

An Analysis of Academic Libraries' Participation in 21st Century Library Trends

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Article abstract

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Methods – The authors examined the websites of 100 Association of Research Libraries (ARL) member libraries, their branches, and 160 randomly selected academic libraries to determine whether they adopted selected 21st century library trends.

Results – Results indicated that ARL member libraries were significantly more likely to adopt these trends, quite possibly due to their larger size and larger budgets.

Conclusion – This research can assist librarians, library directors, and other stakeholders in making the case for the adoption or avoidance of particular 21st century library trends, especially where considerable outlay of funds is necessary.





Research Article

An Analysis of Academic Libraries' Participation in 21st Century Library Trends

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Abstract

Objective – As academic libraries evolve to meet the changing needs of students in the digital age, the emphasis has shifted from the physical book collection to a suite of services incorporating innovations in teaching, technology, and social media, among others. Based on trends identified by the Association of College and Research Libraries (ACRL) and other sources, the authors investigated the extent to which academic libraries have adopted 21st century library trends.

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Conclusion – This research can assist librarians, library directors, and other stakeholders in making the case for the adoption or avoidance of particular 21st century library trends, especially where considerable outlay of funds is necessary.

Introduction

As academic libraries evolve to meet the changing needs of students in the digital age, the emphasis has shifted from the physical book collection to a suite of services incorporating innovations in teaching, technology, and social media. These services tend to facilitate creativity, engagement, and the ability to access resources anywhere any time (Andrews et al., 2016). While there is much “crystal ball gazing,” little assessment of how academic libraries have come to implement 21st century trends has taken place (Garofalo, Johnston, & Lupold, 2015). Data collection efforts such as those conducted by organizations like the Integrated Postsecondary Education Data System (IPEDS) and the Association of Research Libraries (ARL) describe what libraries have done or what researchers and faculty want, but they do not operationalize what a 21st century library looks like. In this study, the authors first identified the most

commonly cited trends that comprise 21st century libraries, then evaluated the websites of over 300 academic libraries to determine the extent to which they adopted these trends. The 300+ sample included a mix of ARL member libraries, ARL branch libraries, and randomly selected non-ARL academic libraries. The authors also investigated which institutional factors, such as number of librarians on staff, budget, collection size, institution size, and institution status (private versus public), predicted the adoption of these trends.

A review of the literature indicated no single definition or description of a 21st century library. Garofalo et al. (2015) advocated focusing on “engagement” and striving to connect with patrons, whether it be through personalized librarians, shared spaces, or collaboration with other services like writing centers. Leong (2013) also supported community engagement and outreach as a 21st century library goal. One

particularly innovative way some libraries are engaging their patrons is by creating makerspaces, which encourage exploration and innovation by allowing people to create, build, and experiment with a variety of equipment, software programs, and tools (Harris & Cooper, 2015; Herron & Kaneshiro, 2017; Nichols, Melo, & Dewland, 2017).

In the book *Leading the 21st Century Academic Library*, edited by Bradford Lee Eden (2015), contributors described emerging positions that require technological skills capable of engaging in online learning, data management, digital collections such as institutional repositories, and other technologies to provide new services. Other topics include pursuing open education resources and ways to increase student engagement in library instruction.

Emerging staff positions, data management, digital scholarship, and open education resources are also mentioned in the Association of College and Research Libraries (ACRL)'s report "2016 Top Trends in Academic Libraries" (2017). The ACRL report further noted activities and services in the areas of research data services (RDS), information literacy and evidence of learning, collection assessment, altmetrics, and the use of social media. Tenopir et al. (2015) looked specifically at research data services (RDS) in relation to library demographics and found that they are more common in four-year and research universities than two-year institutions. As would be expected, Tenopir et al. note that research universities are more likely to employ RDS.

Sewell and Kingsley (2017) noted that academic librarianship is moving away from curation of material and into support for research with new staff skills needed in areas such as research data management and curation of open access resources. These shifts are confirmed by ACRL's trends toward data management services, digital scholarship/institutional repository support, and emerging staff positions with skills in scholarly and digital communications,

knowledge management, data management, digital humanities, and geographic information systems (ACRL, 2017). The American Library Association's (ALA) *The State of America's Libraries* report (Rosa, 2016) confirmed this further, noting that academic libraries are "embracing new responsibilities in such areas as scholarly communication, digital archives, data curation, digital humanities, visualization, and born-digital objects" (p. 3) as well as working in areas like altmetrics and research data management.

An important recent initiative in information literacy and evidence of learning is the Assessment in Action (AiA) program lead by ACRL. AiA challenged participating institutions to plan and implement projects "that aligned with institutional priorities and contributed to campus assessment activities" (Brown, 2017, p. 1). The three-year program produced several documents describing multiple ways in which libraries can positively impact student success. ACRL's report documents five areas where the library had a particularly positive impact on student learning and success, two of which concern information literacy instruction and one that concerns library partnerships with other campus units such as writing centers (Brown, 2017).

Innovative or non-traditional reference services are another area that could be considered a 21st century library trend. Increasingly, academic librarians are developing new and innovative ways to reach their patrons, whether finding students and faculty where they are (e.g., dorms and academic buildings outside the library) or through virtual services such as chat or LibAnswers (via Springshare). MacDonald and McCabe (2011) reported on a service called iRoaming in which librarians walk around the library with tablets to assist patrons at point of need. Other libraries have employed tablets mounted on robots which telechat to provide reference services remotely (Hartsell-Gundy, Johnson, & Kromer, 2015). Coleman, Mallon, and Lo (2016) investigated the impact of

innovative reference services at academic libraries and found that many libraries have developed alternate ways of reaching patrons including using a cooperative reference service, methods for making appointments with librarians, creation of an FAQ, and creation of a blog to enable patrons to see answers to questions already asked. Finally, Li (2013) discussed how distance education has caused reference services to adjust, offering various virtual reference services such as chat, videoconferencing, voice-over IP, co-browsing, instant messaging, use of a toll-free telephone number, and email.

While libraries are addressing the needs of the 21st century learner in many ways, a review of the literature reveals a consensus to include some of the following: digital scholarship (including institutional repositories), data management services, makerspaces, evidence of learning with respect to information literacy instruction, innovative staffing with an emphasis on technology or digital services, engagement with open access resources (e.g., curation of open educational resources via a Libguide), collaboration with other departments, innovative reference services, altmetrics, and the use of social media. In what follows, the authors describe an assessment of 314 academic libraries as to their adoption of some of these 21st century trends using the following research questions to guide our inquiry:

- What 21st century trends have the libraries in our sample adopted?
- Are ARL libraries more likely to adopt 21st century trends than branches of ARLs or non-ARL members?
- What factors predict the likelihood of an academic library adopting 21st century library trends?

Methods

Trends Selected

Based on the literature review and examination of academic library websites for information commonly available on websites, the authors chose the following eight 21st century library trends to look for in this study: research data services (RDS), digital scholarship (including institutional repository), makerspace, emerging staff positions, open educational resources, distance learner services, non-traditional reference services, and use of social media. Additionally, the authors checked for related variables they felt important to explore, such as whether the library offered research design and analysis help (not just reference assistance), collaborated with a campus writing center, offered specific services for international students or students with disabilities, loaned out devices such as laptops and tablets, and had a mobile-friendly website.

Sample

The sample included a combination of libraries that are members of the ARL, libraries at branches of ARL membership institutions but not ARL members themselves, and non-ARL libraries. ARL is an organization of 123 research libraries in the United States and Canada. ARL libraries share similar research missions and make up a large portion of the academic and research library marketplace. They are typically at larger, comprehensive, research institutions (ARL, 2017). ARL libraries were used as a variable in this study because they may be more likely to adopt these trends due to their typically higher budgets and their mission to support research. The total sample included the 100 ARL libraries at institutions in the United States (Canada was excluded due to our sampling decision to only study the United States), 54 libraries that are branches of ARL member institutions but not ARL libraries themselves, and 160 randomly selected, non-ARL libraries.

The final sample consisted of 314 libraries from post-secondary institutions in the United States.

To obtain the random sample of non-ARL libraries, a full list of all 3,148 four-year institutions was drawn from the Integrated Postsecondary Education Data System (IPEDS). Entries for any institutions that closed were removed. Technical schools were also filtered out, as the authors were interested in academic institutions only. This brought the list to 1,653, from which the ARL libraries and their branches were removed. The authors then used an online random number generator to randomly select 200 libraries from the list, 160 of which were ultimately included in the sample. The 40 that were excluded were branches where all data appeared the same for the whole school system (i.e., the system shares one library).

It is important to clarify that for university systems with several branches, only the branches designated as members of ARL have ARL status. Being a branch of an ARL library does not automatically confer ARL membership to that branch. In some cases, all branches of an ARL library are members (e.g., Rutgers). However, in many cases the branches of ARL libraries do not have ARL membership (e.g., campuses of the University of Michigan other than the main campus in Ann Arbor). In order to add this variable into the data analysis, the branches of ARL libraries that were not ARL members themselves were coded separately. This allowed the authors to test whether being a part of a system with an ARL member may have benefits not afforded to non-ARL affiliated libraries.

Procedure

The authors visited the website of each school in the sample in order to ascertain whether the trends described above were adopted by the libraries. Although surveying librarians at the sample institutions would have allowed us to gather more complete data on trend adoption,

the method we utilized allowed for 100% representation of our selected sample.

Prior to data collection, the research team went through a period of training. During the first session, the team collected data for 10 libraries to develop a method for searching for each variable completely. Teams of 2 researchers were then assigned 15 libraries. Each team member filled out the data collection worksheet separately. Those worksheets were returned to the first author who calculated interrater reliability (IRR). IRR was computed by calculating the number of responses that were in agreement out of the entire sample for each pair of raters using an Excel spreadsheet. The first team demonstrated 92% agreement in their responses. This team then reviewed places of disagreement to determine where agreement could be improved. IRR for the second team had 73% agreement, which was lower than desirable so that team retrained and worked together on an additional set of libraries in order to norm their responses. After retraining, the IRR for the second team was recalculated on a new sample of 20 schools which resulted in 90% agreement. After all teams demonstrated that their data collection was reliable, each researcher was assigned a set of libraries on which to collect data. After all data were returned to the first author, who managed and analyzed the data, each library website and data line for that website was cursorily checked to ensure that the other researchers did not miss any data. Additionally, the first researcher randomly selected libraries assigned to each team member to check the data collection more thoroughly. Through these procedures, the reliability of the data can be affirmed.

The next portion of the data collection included pulling institutional and library characteristics from IPEDS. These data included institution size (FTE student enrollment), whether private or public, Carnegie classifications, highest degree granted, library budget for salaries, materials and operations, physical, electronic, and media collection size, and circulation statistics of these

items. Data were analyzed using SPSS version 23.

Results

Description of the Sample

A total of 314 schools were investigated. The sample included 160 randomly selected schools, the 100 ARL member United States libraries, and 54 branch libraries of the ARL libraries.

Although a portion of the sample was randomly selected, 48 of 50 states were represented.

Description of Trend Adoption by Library Type

Trend adoption varied by library type (ARL, branch, non-ARL). ARL libraries more often adopted most trends, except for distance learning/learner services. The numbers presented in Table 1 are raw numbers and not percentages. Therefore, since there are 100 ARL libraries, 84 of which have an institutional repository (IR), 84% of ARL libraries have an IR, while 26% (n = 41) of non-ARL libraries have an IR. Sixty-six percent (n = 66) of ARL libraries openly support OER, while only 26% (n = 42) of

non-ARL libraries do. RDS, a relatively new service among academic libraries, has only been adopted by 10 non-ARL libraries (6%), while 73 ARL libraries (73%) offer such services.

Makerspaces too have seen limited adoption in all libraries: 39% (n = 39) of ARL libraries have a makerspace while 11% of non-ARL libraries (n = 18) offer these services. Most libraries (n = 92 for both ARL and non-ARL libraries) had a social media presence; similarly, most libraries offered some form of non-traditional reference. Most non-traditional reference included chat or LibAnswers, but also personal librarian services, delivering reference service in the residence halls, Twitter, and other virtual forms of chat.

Emerging staff positions as defined by ACRL include scholarly communications, digital projects, data management, user experience, technical support, digital humanities, and learning commons librarians (ACRL, 2016). Although ACRL's top trends noted knowledge management librarian as an up-and-coming position, and one for which ACRL commonly found job descriptions, no such position was found at any of the libraries in our study.

Table 1

21st Century Trends by Library Type (ARL, ARL branch, non-ARL)

	IR/Digital Scholarship	Emerging Staff Positions	Social Media	RDS	Maker-space	OER	DL Services (to DL students)	Non-Traditional Reference (e.g., chat, virtual, Twitter)
Non-ARL Libraries (n= 160)	41	50	92	10	18	42	42	88
ARL Libraries (n = 100)	84	85	92	73	39	66	41	91
ARL Branches (n = 44)	32	23	34	8	10	27	17	38
Total	157	158	218	91	67	135	100	217

Trend scores that ranged from 0-8 were calculated for each library. One point was given for each of the eight trends adopted. The mean trend score for the entire sample was 3.6 with a standard deviation of 2.2. Mean trend scores for each group are as follows: Non-ARL, 2.4; ARL, 5.7; branch, 3.6. Although no benefit of ARL membership is assigned to libraries that are branches of, or in the same university system as, an ARL, branch scores were moderately higher than non-ARL affiliated libraries. An analysis of variance (ANOVA) revealed significant differences between these three groups on the trend scores ($F(2,308) = 112.811, p < 0.001$).

Description of Library Characteristics by Library Type

The data from IPEDS is reported in Tables 2-4 as means by library type (ARL, ARL branch, non-ARL). Several outliers from non-ARL libraries

were removed as they greatly impacted the means superficially. For example, 2 institutions reported over 100,000 electronic databases where the means for electronic databases for ARL libraries without these 2 outliers were 890 and 156 for non-ARL libraries, indicating either an error in reporting or an uncommon method of characterizing an electronic database. As expected, ARL libraries and their branches reported higher means for economic factors, particularly with respect to staff salaries. Interestingly, the amount of money spent on salaries was similar to the amount of money spent on materials and services for all three library types. For library collection sizes (reported in Table 3), ARL libraries and their branches possessed greater numbers of each material type, almost by a factor of five, over non-ARL libraries. Physical book collections were exponentially larger for ARL libraries than for non-ARL libraries, with the former housing a mean of 4,399,197 while non-ARL libraries housed an average of 326,572.

Table 2
Library Expenditures on Staff, Materials, and Operations

Library Type	N	Avg. Total Salaries	Avg. Total Materials/Services Expenditures	Avg. Total Operations and Maintenance	Avg. Total Expenditures
Non-ARL	151	980,016	898,717	157,130	2,207,241
ARL	99	12,308,587	12,814,542	4,007,414	32,185,023
Branch	46	1,413,746	1,363,755	276,372	3,313,217

Table 3
Size of Library Collections

	N	Avg. Number of Physical Books	Avg. Number of Electronic Books	Avg. Number of Electronic Databases	Avg. Number of Physical Media	Avg. Number of Electronic Media
Non-ARL	157	326,572	197,348	156	46,492	46,036
ARL	99	4,399,197	1,001,269	890	1,618,960	179,977
Branch	45	413,957	345,059	262	130,438	45,540

Table 4
Circulation of Materials

	N	Avg. Total Physical Library Circulation	Avg. Total Digital/Electronic Circulation (Media and Books)	Avg. Total Library Circulation
Non-ARL	151	29,088	186,473	215,562
ARL	99	220,414	2,107,993	2,328,408
Branch	46	28,056	377,357	404,762

Factors that Impact Adoption of 21st Century Trends

A multiple regression was conducted to determine which of the following institutional variables impacted an institution’s likelihood of adopting 21st century trends: designation as ARL/non-ARL/branch, private or public status, student FTE, and Carnegie classification. Library characteristics that were examined included physical collection size, database collection size, e-book collection size, salary for staff, and total operations budget. An initial analysis revealed ARL status, Carnegie classification, operations budget, and student FTE as the significant variables among those entered. An additional analysis was conducted with only these four variables entered. This analysis of the 292 schools for which we had complete data (some schools were removed because branches shared reported resources) confirmed that those 4 variables contributed to trend adoption. A significant model was fit ($F(4, 290) = 63.538, p < .0001$), with an R^2 of .467. Trend scores are equal to $1.110 + .537(\text{ARL status}) - .037(\text{Carnegie classification}) + .853(\text{student FTE})$ is equal to 1.110, Carnegie classification is equal to $-.037$ (meaning that classification had an inverse relationship), and student FTE is equal to $.853$. This analysis did not show that total operations expenditures were a significant predictor indicating that this variable was associated with other variables such as student FTE. In sum,

each variable contributed some portion of the trend score. For example, trend scores increased $.537$ points for each school with ARL member status.

Because the goals of an ARL member are notably different than non-ARL libraries, a second analysis looked at the factors that impacted adoption of trends among non-ARL libraries only. This analysis included the following predictor variables: total operations expenditures, expenditures on materials, expenditures on salaries, number of physical books, number of electronic books, number of electronic databases, student FTE, and Carnegie Classification. In this analysis, salary expenditures were a significant predictor of trend scores at $p = 0.05$. The model fit ($F(8, 141) = 8.568, p < .0001$), with an R -squared value of $.327$. In other words, library staffing allowed for support of trend adoption.

Other Trends Observed

In addition to the eight trends included in the trend score calculation, the authors collected data on other, related variables that the authors thought were important to explore. These are reported below in Tables 5 and 6 and include trends related to staffing positions and services.

Table 5

Other Common Staff Positions Found at Academic Libraries but Not Identified as a 21st Century Trend

	Outreach Librarian	First Year Librarian	GIS Librarian	Distance Ed. Librarian	Embedded Librarian	Instructional Coordinator
Non-ARL Libraries (n= 160)	27	4	3	11	10	39
ARL Libraries (n = 100)	38	19	40	11	6	35
ARL Branches (n = 44)	13	3	3	7	7	14
Total (n = 304)	78	26	48	29	23	88

Table 6

Other Services

	Research Design and Analysis Help	Writing Center Collaboration	Services for International Students	Disabilities Services	Device Loan	Mobile Website
Non-ARL Libraries (n= 160)	5	31	5	31	43	123
ARL Libraries (n = 100)	44	43	20	66	68	89
ARL Branches (n = 44)	7	22	8	24	31	44
Total (n = 304)	56	96	33	121	142	256

Discussion

A total of 314 websites of academic libraries were analyzed to determine the extent to which these libraries adopted 21st century trends. For ARL libraries the most common trends were research data services (RDS), IR/digital scholarship, and innovative reference. For non-

ARL libraries, emerging staff, IR/digital scholarship, and innovative reference were the most commonly adopted trends. These findings are also supported by the regression analysis in which it was demonstrated that the money spent on library staffing at an institution was the only significant predictor of trend score.

ARL libraries were more likely to adopt 21st century library trends than non-ARL libraries, due to the size and budget of the institution. Most importantly, however, the goals of ARL libraries to support research likely drive the adoption of these trends. It is important to note that comparisons among ARL and non-ARL libraries may not be suitable because non-ARL libraries include a wide variety of sizes of institutions (from very small private to very large public), while ARL libraries are typically larger schools with a larger average FTE.

Additionally, because ARL libraries are larger and better funded, they are often early adopters. Simply put, they can afford to be wrong about a trend. Many libraries that do not have budgets flexible enough to tolerate chasing a trend that may turn out to be a fad, will wait until the trend is supported by the literature or becomes so commonplace in other libraries that students expect it. In this way, ARL libraries can influence the trajectory of certain trends. This dynamic can be seen in the research conducted for this article. For every new service or job title, the ARL libraries have adopted them in greater number.

One of the more commonly adopted trends by ARL over non-ARL libraries is IR/digital scholarship. IRs can be prohibitively expensive and/or technologically challenging to operate. Smaller and less well funded libraries may find these significant barriers to adoption. Interestingly, OERs, which are about leveraging free resources and therefore appealing to the cost conscious, were more readily adopted by ARL than non-ARL libraries. One reason for this might be a lack of sufficient staff. While OERs themselves are free resources, it takes time and expertise to vet them, clarify any copyright provisions, and keep up with the constantly changing and expanding OER landscape.

Data on services other than the eight 21st century trends are represented in tables 5 and 6. As with social media, the adoption of mobile websites is ubiquitous enough to be considered a new

standard in website design. Out of this seemingly eclectic group of services, the most commonly adopted service is device loans, with 68 out of 100 (68%) ARL libraries, 31 out of 44 (70%) ARL branches, and 43 out of 160 (27%) non-ARL libraries offering this service. To more thoroughly examine this trend, research into the types of devices being loaned and what the circulation statistics are, is needed. The second most popular service trend for non-ARL libraries are writing center collaborations and disability services. For ARL libraries, disability services are also the second most popular. These trends, together and in conjunction with the growing number of Outreach Librarian positions (38% of ARL libraries, 30% ARL branches, and 17% of non-ARL libraries), show the growing importance of outreach and external collaboration. Interestingly, while the above-mentioned collaboration services are on the rise, adoption of collaboration with international students appears to be lagging; it is the least likely service trend for both ARL and non-ARL libraries. This may be a weakness in solely examining library websites, as library subject specialists may very well be conducting outreach to this group without it being represented in their job titles. Further research could compare the number of international students enrolled in the schools sampled. For ARL libraries, the third most adopted service trend was research design and analysis assistance. As previously mentioned with respect to RDS, this trend reflects the importance ARL institutions place on conducting research.

Another interesting observation is the number of Geographic Information Systems (GIS) Librarian positions at ARL libraries (40%). This is a relatively new area that seems to have become quite popular as more research is done using geospatial data. It can require significant technological knowledge, which may explain why it is not a high-ranking trend for non-ARL libraries or ARL branches (2% and 7% respectively). While not identified as a 21st

century trend for this paper, it is a trend worth watching.

If we were to distill the findings of this study, a strong case could be made that the most important and popular trends are supporting and curating IRs/digital scholarship and outreach/external collaboration. If we look to ARL libraries as trend setters in the library profession, it is clear that IR/digital scholarship is the most pressing trend.

Although the 2018 ACRL analysis of emerging trends was published prior to the data collection in this study, it showed that some focus has shifted to fake news and information literacy, and legacy print collections, while trends that remain the same are project management, open access resources, data management and data collection, and patron driven collections.

Limitations

The method of this study, while allowing for 100% participation of the selected sample, has some weaknesses. Two trends that the authors could not assess through this method was collection development assessment and evidence of learning. Although some websites included information about information literacy assessment, the authors could not be certain that this particular trend would be found consistently on a website. A survey would have allowed a better assessment of these trends. It is recommended that future research validate the results of this study through more interactive means. Lastly, the eight trends selected for the trend score, while supported by the library literature, are somewhat subjective in that there may be multiple ways to assess one variable. For example, although we could not determine the use of altmetrics, a social media presence was a clue that libraries were using common and modern methods of connecting with patrons. It is important to note that due to random selection, a portion of the non-ARL libraries are in small institutions and are therefore poorly compared to the larger ARL libraries.

Implications and Recommendations for Future Research

The implications for library practice and policy as a result of this research primarily point to the need for professional development of library staff in order to be able to support these new trends, particularly with an emphasis on technology and research support. Future research should continue to analyze adoption of these trends and others to both validate the results written here and to establish a model of prediction. Such models can assist libraries in avoiding costly mistakes and adopting trends that are appropriate for their library type and budget.

Conclusion

To define and assess what 21st century academic libraries look like, the authors identified the most commonly cited 21st century library trends and evaluated the websites of over 300 academic libraries to determine the extent to which they adopted these trends. The authors visited the websites of all ARL member libraries in the United States, their branches, and 160 randomly selected academic libraries that are not ARL libraries. The primary goal of this study was to identify the extent to which the libraries in the sample reflected the status of a 21st century library, as defined by adoption of the trends discussed above. Additionally, the study sought to determine whether ARL libraries were more likely to adopt these trends over non-ARL libraries. Lastly, regardless of ARL status, the authors investigated which institutional factors, such as number of librarians on staff, budget, collection size, student FTE, and institution status (private versus public), predicted the adoption of 21st century trends. Results indicated that ARL member libraries were significantly more likely to adopt these trends, quite possibly due to their larger size and larger budgets. This research can assist librarians, library directors and other stakeholders in making the case for the adoption or avoidance

of some trends, especially where considerable outlay of funds is necessary.

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