| Institution | Cornell | Wash U | Illinois | Penn State | Minnesota | Michigan | Total |
Date of Session	2016-10-11	2016-10-25	2016-10-27	2016-11-04	2016-11-14	2016-11-18	All 6 Sessions
Sciences & Engineering	9	6	10	5	11	12	53
Social Sciences	6	1	2	1	1	4	15
Humanities	0	1	1	1	0	2	5
Library and Information Science Faculty	0	0	5	0	0	0	5
Service Providers*	5	3	0	4	1	0	11
Total	20	11	18	11	13	18	91

*Table 1. Disciplinary/professional distribution of participants at the six focus group sessions *Service providers, such as IT staff and library staff, were grouped into this category.*

Rate how important this activity is to you. *(Write a number 1-5 with 5 = highest importance, 1 = not important)*			
Round 1	Round 2	Round 3	Round 4

Figure 1. The front and back of an example card used in the importance-rating activity

their focus groups with translational sciences researchers. Although our methods differ, these studies provide a number of comparable insights to this study, such as researchers' low satisfaction level with their data curation knowhow and the lack of ability to perform curation actions on their data due to lack of time and a burdensome workload.

The lack of shared definitions for data curation terms has been an important area of discussion, recently prompting an Research Data Alliance (RDA) Working Group to task itself with establishing "a reference data terminology that can be used across communities and stakeholders to better synchronize conceptualization" (RDA, 2016). To pursue our question on which data curation activities are most important to researchers, the authors consulted several sources to obtain term definitions and rework them for our study participants, including the CASRAI Dictionary, the Research Data Alliance (RDA) Terms Definition Tool, the Digital Curation Center (DCC) Glossary, the ICPSR Glossary of Social Science Terms, the Research Data Canada Glossary, the Digital Preservation Coalition Glossary, and the Society of American Archivists Terms Glossary. Along a parallel path, much can be learned from reviewing "competences" for both data curators and researchers working with data. For example, research by Madrid (2013) surveyed multiple panels of experts, using the Delphi Method, to develop consensus around competencies for digital curators. The results of this research identified twenty high-level competencies for digital curators, including "plans, implements, and monitors digital curation projects"; "selects and appraises digital documents for long term preservation"; and "verifies the provenance of the data to be preserved and ensures that it is properly documented." Librarians who work specifically with data have been found to need similar skills by Schmidt and Shearer (2016). And twelve researcher-focused competencies were explored in detail in the Data Information Literacy project (Carlson, Fosmire, Miller, & Nelson, 2011; Carlson & Johnston, 2015), which focused on the educational needs of graduate students across a variety of science disciplines.

To better define the activities involved with data curation, work by the DigCCurr program (Lee, 2009) provides a useful matrix of curation themes and ideas but does not supply them with sufficiently detailed definitions. Follow-up work by Bowden, Lee, and Tibbo (2011) focused on the curator views of DigCCurr activities in the Closing the Digital Curation Gap project (http://digitalcurationexchange.org/cdcg). Their focus groups provided a good template for the present study. To ensure the inclusion of activities important to the digital repository community, the TRAC assessment tool by the Center for Research Libraries (CRL) and the Online Computer Library Center (OCLC) (2007) was consulted, but the language is jargon laden and lacks a researcher assessment of needs. Finally, the Digital Curation Center's data lifecycle model (Higgins, 2008) and the Data Curation Handbook Steps (Johnston, 2017) paved the way for defining the Data Curation Activities used in our study.

METHODS

Between October 21, 2016, and November 18, 2016, the authors engaged with researchers, librarians, and research support staff across six focus group sessions, termed "Data Curation Roundtables," held at the following academic institutions: Cornell University, Penn State University, the University of Illinois at Urbana-Champaign, the University of Michigan, the University of Minnesota, and Washington University in St. Louis. The 91 participants represented a diverse mix of experience levels (e.g., faculty, graduate student, postdoc) and a variety of disciplines (see Table 1, hereafter "participants"). Each session lasted one and a half hours, with lunch provided for free in exchange for attendees' participation. Notably, participants were either recruited through direct invitation or attended the open session due to self-interest; in both cases, selection bias impacted the representation of the sample.

These sessions sought to engage directly with both the communities that produced data and those that are likely to make use of data sets authored by others, to better understand the value of data curation. The

U. of Minnesota Research Data Curation Activities Worksheet

Please indicate the data curation activities that you or a third party (e.g., a campus service, or an external service) perform for your data and your level of satisfaction with the results. N/A = Not Applicable

Risk Management: The process of reviewing data for known risks such as confidentiality issues inherent to human subjects data, sensitive information (e.g., sexual histories, credit card information) or data regulated by law (e.g. HIPAA, FERPA) and taking actions to reject or facilitate remediation (e.g., de-identification services) when necessary.

Does this happen for your data?	Yes	No	I Don't Know	N/A
If Yes, are you satisfied with the results?	Yes	No	Somewhat	

Comments:

File Inventory or Manifest: Data files are inspected and the number, file types (extensions), and file sizes of the data are understood and documented. Any missing, duplicate, or corrupt (e.g., unable to open) files are discovered.

Does this happen for your data?	Yes	No	I Don't Know	N/A

Figure 2. Worksheet instrument used to gauge researcher satisfaction with data curation activities

goals of the focus group sessions were to answer these questions:

1. What data curation activities do researchers see as important or having value to themselves or to their communities of practice?
2. How, to what extent, and why do researchers engage in data curation activities themselves as a normative part of their research workflows?
3. What level of satisfaction do researchers have with their current data curation treatments? Or, what are the barriers preventing researchers from data curation (time, personnel, knowledge, money, equipment, other resources)?

By developing an understanding of what curation activities researchers value, the library community will be better positioned to develop and deliver services that are in-line with real-world needs and expectations.

DEFINITIONS OF DATA CURATION ACTIVITIES

In preparation for the sessions, the authors identified and defined 47 data curation activities relevant to data curation services and best practices (**see Appendix**). In addition, at the start of each focus group session, several key definitions were presented to all participants to set the foundation for the event:

- Data Curation: the encompassing work and actions taken by curators of a data repository in order to provide meaningful and enduring access to data
- Data Repository: a digital archive that provides services for the storage and retrieval of digital content
- Data : Facts, measurements, recordings, records, or observations about the world collected by scientists and others, with a minimum of contextual interpretation. Data may be any format or medium (e.g., numbers, symbols, text, images, films, video, sound recordings, drawings, designs or other graphical representations, procedural manuals, forms, data processing algorithms, or statistical records).

Each focus group session was broken into three parts corresponding to each of our questions. First, a card-swapping and rating exercise captured the participants' opinion of the importance of data curation activities for their data. Second, a paper-based survey instrument collected their levels of engagement and satisfaction with those same data curation activities.

Rank	Data Curation Activity	C	WU	IL	P	MN	MI	Count of Ratings	Average Rating	Rating Range*
Rating = 5 Highest Level of Importance "Most Important"									
1	Documentation	X	X	X	X	X	X	6	4.6	4.9 – 3.5
2	Chain of Custody		X					1	4.5	n/a
3	Secure Storage	X	X		X		X	4	4.4	5.0 – 3.9
4	Quality Assurance	X	X	X	X	X		5	4.3	4.6 - 3.9
5	Persistent Identifier	X	X	X	X	X	X	6	4.3	4.8 – 4.0
6	Discovery Services				X			1	4.3	n/a
7	Curation Log				X			1	4.1	n/a
8	Technology Monitoring Refresh			X				1	4.1	n/a
9	Software Registry		X				X	2	4.1	4.3–3.9
10	Data Visualization		X			X		2	4.0	4.0–4.0
11	File Audit	X		X	X	X	X	3	4.0	4.3–3.5
12	Metadata	X		X	X	X	X	5	4.0	4.9–3.9
Rating = 4 out of 5 Level of Importance "Very Important"									
13	Versioning	X	X	X	X	X	X	6	3.9	4.8–3.4
14	Contextualize	X	X	X	X	X	X	6	3.9	4.6–3.3
15	Code review	X	X	X	X	X	X	6	3.9	4.5–2.9
16	File Format Transformations	X	X	X	X	X		5	3.8	4.5–3.3
17	Interoperability				X	X		2	3.8	4.9–3.3
18	Data Cleaning		X		X			2	3.8	4.0–3.5
19	Embargo	X	X	X	X	X	X	6	3.7	4.1–3.3
20	Rights Management	X			X	X	X	4	3.7	4.3–3.0
21	Risk Management	X		X	X	X	X	5	3.6	3.9–3.0
22	Use Analytics	X	X	X	X	X	X	6	3.6	4.1–3.0
23	Peer Review		X	X		X		3	3.5	4.8–2.6
24	Terms of Use	X		X	X	X		4	3.5	3.6–3.4
25	Data Citation	X		X	X		X	4	3.5	4.1–2.8
26	File Validation	X		X	X		X	4	3.4	4.0–3.0
27	Migration		X				X	2	3.4	3.9–2.8
28	File Inventory or Manifest	X		X	X	X		4	3.2	3.5–2.8
29	Metadata Brokerage	X		X	X	X	X	5	3.2	4.0–2.6
30	Deidentification	X		X	X	X		4	3.1	4.3–2.1
31	Repository Certification		X					1	3.0	n/a
Rating = 3 out of 5 Level of Importance "Important"									
32	Emulation		X	X				2	2.9	3.1–2.6
33	Restricted Access	X		X				2	2.6	2.9–2.4
34	Correspondence						X	1	2.5	n/a
35	Full-Text Indexing				X			1	2.5	n/a
Rating = 2 out of 5 Level of Importance "Less Important"									
Rating = 1 out of 5 Level of Importance "Not Important"									

Table 2. The 35 data curation activities as rated by 91 participants across six focus group sessions (C=Cornell University, P=Penn State University, IL = University of Illinois, WU = Washington University in St. Louis, MI = University of Michigan, MN = University of Minnesota).
* Range represents the highest and lowest average rating given per institution.

Third, the authors engaged participants in a facilitated focus group discussion about the challenges of applying the top-five most highly rated data curation activities from the first exercise in their individual workflows. To aid consistency of our methods, one author [name removed] was present for all six sessions. The methodology for each part is described in more detail below.

PART 1: RATING THE IMPORTANCE OF DATA CURATION ACTIVITIES

To address the first question, the authors first asked participants to rate the importance of a selection of 18–20 data curation activities. Not all the activities were selected for the rating exercise, as it was up to the local facilitator to select the subset of activities to focus on depending on their local service offerings and interest. To keep the exercise engaging, the activities were printed individually on a 5x8 card with the definition of the activity on the front and a score sheet on the back (see **Figure 1** and supplementary file). Each participant was given two to four cards at a time, and then was instructed to read each definition and rate that activity's importance from 1 (lowest) to 5 (highest). Once each card in their hand was rated, the participants were asked to exchange their cards with another participant in the room and repeat for a total of four rounds each. Since there were two or three copies of the same card circulating around the room, participants were advised to trade with those who had cards they had not rated previously. A quick total of all four rounds yielded a priority list of data curation activities that were used as the focus of the group discussion throughout the session.

Data Curation Activity	Rating	"Yes, this happens"	Yes	No	Somewhat	N/A
			"Does this activity happen for your data?" → If Yes, Are You Satisfied? (percent of total)			
Documentation	4.6	80.2%	26.4%	9.9%	46.2%	17.6%
Secure Storage	4.4	75.0%	38.3%	3.3%	18.3%	40.0%
Chain of Custody	4.5	63.6%	27.3%	0.0%	36.4%	36.4%
Metadata	4.0	62.5%	28.8%	7.5%	31.3%	32.5%
Data Visualization	4.0	58.3%	12.5%	4.2%	33.3%	50.0%
Quality Assurance	4.3	51.6%	14.3%	4.4%	27.5%	53.8%
Software Registry	4.1	41.4%	13.8%	10.3%	20.7%	55.2%
Persistent Identifier	4.3	37.4%	18.7%	11.0%	33.0%	37.4%
Technology Monitoring & Refresh	4.1	33.3%	0.0%	5.6%	33.3%	61.1%
Discovery Services	4.3	18.2%	0.0%	9.1%	18.2%	72.7%
File Audit	4.0	16.3%	2.0%	14.3%	14.3%	69.4%

Table 3. "Very important" data curation activities with recorded levels of engagement and satisfaction by 91 participants
* The data curation activity "Curation Log" was also highly rated at 4.1 out of 5, but it was unintentionally missing on the worksheet and therefore engagement and level of satisfaction results are not available.

PART 2: CAPTURING RESEARCHER ENGAGEMENT AND SATISFACTION WITH DATA CURATION ACTIVITIES

To address the second question, a worksheet (see **Figure 2** and supplemental file) with 18–20 of the same data curation activities captured participant responses to the questions "Does this happen for your data?" and "If Yes, are you satisfied with the results?" along with space for comments. Of the 47 data curation activities, 32 were assessed using the worksheet exercise, with the selection and order varied at each institution according to the preference of the local author (e.g., service offerings already provided by that institution).

To better understand how data curation activities were happening, researchers were asked to provide comments describing how and by whom (themselves or a third party) a particular activity occurred or to explain why they were or were not satisfied with the results.

PART 3: BARRIERS AND CHALLENGES TO RESEARCHER ENGAGEMENT IN DATA CURATION ACTIVITIES

Finally, to answer our third question, the sessions allowed ample time to discuss the most highly rated data curation activities in greater detail. Breaking out into small groups of four to six, the researchers described their current practices for engaging with the toprated data curation activities (resulting from Part 1), the challenges and barriers to this work, and the means by which these services were generally obtained. The notes were captured by the authors in attendance or by support from library staff members at that institution. The discussion sessions were designed to test several of our key assumptions as leads/ directors of library-based data curation services:

- The value of data curation is not easy to measure and/or may be unknown,
- There exists a complex and evolving ecosystem of differing expectations with respect to research data such as func-
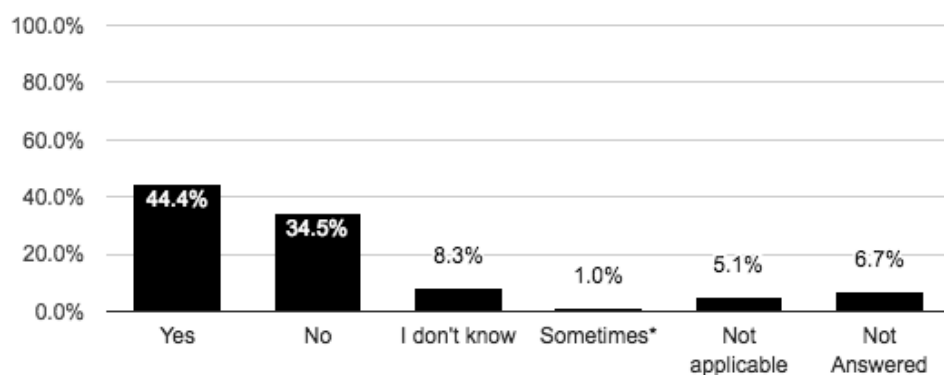
tional vs. domain curation and researcher needs vs. funder needs, and
- It can be better or easier to just do it yourself when it comes to data curation.

RESULTS

The six sessions generated results for each of our three questions: First, what data curation activities do researchers see as important or having value, either to themselves or to their communities of practice? Second, how, to what extent, and why do researchers engage in data curation activities as a normative part of their research workflows? Third, what level of satisfaction do researchers have with their current data curation treatments, or what are the barriers preventing researchers from pursuing them (time, personnel, knowledge, money, equipment, other resources)?

PART 1 RESULTS: RATING THE IMPORTANCE OF DATA CURATION ACTIVITIES

The card-rating exercise revealed the most important data curation activities for participants overall and by institution. Of the 35 activities, 31 rated received at least an average 3 out of 5 rating for importance. Table 2 displays how activities were rated in descending order of average importance and the frequency with which each activity was rated (NB: a higher count is proportional with our confidence in the rating with a minimal threshold of two groups for calculating the rating range).

PART 2 RESULTS: ENGAGEMENT AND SATISFACTION WITH DATA CURATION ACTIVITIES

The worksheet exercise revealed the activities in which researchers currently engaged, what techniques they used, and their levels of satisfaction with the results. Out of the 91 participants, 4 failed to turn in their worksheets (due to leaving early, etc.), and the missing worksheets were coded as "did not answer." Additionally, the response "Sometimes" was introduced as a coded answer applied only when a participant circled both yes and no. In total, 32 of the data curation activities were analyzed by participants in this exercise and 44% "Yes" responses to "Does this [data curation activity] happen for your data?" indicated that many data curation activities were happening for participants in a variety of ways (see **Figure 3**: documentation (80%), secure storage (75%), chain of custody (64%), metadata (63%), file inventory or

Figure 3. Overall breakdown of 91 participant responses to "Does this [data curation activity] happen for your data?" (Total =100%)

manifest (58%), data visualization (58%), versioning (56%), file format transformations (55%), and quality assurance (52%) marked as "Yes, happening").

However, overall satisfaction with data curation activities was low, with only 18% responding positively to our question regarding satisfaction with the results of those activities (see **Figure 4**). More often participants who received data curation activities for their data were either not satisfied or only somewhat satisfied. No activity was occurring in a satisfactory way for a majority of participants. Secure storage came the closest at 39% satisfied, while efforts to create metadata and perform file format transformations satisfied 29% of our sample.

Looking closer at the top-12 highly rated activities reveals key areas of opportunity for libraries, as many important data curation activities are not happening in a satisfactory way. **Table 3** shows the worksheet responses for 11 of the 12 data curation activities that averaged a score of 4 or higher on a 5-point scale in Part 1, and these findings are explored in our discussion (the responses to all 35 activities are appended as a supplemental file).

Comments provided by participants in the worksheet provided additional detail as to how researchers were applying data curation activities and their difficulties in obtaining such services. Time was a factor for many researchers, with one citing, "Much more to do with limited staff. Running into trade off of documentation vs. work." For activities such as documentation and metadata, comments expressed a desire for more standards and templates: "[Documentation] always seems like a chore to do this and effort (time) being spent to get students, collaborators, and myself to do this. Consistent format and guide to assemble this would help." A few comments echoed the lack of standards and cited more ad hoc practice: "I don't use technical metadata, but instead use the file[name] title to keep track of this." Overall, comments expressed more instances of frustration than exemplars and demonstrated a desire for greater support in many data curation activities. Part 3 Results: Barriers and Challenges to Researcher Engagement in Data Curation Activities

Third, our focus group discussions gave us insights into the barriers and challenges faced by researchers engaged in data curation activities. In each session we focused on five of the top-rated data curation activi-
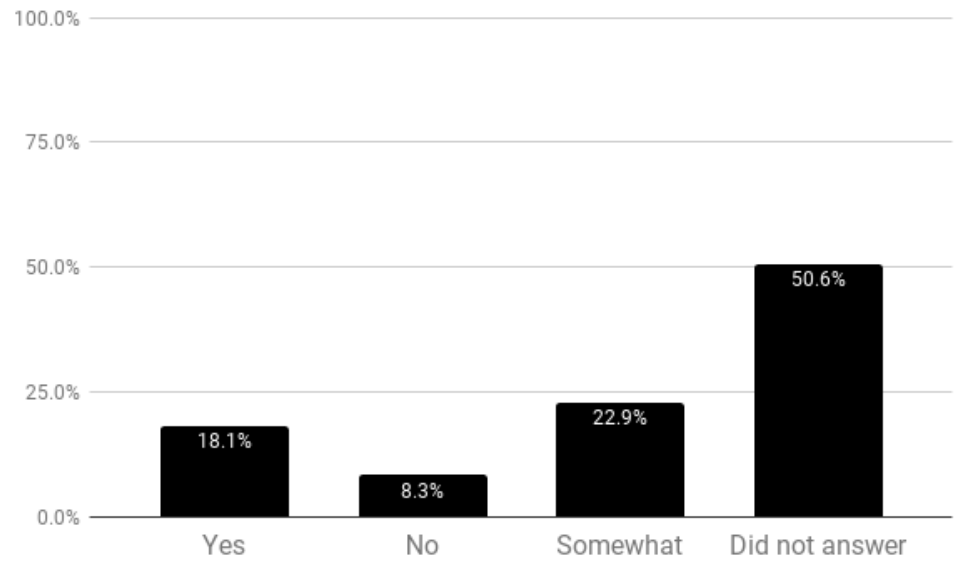

Figure 4. Overall breakdown of 91 researcher responses to "If yes [this data curation activity happens for your data], are you satisfied with the results?" (Total=100%)

ties for that session. Two of the focus groups session discussions are profiled here and complement the results from Parts 1 and 2 by providing more granularity to the importance of data curation activities.

CASE STUDY: UNIVERSITY OF ILLINOIS FOCUS GROUP DISCUSSION

Conversation in the room was free-flowing. Participants seemed to somewhat self-assemble at tables where they knew people, so we had a table with the bulk of the health sciences attendees, another with participants from a natural history background, and another with most of the engineering attendees. However, people from other areas were mixed in throughout. At the health sciences table, one thread of the discussion revolved around being surprised at the low rating that others had given to "de-identification." Given the importance of human subjects to health sciences research,

one of the participants was mortified that someone at another table rated it as "3," and two others at the table also expressed bafflement. One attendee shared that they were asked to share raw MRI data with collaborators at [another institution], and they were concerned about the possibility of facial reconstruction and subsequent ability to identify the research subjects. A proposed solution was to make those accessing the data at [the other institution] sign an agreement saying they promised not to attempt identification, but the researcher expressed dissatisfaction that such a solution relied on conscientious behavior and believed the resolution left much room for failure. This sharing concern led into another thread at the table about publication of data prior to completing all the analyses and publications. The respective fields of the focus group participants are highly competitive, and there was concern expressed about be-

"Very Important" Average Rating of 4.0–4.9	"Important" Average Rating of 3.0–3.9	"Less Important" Average Rating of 2.0–2.9	"Not Important" Average Rating of 1.0–1.9
documentation, chain of custody, secure storage, quality assurance persistent identifier, discovery services, curation log, technology monitoring and refresh, software registry, data visualization, file audit, metadata	versioning, contextualize, code review, file format transformations, interoperability, data cleaning, embargo, rights management, risk management, use analytics, peer-review, terms of use, data citation, file validation, migration, file inventory or manifest, metadata brokerage, deidentification, repository certification	emulation, restricted access, correspondence, full-text indexing	

Figure 5. Average rating of importance for 35 data curation activities

Satisfaction for Data Curation Activities Already Happening for Researchers' Data (n=91)
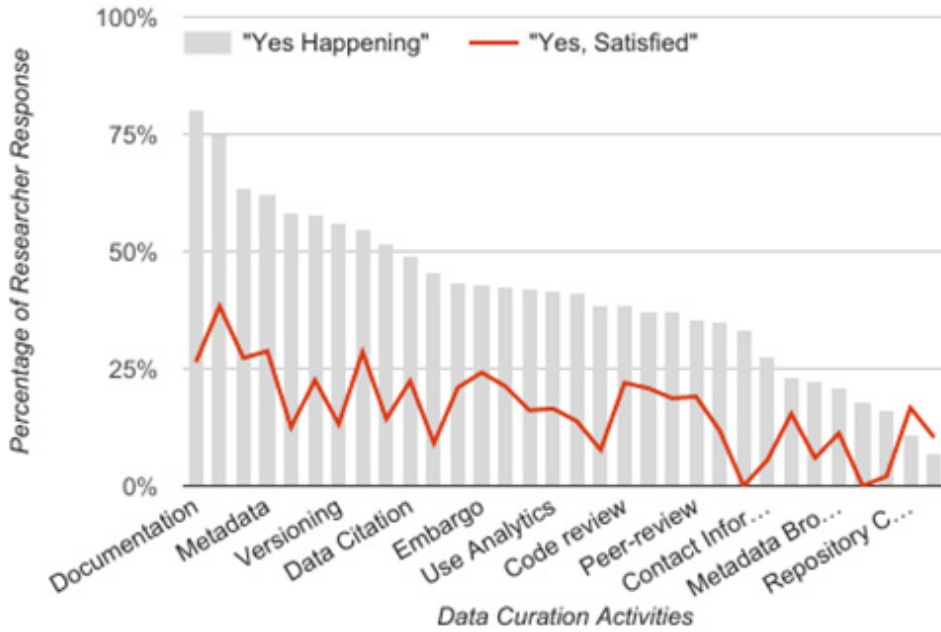

Figure 6. Visualization of worksheet responses indicating levels of satisfaction with data curation activities that were happening for participants' data

ing scooped and losing out on publications. One participant expressed feelings that producing fewer publications would not only decrease future grant competitiveness for the faculty and unit, but also impact their ability to recruit talented graduate students and postdocs who relied on publication output to demonstrate their productivity, skills, and creativity. Others concurred.

When the conversation was focused on what data curators could contribute, participants were happy to offload as much as possible (e.g., PIDs were seen as important to data that is published and not something that the researchers themselves were interested in figuring out themselves). Another table expressed a similar sentiment, further indicating that trust was currently not an issue with external services and believed that others could be counted on to do a good job. In regards to the disclosure of sensitive data, one participant at the health sciences table was interested in having an "authority" on campus to turn to for situations such as the MRI example.

CASE STUDY: UNIVERSITY OF MICHIGAN FOCUS GROUP DISCUSSION[3]
The discussion varied across the tables, but several themes emerged. One theme was the balance between a desire to improve data management and curation practices with the amount of time and effort it would take to do so. For example, documentation

was another important activity that nearly everyone engaged in, but fewer attendees indicated they were satisfied with the results. Good documentation was seen as a crucial element in the immediate use of the data and the potential reuse of the data by others. However, attendees noted a wide variation in the quality of documentation produced. Standardization would make it easier for others within and outside of the lab to read and understand, but attendees also recognized the need for flexibility with documentation to accommodate project and individual needs. The amount of consideration needed to develop standardized policy and practices for data with accommodations for deviations is daunting for researchers, especially if they do not feel confident in their knowledge of data management and curation issues.

Another theme that emerged from this event was an acknowledgment that more investment in curating data is needed. For instance, attendees who engage in or support developing software or scripts to use with the data mentioned that the process for maintaining software may be haphazard. A lack of protocols, formal processes, or tools for software and scripting data make quality assurance a challenge.

Finally, data curation is a new or emerging area for attendees and for their research communities. Many of them have not yet had to address curation activi-

ties such as file validation or file format transformations, though these are seen as important for future consideration. Attendees indicated that they or their research team were at different stages of managing, sharing, or curating their data, which accounted for some variation when assigning importance to activities. Use analytics, for example, had particularly wide variance: attendees who were actively sharing data gave it a high-importance rating, and attendees who were not yet sharing data rated it lower. Generally, curation activities that would directly benefit the researchers, such as persistent identifiers and contextualization to link the data and research outputs, were of particular interest in our group discussions, even if they were not given a high rating of importance.

DISCUSSION
Our focus groups on researcher attitudes toward data curation activities answered our three questions. We identified which data curation activities participants in our sample saw as important or having value to themselves or to their communities of practice. In this way, developing an understanding of which curation activities researchers value will help providers develop and deliver services that are more in line with real-world needs and expectations. Next we determined how, to what extent, and why our participants engaged in data curation activities themselves as a normative part of their research workflows. Finally, we identified gaps in highly valued data curation activities in which the sampled participants did not engage for their data (or engage as completely as they would like to) and some of the barriers preventing them from doing so.

STUDY LIMITATIONS
Although well-suited to our purposes of examining the particular needs of researchers across the partner institutions designing a shared data curation service as part of the Data Curation Network project, our study presents some limitations for understanding researcher attitudes regarding data curation activities more generally. For example, the local facilitator chose which activities to include in the rating activity either in accordance with perceived local interest or in order to eliminate activities that might be difficult to offer across institutions. Therefore, as mentioned in footnote 1, twelve activities defined by the DCN were not
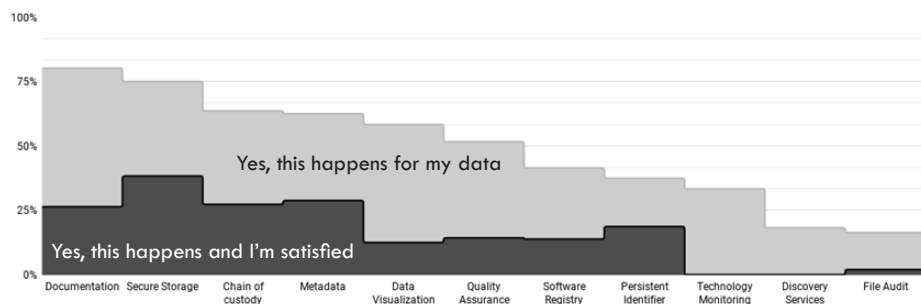
Data Curation Activity	Documentation	Secure Storage	Chain of custody	Metadata	Data Visualization	Quality Assurance	Software Registry	Persistent Identifier	Technology Monitoring	Discovery Services	File Audit
Importance Rating (1-5)	4.6	4.4	4.5	4	4	4.3	4.1	4.3	4.1	4.3	4
Yes, this happens	80%	75%	64%	63%	58%	52%	41%	37%	33%	18%	16%
Yes	26%	38%	27%	29%	13%	14%	14%	19%	0%	0%	2%

Figure 7. Percent of Satisfaction for the Data Curation Activities rated Very Important where light grey represents "Yes this happens" and dark grey represents "Yes, this happens and I'm Satisfied" on a 100% scale

rated at any of the researcher engagement sessions. Furthermore, only 4 activities out of 34 rated below a 3 on a 5-point scale for importance (see Figure 5). These were emulation, restricted access, correspondence or contact information, and full-text indexing. However, since our sample was composed of self-selected and invited attendees with interest or experience in data curation to our session titled "Data Curation Roundtable," the results may be more positive toward data curation topics in general, and we do not propose that these findings of importance are typical for all researchers.

LEVELS OF IMPORTANCE AND SATISFACTION
Based on the results of the Part 2 worksheet exercise, our analysis found that no single data curation activity was happening in ways that satisfied the majority of our participants (see **Figure 6**). The activity that came closest was secure storage, which was occurring for 75% of our sample yet satisfied only 38%. Notably, two activities were found to satisfy a greater percentage of researchers than was reported for their data, repository certification and migration, possibly indicating that participants were satisfied with these activities not happen-

ing (see **Figure 6**).

Our study found gaps in support for data curation activities that are very important (average rating of at least 4 out of 5 in importance) but that are either not happening or not happening in a satisfactory way for a majority of our researchers (Figure 7). These may be areas of opportunity for libraries to invest in new services and/or heavily promote services that may already exist but are not reaching the researchers who value them:
- minting and managing persistent identifiers (37% said happens),
- providing research data discovery services (18% said happens),
- monitoring and refreshing the technology housing data (33% said happens),
- maintaining a software registry (41% said happens), and
- providing tools and support for auditing file integrity (16% said happens).

Similarly, several highly rated data curation activities were happening for a majority of our researchers, but researchers were not overwhelmingly satisfied with the results. Therefore, libraries might provide better tools and/or best practices to increase the effectiveness of these data curation activities for

the researchers who engage in them:
- creating adequate documentation (only 26% satisfied),
- tracking the provenance and chain of custody for data (only 27% satisfied),
- providing secure storage (only 38% satisfied),
- performing quality assurance for data (only 14% satisfied),
- visualizing data (only 12.5% satisfied), and
- creating and or applying metadata (only 29% satisfied).

CONCLUSION
The results of our focus groups with researchers provided a number of key findings that were used to build evidence for the specific activities a collaboratively staffed Data Curation Network might focus on in the future. But we also learned several things that could inform the development of better academic library data curation services more generally. Our focus groups revealed that while researchers were actively engaged in a variety of data curation activities for their data, none of these activities were happening in a satisfactory way for the majority of our group. Second, discussions with researchers revealed the various ways in which researchers engaged in some data curation activities as well as their barriers for not doing so for others, including time constraints and the lack of clear standards. We suggest, therefore, that research libraries stand to benefit their users by emphasizing, investing in, and/or heavily promoting the highly valued services that may not be happening for many researchers, namely minting and managing persistent identifiers, maintaining a software registry, providing tools and support for auditing file integrity, creating and managing metadata that places data within a context of related publication sources, and providing code-review services. Similarly, libraries might support better tools and/or best practices to increase the levels of satisfaction for these commonly occurring data curation activities that are falling short of expectations, including maintaining up-to-date data documentation templates that could be used by a

» **Although well-suited to our purposes of examining the particular needs of researchers across the partner institutions designing a shared data curation service as part of the Data Curation Network project, our study presents some limitations for understanding researcher attitudes regarding data curation activities more generally.**

> **The results of our focus groups with researchers provided a number of key findings that were used to build evidence for the specific activities a collaboratively staffed Data Curation Network might focus on in the future.**

variety of researchers, providing best practices for secure storage, creating quality assurance checklists and review procedures for a variety of data formats and types, recommending best practices or tools for data visualization, promoting better adoption of metadata standards across disciplines, recommending tools and file-naming schemas for versioning data sets, and being more transparent about the conditions and procedures for file format transformations. ∎

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FOOTNOTES:

[1] Twelve activities defined by the DCN were not rated at any of the researcher engagement sessions: arrangement and description, authentication, ceasing data curation, conversion (analog), deposit agreement, file download, file renaming, indexing, restructuring, selection, succession planning, and transcoding.

[2] In addition to the 12 activities not chosen for the card-rating activity listed in footnote 1, the following three activities were not assessed with the worksheet exercise: curation log, emulation, and interoperability.

[3] Excerpt from full case study report published online by Carlson (2017).

Public Libraries and School Libraries: Partnerships to Support Truth in History

BY KAYE DOTSON, ELAINE YONTZ, AND
PLUMMER ALSTON JONES, JR.

The oft-repeated admonition that those who don't know history are doomed to repeat it, has never had more meaning than in these current times.[1] It has become increasingly clear that students need a solid foundation in history based on truth and clear, documented facts, unfettered by stereotypes or bias. This concept may be best supported by exposing students to collections of diverse resources and historical documents, as may be found in a combination of both public and school libraries. Using both types of library resources will more fully support efforts to develop students' information skills, research and information gathering. For North Carolina students, the development of this foundation can be supported by the efforts of both school librarians and public librarians in sharing resources to accurate information.

In the public school system, teachers specifically address the teaching of North Carolina history in grade levels 4th and 8th, although teachers in other grade levels also contribute to this topic as it relates to their instructional content and needs. According to educator guides from the North Carolina Department of Public Instruction, the goal is to teach North Carolina history thematically, with chapters covering geography, people, and changes over time in the state's society, politics, culture, technology, demographics, and economics.[2] How can public libraries and public schools work together to accomplish and enhance this goal? The answer rests with the skills and knowledge of both professional school librarians and public librarians. The specific expertise of each of these professional librarian groups can support the students, making students' study and exploration richer and more meaningful.

PROFESSIONAL SKILLS OF LIBRARIANS: SCHOOL AND PUBLIC

The school librarian knows what is required in each grade level and subject area, and is prepared to collaborate with teachers, sharing strategies, resources, and emerging technologies. These key partners identify and provide support for diverse student information needs and model multiple strategies for students and other teachers to use for locating, evaluating, and ethically using information for specific purposes. They engage students in authentic learning, making use of digital tools and resources. Many students, however, need in-depth instruction on how to evaluate the contents and validity of certain digital tools and websites.[3] Therefore, a critical component at this juncture of the teaching and learning process involves skills leading to the evaluation of the resources and technologies that are to be made available. School librarians must concentrate on helping students distinguish between fact and opinion, and determine the authority of sources.

The teaching of ethical research practices and accurate documentation is of primary concern at this point in the education of students.[4] It is essential that school librarians play a strong role in the teaching of practices to determine not only the reliability of resources, but also the ethical use of those resources. As early as primary school, students must begin to evaluate the immense amount of information that is available today. B. J. Hamilton, in 2009, stated correctly that "We are at a critical moment in our profession, and we need to seize this moment to collaborate with our learning communities as leaders in interpreting and teaching information literacy."[5] The time to address these needs is early in the primary years. Both school and public librarians are able to design and support

Table 1 Initiatives that support partnerships between public and school libraries

Name of Resource	URL	Maintained by	Description	Especially Notice
NCPedia Educator Resources	https://www.ncpedia. org/educator-resources	North Carolina Government & Heritage Library at the State Library of North Carolina	Page especially for K-12 teachers, based on North Carolina's online encyclopedia	Links to NC Curriculum, Lesson Plans, and Fun Activities
DigitalNC: North Carolina's Digital Heritage	https://www.digitalnc.org/	North Carolina Digital Heritage Center, part of the North Carolina Collection at UNC Chapel Hill.	A gathering place for materials contributed by cultural heritage institutions statewide	Links to Yearbooks, Newspapers, Images, and AV on the top page.
Education at the State Archives	http://archives.ncdcr. gov/Educators	State Archives of North Carolina	Materials especially appropriate for K-12 teaching and learning	Information for Educators link, http://archives.ncdcr. gov/Educators/Information-For-Educators, and Resources and Tools link, http://archives.ncdcr. gov/ Educators/Resources-andTools-for-Education, for teaching suggestions and lesson plans.
North Carolina Digital Collections	http://digital.ncdcr.gov/	State Library of North Carolina & State Archives of North Carolina	Over 90,000 historic and recent photographs, state government publications, manuscripts, and other resources.	Links to Civil War, Time Periods, and Places on top page.

inquiry-based information literacy mentoring to help students inquire, think critically, and gain and create knowledge that is true and reliable.

For public librarians, the knowledge of concepts, principles, and techniques of reference and user services supporting access to relevant and accurate recorded knowledge and information to individuals of all ages and groups are integral parts of their skill set. They have practice in techniques for retrieving, evaluating, and synthesizing information from diverse sources for equally diverse users. Their knowledge related to the teaching and learning of concepts, processes and skills used in seeking, evaluating, and using recorded knowledge and information clearly supports collaborative partnerships with classroom teachers.[6]

Access to information can be further expanded when students use the public library in addition to their school library. The public library often is able to purchase materials that would not be supported in the school setting due to the specific nature of the resource or for other reasons, and yet these resources can greatly enhance the historical inquiry of those students. The reference materials and user services available in public libraries can provide access to relevant and accurate recorded knowledge and specialized information to which these students may not otherwise have access.

Former President Obama's ConnectED Initiative to broaden the impact of librar-

ies in building powerful partnerships to improve education outcomes, has increased attention and resources for this effort.[7] Together the school librarian and public librarian can provide students with a tantalizing mix of increased resources, support, and technology for inquiry-based learning.

CONNECT ED CHALLENGE
The ConnectED Library Challenge is part of an initiative for communities throughout the country to create or strengthen partnerships so that every child enrolled in school can receive a library card and have access to the books and learning resources of America's public libraries. The initiative, "designed to enrich K-12 education for every student in America," calls upon library directors to work with their mayors or county executives, school leaders, and school librarians. The project was developed with Institute for Museum & Library Services direction and support.[8]

SCHOOLS AND PUBLIC LIBRARIES SUPPORTING EACH OTHER: PROJECTS, PARTNERSHIPS, AND TOOLS
Before discussing current networking efforts between public and school libraries, it is important to remember prior efforts during the 1980s and 1990s that paved the way. During this productive period, North Carolina libraries, coordinated by the State Library of North Carolina and the North Carolina Department of Public Instruction, were encouraged to enter into regional coopera-

tives and partnerships in so-called Zones of Cooperation (ZOCs) initiatives throughout the state. These included, but were not limited to, the North Carolina Information Network (NCIN). North Carolina Wise Owl, the Wilson County Networking Project, the Neuse Regional Library's Electronic Network Project, and CLEVE-Net (Cleveland County).[9]

Donna Shannon's 1991 study supported the need for cooperation among school and public library systems. Shannon confirmed that school libraries were unable to meet all the information needs of their students. Shannon found that commitment and communication were two essentials in developing and sustaining cooperative relationships among school and public libraries. In order to take full advantage of resources and to optimally meet student needs, it is helpful to form interactive partnerships between school libraries and public libraries.[10]

Now there are a number of different initiatives, state- and nation-wide that support partnerships between public and school libraries for the benefit of students and teachers, expanding the resources that students may access. The table below includes some of the current resources available that will be of interest to North Carolina librarians, educators, and others. Further information about these and other initiatives will be shared later.

The initiatives and examples following can be replicated, or modified, to fit libraries across the state and country **(see Table 1)**.

ONE ACCESS

Charlotte Mecklenburg Public Library (CMPL) and Charlotte-Mecklenburg Schools have a long history of working together as educational partners. This relationship was formalized in 2014 with a memorandum of understanding between the two agencies that led to the creation of the position of Educational Partnerships Manager for the CMPL. In 2015, the ONE Access (One Number Equals Access) initiative launched, allowing CMS students to use their student ID numbers as a CMPL account number, thus giving them seamless access to a world of information. Since then, more than 190,000 CMS students have interacted with CMPL using their ONE Access accounts.

This partnership was intended to provide access via CMS Student Portal to curriculum-supported content with the Library's Digital Branch; greater use of social media to promote Library resources to students, teachers, and families; and increased engagement with parents to improve understanding and use of ONE Access resources for student success, especially online classes, tutoring, ESOL support, and more.[11]

WOW CARD INITIATIVE

Gaston County Public Library features a way to reach students with the WOW Card Initiative. This acronym for "Without Walls," is an initiative that gives every public school student in Gaston County a free digital library card to access the digital resources of the Library. WOW is enabling the access to valuable library resources for thousands of students to achieve educational success. An example showing how one school, Holbrook Middle, provided access to the WOW card can be found at the school website, https://www.gaston.k12.nc.us/holbrook.[12] This initiative extends the online resources of the public library to students who cannot travel to the headquarters or branches of the CMPL.

N.C. KIDS DIGITAL LIBRARY

The N.C. Kids Digital Library is a project led by the State Library of North Carolina and the N.C. Public Library Directors Association. Library users across North Carolina have free access to 16,000 e-books and other online materials for kids. This ready access provides students with materials even when schools are not in session.[13]

PILOT MOUNTAIN ELEMENTARY SCHOOL PROJECT

Pilot Mountain Elementary School featured an ALA-sponsored project led by award-winning librarian Amy Harpe, titled "Everybody Has a Story," to support students in recognizing people and overcoming stereotypes by comparing stories from different perspectives.[14]

"My hope is that students will look at people for their story and not their stereotype, think about their community in new ways, be good stewards of their culture and their history, and learn more about their town as well as the world," said Amy Harpe, the school's media specialist and the program's lead creator. This project won recognition from the American Library Association for teaching students about cultural and historic preservation both locally and globally.[15] The public library, with its History Rooms and Genealogy Resources, offers a unique set of data and documents to help students learn about their own areas and cultures.

Public library patron Jennifer Dickenson discovered that "patrons can use Ancestry.com to research their family trees. I even found a copy of my grandfather's draft card from World War II. They also have digital copies of area high school yearbooks available to view. I found my mother's high school senior yearbook! One patron let the center borrow some old negatives that had belonged to her mother. It was a fascinating glimpse into the life told in pictures and how they lived back in those years."[16]

These materials may not have been available through any other source if the public library had not collected them and made them accessible to the public. So often public libraries collect, preserve, and make available unique artifacts or documents that reflect the culture of the area served. These Special Collections house the life-time collections from key members of the community, including rare or one-of-a-kind documents to help students learn about the unique history of their area.

It is evident that school librarians need to educate students on the available resources that may be found in the public library to support projects like "Everybody Has a Story," and many other areas of interest. Librarian Amy Harpe shared an excerpt from local public librarian Anna Nichols regarding the project: "One of the indicators of the enormous success of this program has been that students come

into the public library with their parents seeking more exposure and information regarding the topics they've studied. We have answered questions, had stimulating conversational exchanges and provided copious materials on the topics of the arts, culture, language, and local persons of interest, food, town architecture, musicians, and a host of other topics that have piqued the minds of our third graders. It has been a delight to share photographs and writings from our local history room with youngsters and their families."[17]

LIMITLESS LIBRARIES

Nashville (TN) Public Library and Metro Nashville Public Schools have partnered to create the Limitless Libraries cooperative to improve school libraries, resource sharing, and student access to learning materials. These digital resources and databases support students with a range of materials and specialized materials.[18]

IMPLICATIONS FOR SCHOOL LIBRARIANS AND PUBLIC LIBRARIAN PARTNERSHIPS

In schools there is often a separation of grade levels, departments, and subject matter that prevents serious interaction. Conversely the school librarian is uniquely positioned to see all areas and has the necessary skills to lead in the teaching of digital literacies in all areas. These librarians also understand that engaging students in authentic and meaningful projects or research can support the understanding of digital literacies. It is important to identify the location of these resources and make efforts to put students in contact with them. Therefore, taking students to public libraries and using resources specifically aimed at areas of interest to the student will meet this need and provide students with opportunities to dig deeper and gain greater awareness of issues.

Since public libraries may provide a range of resources, print, or web based, for use that students in schools have not yet encountered, introduction to those resources is needed. Public librarians who are prepared to teach students and other stakeholders can share how to use those resources. Explicit instruction will result in optimum use of resources whether digital or print.

School librarians and public librarians find huge opportunities to co-design instructional units, drawing upon the skills and strengths of each other. This supports

the public libraries with stakeholder use and supports the school librarian with enhanced strengths, resources, and support. Integrating the public library resources with the school's needs through preparation, planning, and collaboration is a win-win for all. Those students, who will be adults, will learn more about the public library and what is available and will more likely grow up to be supporters of the public library. Librarians must take advantage of this and advocate for all.

The goal for both groups of librarians is to enhance students' ability to discover. Librarians will serve as facilitators for this discovery. Their role involves creating and managing meaningful learning experiences and stimulating students' thinking through the use of a wide range of resources.

When librarians encourage student use of both school libraries and public libraries we can expect to see:

- Improved access to resources unavailable in school libraries
- Increased equity in terms of student access to varied materials
- Improved academic success
- Increased student engagement and literacy
- Increased knowledge of resources to support life-long learning
- Learning is extended beyond the classroom with access to more resources

All of these points mentioned above are reasonable to expect, but the second point regarding increased access may be one of the most significant for socioeconomically disadvantaged and at-risk students. Public libraries are often described with the phrase "the great equalizer."[19] Having access to the broad variety of materials unlikely to be found in the school library will "level the playing field," increase equity, and provide public school students the same advantages for research and reading that other students may have.[20]

CONCLUSION

The partnerships between public librarians and school librarians, making optimum use of resources will serve to make education deeper, more meaningful, and will facilitate life-long learning. Understanding resources and how to use them will help students through all future educational opportunities and experiences and will support their lifelong learning.

With access to multiple resources,

students will be exposed to more North Carolina history, geography, politics, culture, technology, demographics, and economics. The expanded exploration by students will help them to discern truth and reality. The ability to think critically with an eye and ear to the facts will serve these students and the greater community well. There is no one better equipped to lead students in a deep and accurate study of North Carolina history than skilled professional librarians, school and public. Educators in schools, working collaboratively in partnership with public librarians is a "win-win" situation for all. ∎

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