

Accessing Engineering Standards: A Study in ARL Best Practices for Acquiring and Disseminating Standards

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Abstract

Engineering Standards are seemingly the bane of every engineering librarian's existence. Sometimes it feels like they give collection development a bad name. Librarians want them, researchers want them, students want them, but they are hard to acquire and can cost a fortune. Especially when an institution doesn't have a specific policy for them. Given these (and other) headaches surrounding Standards, librarians at Florida State University (FSU) decided to conduct a study of how Association of Research Libraries (ARL) are accessing their standards. Through a mixed-methods approach, the study sought to understand how and why standards are requested, obtained, and accessed for use by Engineering Researchers (faculty, postdocs, students, and staff) at various institutions. The secondary objective of the study was to help FSU Libraries develop a Standards acquisition policy as part of their collection development duties.

This study began with the creation of a spreadsheet of academic ARL Libraries and identifying those with Engineering programs and their librarians. The authors explored institutional websites to ascertain if they supported any type of engineering program, only using freely available public information. The FSU Institutional Review Board approved this study, with the ID: STUDY00000673, prior to the distribution of a targeted emailed Qualtrics Survey to the identified librarians. Over the course of one month, two emails were sent asking librarians to complete the Qualtrics survey. While emails were targeted, collected responses were anonymized. After the survey closed, the authors did an additional perusal of the collected responses and de-identify any content that may be considered to be identifying information such as school names or acronyms. With a response rate of just over 33%, the variances in responses felt beneficial enough for the authors to extrapolate meaningful analyses of collected responses. Data collected from the survey was analyzed using NVivo, a text analysis software used for identifying trends in qualitative data.

In this paper, the authors share a discussion on the literature review conducted on Standards collection development. There is a focus on STEM and/or engineering libraries for this section. While also discussing the methods for the study itself, the paper evaluates trends and results. The paper concludes with potential next steps in crafting a Standards collection policy and ideas for further Standards acquisition research needs.

Introduction

Collection development comes in many forms, especially when discussing the specialization of different subject areas. For engineering librarians, collection development often moves past the

typical monograph and database discussions into standards. Standards are an important part of modern society and globalization. Standards are the reason that a plug fits into the wall, a fire hose fits all fire hydrants, and why all USB's work in different computers and more. A standard is a collectively agreed upon set of rules, regulations, requirements, measurements, or technical specifications that are published by an organization [1]. They are published by national standard bodies that provide the means for writing and disseminating new standards. Table 1 shows a list of frequently accessed standards organizations and their commonly used acronyms. Due to a lack of peer-reviewed articles on the subject on accessing standards, the authors felt that conducting a survey of Association of Research Libraries (ARL) would prove useful to analyze standards acquisitions and dissemination, while helping to begin the conversation for developing best practices within the profession.

Acronym	Full Name
AASTHO	The American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AHAM	Association of Home Appliance Manufacturers
AIAA	American Institute of Aeronautics and Astronautics
ANSI	American National Standards Institute
API	American Petroleum Institute
ASABE	American Society of Agricultural and Biological Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BPE	Bioprocessing Equipment
CSA	Canadian Standards Association
EHEDG	European Hygienic Engineering Design Group
ICAO	International Civil Aviation Organization
ICC	International Code Council
IEEE	Institute of Electrical and Electronics Engineers
IET	Institution of Engineering and Technology
IHS	Information Handling Services
ISO	International Organization for Standardization
ITU	International Telecommunication Union
NFPA	National Fire Protection Association
RESNA	Rehabilitation Engineering and Assistive Technology Society of North America

RTCM	Radio Technical Commission for Maritime Services
SAE	Society of Automotive Engineers
TechStreet	Technical Standards Source

Table 1: A list of standards organizations and publishers with their acronyms

Literature Review

Over the course of this study, finding relevant articles about the collection of industry standards in academic libraries was a struggle, which is reinforced by the Cusker [2] article's finding that, "There appears to be relatively little literature on the topic of libraries collecting technical standards." With few articles to work with for this literature review, the authors choose to focus on the papers that discussed the various types of purchasing models and the evolution of how academic libraries made standards available to their patrons. Additional literature [1], [4], [5], [6] on standards distribution and collection models served as baseline knowledge building resources.

Standards not only allow cross product compatibility but increase safety and promote quality assurance to customers. "93% of global trade has direct ties to standards and technical regulations" [3]. This statistic illustrates the importance of standards to many fields from business to medical instruments, to transportation. However, in no greater industry are standards more important than in that of engineering [7]. Engineers are responsible for researching, designing, and building almost all the products humans use every single day. Engineers that have access to standards are more able to endeavor on new technological advancements while making sure they follow the correct guidelines. Engineering companies have been shown to prefer to hire graduates who have had some prior experience in standards [1]. Students and faculty look to their academic libraries and librarians to provide access to specialized standards from distinct standards organizations and publishers. According to ANSI there are over 540,000 U.S. standards available from over 140 publishers [3]. The sheer number of standards and options of publishers means there are several purchasing options for libraries.

Understanding purchasing models and balancing budgets with the needs of engineering departments have become a tightrope act that librarians are all too familiar with. Engineering subject libraries began in academic libraries in the early 20th century [1]. Since then, these engineering libraries have begun collections of tens of thousands of standards and developed a way to index them [8]. However, within the last 10 years many libraries have shifted away from delivering print-only access to online access of standards [1]. To meet both space and budgetary demands, academic libraries have shifted to a model of buying "big package" deals with publishers of standards. Some of these packages have perpetual access to standards and some only have temporary one time and/or one user access to these standards [8]. These big package deals are often with companies that provide access to several publishers at once, known as

aggregators. These aggregators provide a much easier and streamlined interface for librarians and researchers to access standards from many different publishers. Furthermore, these aggregators often offer on-demand purchasing options to libraries.

Previously, when print standards were in use, interlibrary loans were considered a good use of obtaining standards not in a library's physical collection but now with an increased amount of online collections, libraries are often no longer permitted to share access to standards with other libraries [1]. The way many libraries currently access standards is through a "just in case, pay to have" model in which they subscribe to multiple aggregators that provide access to thousands of different standards. Most academic libraries have standing orders to the most relevant organizations. This is great if libraries know exactly what types of standards their students/faculty need but not great if the university engineering school lacks focus. This model also is very wasteful as it includes many standards that students/faculty will never use [7]. Also, many aggregators overlap publishers, which leads to paying twice for the same publisher.

Another way libraries access standards is through a "just in time, pay as you go" policy in which when a student requests a standard, the library purchases that individual standard on-demand [1]. This requires that academic libraries have a budget for each user. The budget limits the number of standards that are affordable and/or accessible because only a few standards can be purchased with this limited budget. Overall, both models provide adequate means for standards access but both individually are not financially sustainable.

The primary way for an academic library to best provide cost effective access to standards for its students is a hybrid between these two purchasing models [7]. This can be achieved only when an academic library comes up with a standards collection development plan based on the needs of its researchers. This can be done by figuring out what exactly the needs are of the engineering school and what they specialize or focus their research and development in [9]. This allows the academic library to purchase standing orders with aggregators and publishers that provide standards that are relevant to the school's field. A pay as you go model will cover the rest of the standards that users need access to. Many academic libraries are at a point now where they are more comfortable having subscriptions with perpetual access and personalizing on-demand access for specific standards because it is cheaper and provides more targeted standards [8].

Methods

A review of the "Approaches for Purchasing Standards" informal survey on the STS-L listserv yielded a starting point for this survey (Survey, 2019). As Florida State University (FSU) is a member of ARL, the authors thought that looking at other ARL institutions would provide a robust foundation to analyze and start a conversation. In the Fall of 2019, the authors created a spreadsheet of academic ARL Libraries and identified those within the list with engineering

programs and their librarians through an exploration of institutional websites. This was completed only using freely available public information. While 109 institutions were identified to have an engineering program using these methods, a total of 127 emails were distributed due to multiple institutions with multiple engineering librarians. The FSU Institutional Review Board approved this study (STUDY00000673) prior to the distribution of a targeted emailed twelve question Qualtrics Survey to the identified librarians; these questions can be found in Appendix A. The survey was designed to lead respondents through a series of questions related to budgets, access, and usage of standards. Seven questions on the survey were open-ended, while five questions were multiple choice.

Over the course of the survey period in early 2020, two emails (an initial email and a reminder email 2 weeks into the study) were sent asking librarians to complete the Qualtrics Survey using an Outlook mail merge to keep the approved IRB language standard across all emails. The survey opened on January 13, 2020 and closed on February 14, 2020. While librarian emails were targeted for distribution, collected responses were anonymized for privacy. After the survey closed, the authors did an additional perusal of the collected responses and de-identified any content that may be identifying information such as school names or acronyms. With a response rate of 33.07% (n=42), the variances in responses felt beneficial enough for the authors to extrapolate meaningful analyses of collected responses.

Data collected from the survey was analyzed using NVivo, a text analysis software used for identifying trends in qualitative data. This software, along with the Qualtrics Survey software, helped the authors analyze and develop conclusions from shared survey responses.

Analysis/Discussion

The survey began with question 1 which was a look at the budget for purchasing standards and whether each institution had a separate standards budget. Figure 1 shares that 60% of institutions (n=25) do not have a separate standards budget. Question 2 then asked respondents to share what their 2019 standards budget was and question 3 asked how much respondents actually spent on standards in 2019.

1

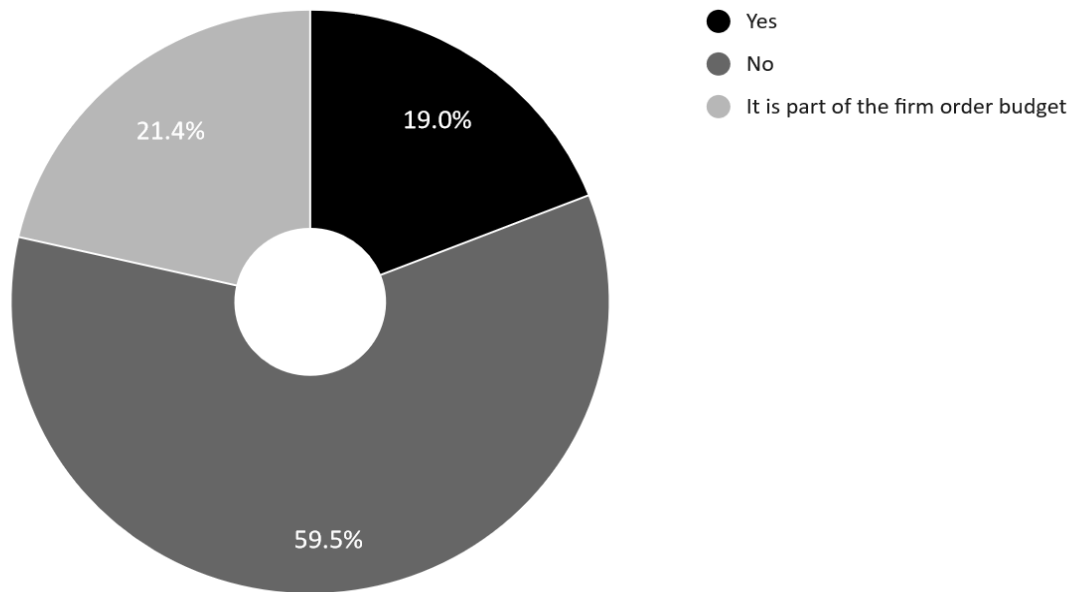
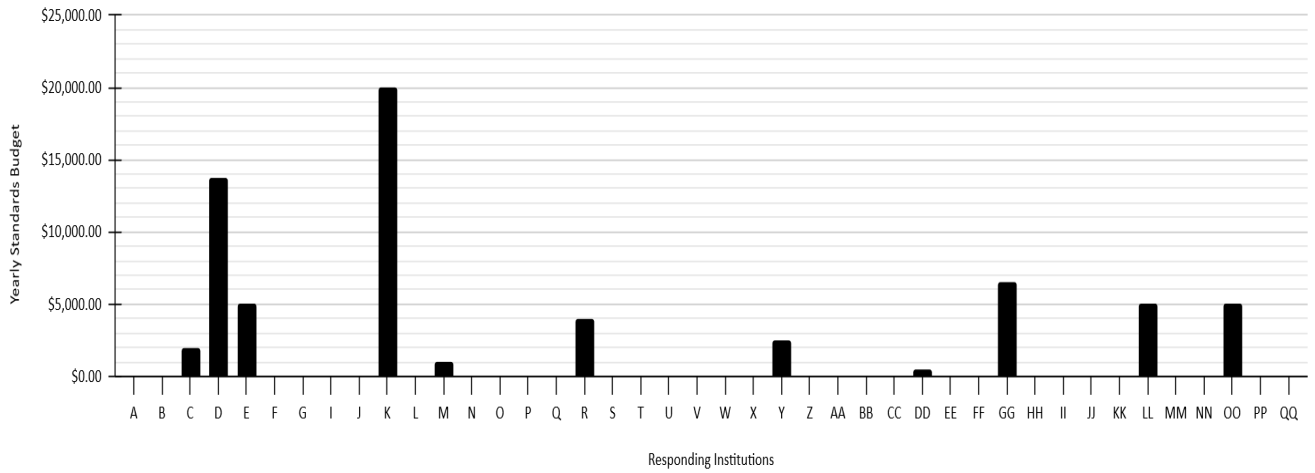


Figure 1: Question 1: “Do you have a set budget each year for purchasing standards?”

The answers to questions 2 and 3 were correlated in figure 2 to show that even when libraries state they do not have a budget, money is pulled from someplace and spent on standards to meet the institutional requests. In figure 2, is a result of the combined data collected from questions 2 and 3 of the survey. For each responding institution is assigned an alphabetical letter (a - qq) and their budget versus spending is graphed. The highest amount spent was \$20,000 in 2019 by two different institutions. Of note is that Institution K budgets this amount yearly and spends it, while Institution Z does not have a standards budget but spent \$20,000 on standards in 2019. Institutions A, B, and OO did not provide values therefore they were counted as null values. Many librarians indicated a \$0 budget but then reported spending money on standards. The responses to the questions 1-3 of this survey become of more interest when combined with question 12 of the survey. In the final question, respondents were asked to describe their standards access model and multiple librarians mentioned not having a budget but having an informal cap on ordering for specific faculty/students.

2A



2B

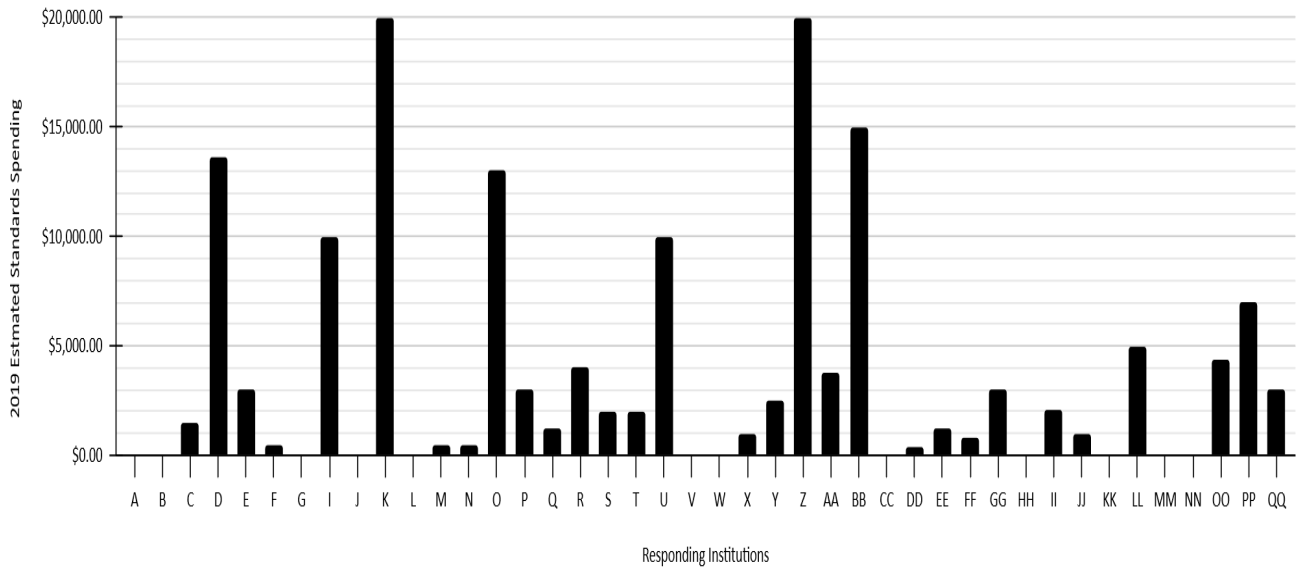


Figure 2A: Question 2: “What is your yearly Standards budget?”

Figure 2B: Question 3: “In the last year, how much would you estimate that you spent on Standards?”

Question 6 dealt with where standards budget money came from. This breadth of responses was notable with 25 libraries (or ~60%) indicating from a collections budget, before quickly dropping to an unspecified source for eight libraries as shown in Figure 3. This can be extrapolated to mean that while some libraries do not have a specified standards collections budget, the use of collection funding to purchase standards in many cases is coming from regular collection/firm order budget.

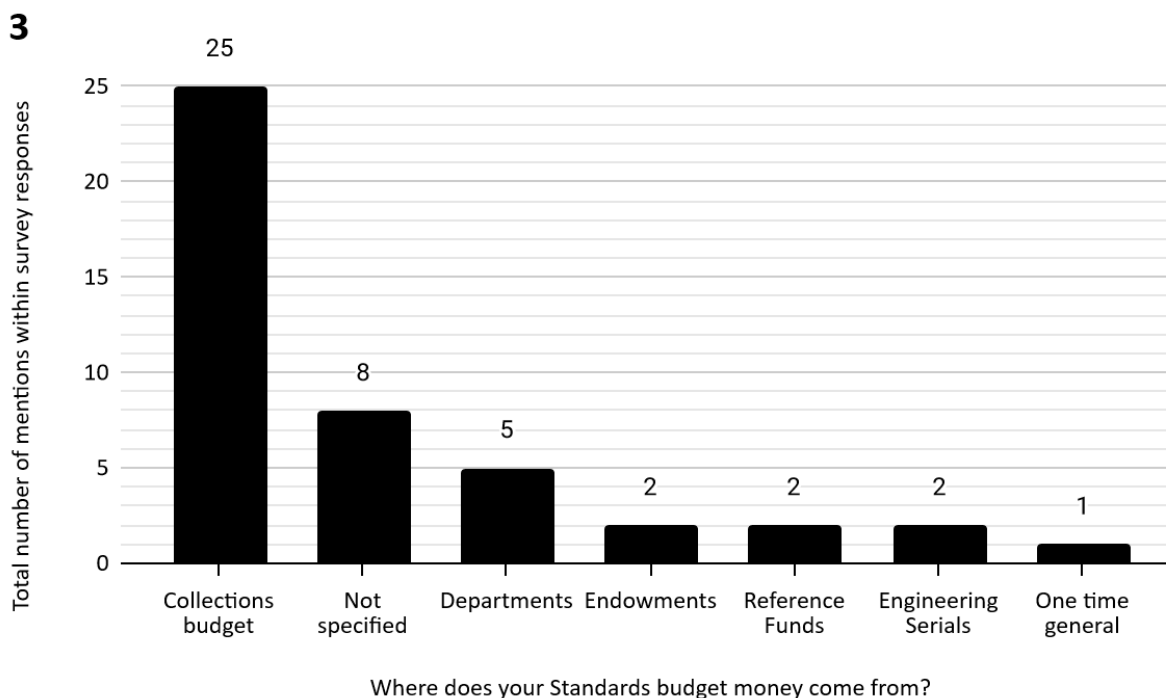


Figure 3: Question 6: “Where does your standards budget money come from?”

Understanding which campus departments or organizations request standards through the responding libraries was the focus of question 5. This information felt like a useful question because, though engineering librarians were directly contacted through this study, many hold multiple liaison areas and/or work with other campus librarians to meet the needs of their users. While Figure 4 does show that most standards are requested by engineering departments, respondents also frequently used vague responses such as, “science,” “all,” or “varies,” thus making it hard to say this is a definitive listing of campus requestors. The only observable secondary spike in users comes from healthcare departments/campus organizations.

Question 7 looked at the databases and/or companies that libraries utilize to procure standards. Most respondents referred to these companies in a more detailed explanation of their access models for question 12 of the survey. Figure 5 illustrates the number of times each company is referenced in the survey results, with TechStreet named most often at 16 responses. TechStreet and similar companies are mainly used for their individual standards access, both in print or PDF format, or through an on-demand subscription model. Tying for second place with ASTM Compass is IHS, both mentioned 15 times, for reasons similar to TechStreet. ASTM Compass, IEEE Xplore, SAE, and Engineering Village were mentioned for their standards access as a package of their database subscription model.

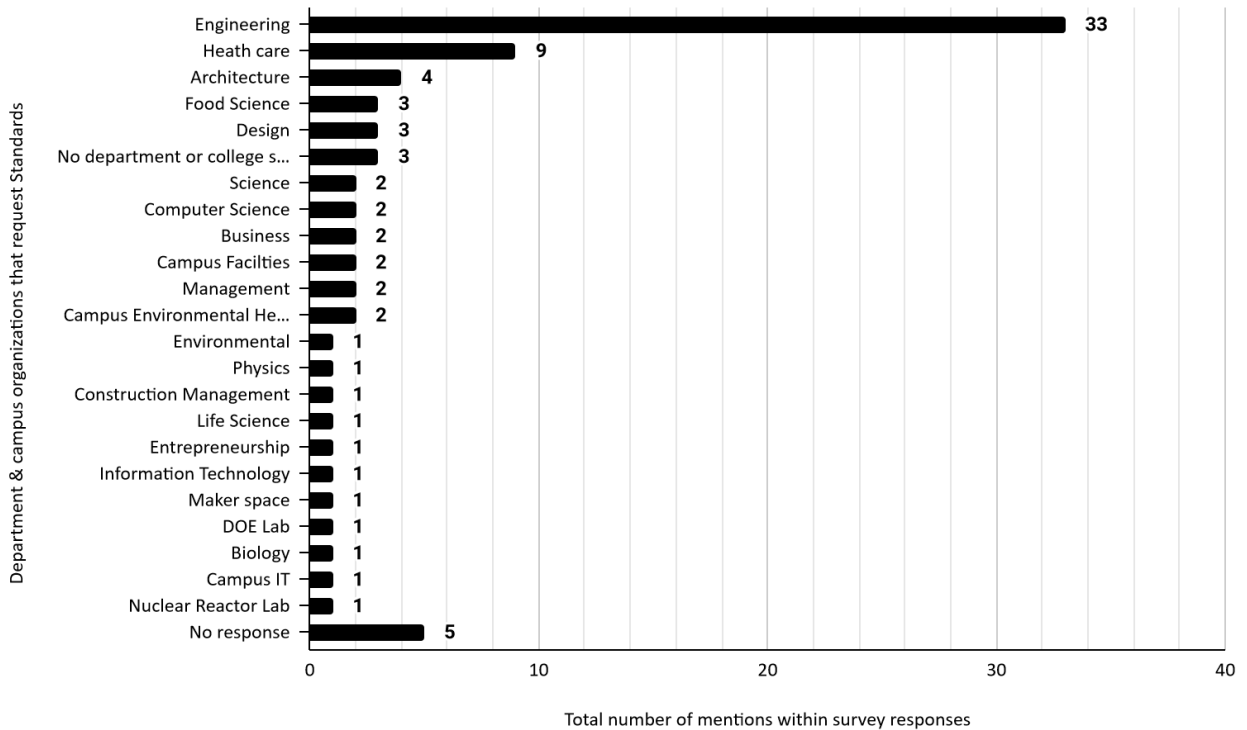


Figure 4: Question 5: “What departments/campus organizations request Standards?”

At FSU Libraries as the conversation has turned to standards access and collections, a question frequently posed is, “Should standards be discoverable in the catalog?” The researchers felt this question is beneficial to the conversation of standards access. Survey respondents were asked if the standards they purchased were cataloged, responses are shown in figure 6. There is nearly an even split between the libraries that do catalog standards and those that do not. It appears that based on responses to this question and responses to the final question, it is not an easy yes. Further conversations between subject liaisons and cataloguing librarians are required to gain a better understanding of the needs of discoverability.

5

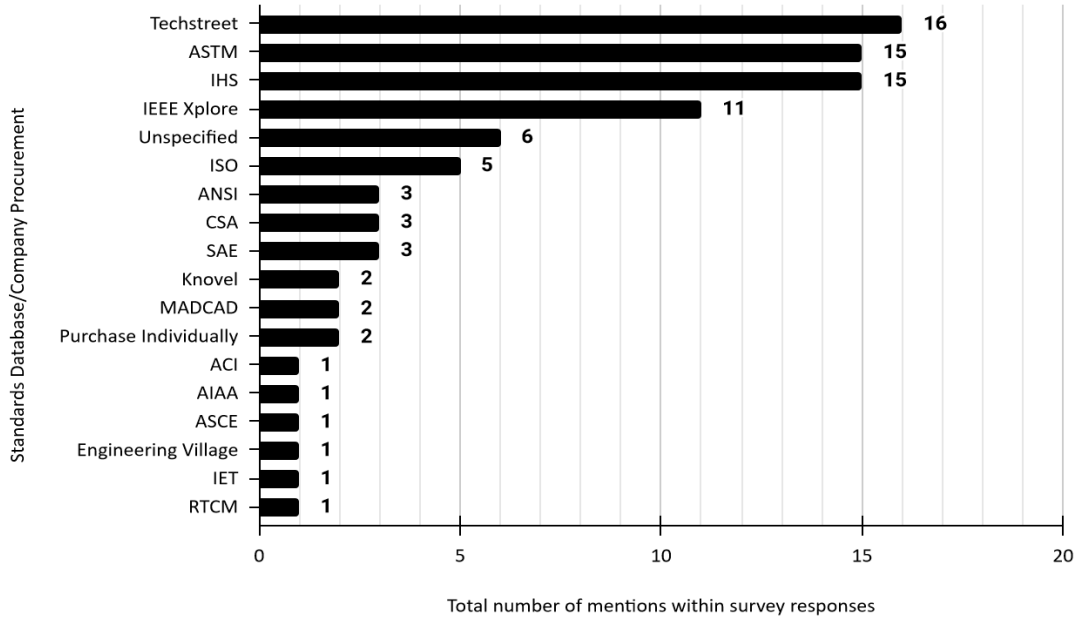


Figure 5: Question 7: “What database/companies do you procure standards from?”

6

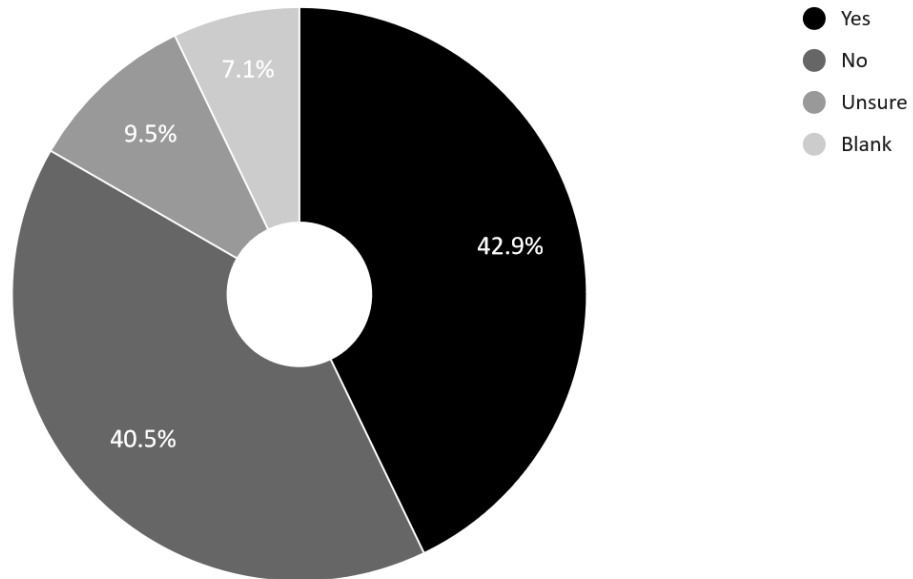


Figure 6: Question 9: “Are your Standards catalogued?”

Standards are not new, and practically every engineering librarian will come across them at some point. Based on the 9th question in the survey, it appears that standard use is staying about the

same or increasing at ARL institutions. Figure 7 shares that while 38% of libraries see standards usage remaining the same, 33.3% had an increase of standards requests and/or usage in 2019. Just 2.4% of responding institutions felt there was a decrease in standards usage which may indicate a shift in research foci at that institution. These responses are clear that standards are here and needed by researchers.

7

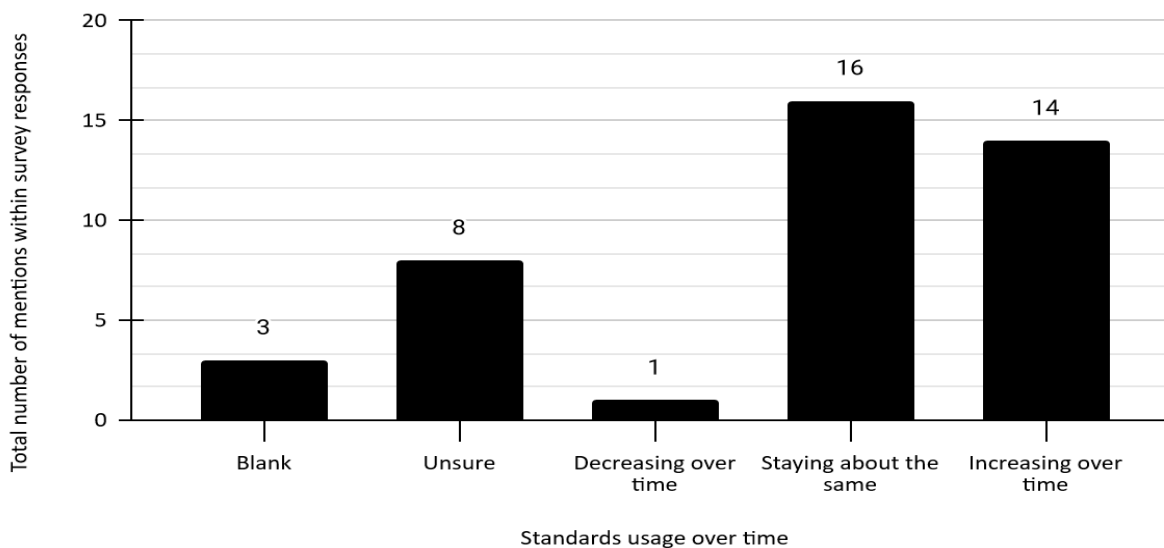


Figure 7: Question 8: “Do you feel the usage of standards at your institution is: (a) increasing over time (b) decreasing over time (c) staying about the same (d) unsure.”

Questions 10 and 11 of the Qualtrics Survey were more reflective in nature than the previous nine questions. While the previous questions took a data-based route, these two questions were important to understand how institutions and ARL libraries were supporting the needs of standards acquisitions. Question 10 asked if librarians felt that institutions understood the needs for standards access, while question 11 asked if library administration understood the needs for standards access. In figure 8, both questions show their results in a bar-chart form with 49% of respondents marking that they felt their institution understood the need to standards access and 46% of respondents marking that they felt their library administration understood the need for standards access.

What is concerning from these questions is that in both cases, the no and unsure answers combine to be approximately equal to the yes answers. Looking at figure 8A regarding institutional understanding of standards access, adding both no and unsure responses is 46%; for figure 8B regarding library administration understanding of standards access, adding both no and unsure responses is 49%. The closeness of these numbers shows that more education of library

leadership and institutional leadership on the importance of standards access is needed in order to meet the continued needs of standards users.

8A

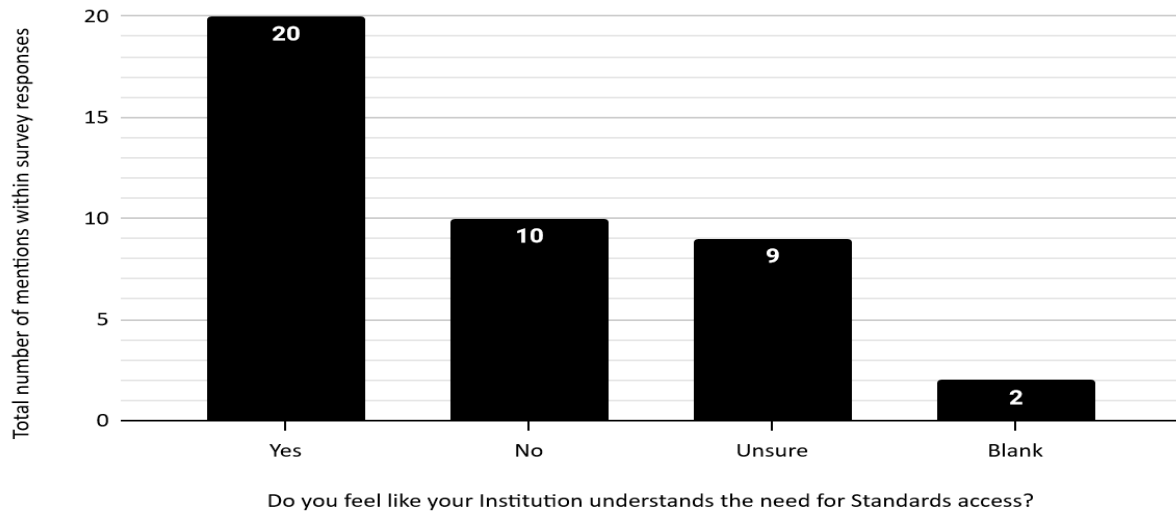


Figure 8A: Question 10: "Do you feel like your institution understands the need for standards access?"

8B

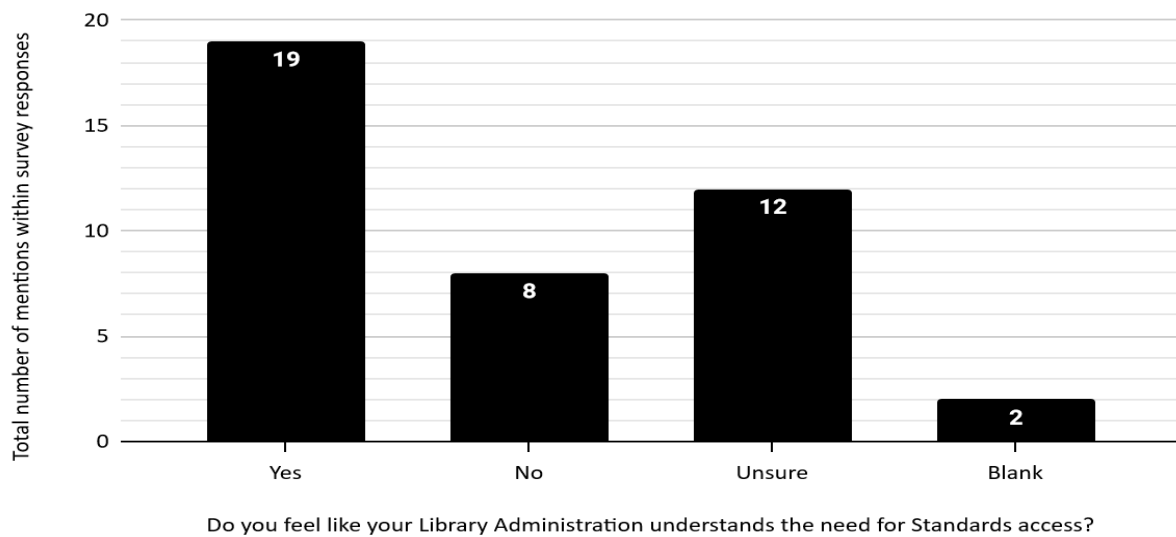


Figure 8b: Question 11: "Do you feel like your library administration understands the need for standards access?"

Question 12 asked the participants to describe their standards access model. Most of the responses to this question talked about the online platforms used and the circulation protocols for

the print version of standards. Within these answers an interesting theme appeared in which many respondents talked about how they handle requests for standards. Many institutions focus their efforts on filling requests made by faculty, staff, and graduate students, while undergraduate students must make a strong case as to why their request should be fulfilled by the library. A few institutions mentioned having online request forms that allow library users to make a request. In one example, an institution mentioned having two prepaid accounts on different platforms that allow users to place on-demand purchase requests. These requests are then reviewed by their librarian to see if they fall below the \$500 mark. If a request is made by a student, an explanation is required. Using this approval method allows the librarian to approve or deny requests for quick turnarounds. This request model appears to be unique as other librarian responses talking about the request process tended to focus more on how they purchased one-off purchases and handled the delivery method of the print standard. Some institutions will make the purchase and then give the standard to the requester without adding the standard to the collection; while other institutions will make the purchase and then keep the print version as part of their course reserves collection to ensure the standard does not get lost. There appears to be many models for handling standard requests; but one thing that appears to be agreed upon is that the purchase of one-off standard requests is expensive and the budget for these requests must be monitored.

Conclusion

The original aim of this survey was to analyze standards acquisitions and dissemination. If a modern academic library's goal is to meet the needs of its students, staff, and faculty to the best of its ability, then the development of sustainable, efficient, and cost-effective standards collection development policy is a must. Additionally, standards publishers should recognize the importance of standards access in academic institutions and provide free or low-cost access to these standards. This could be a mutually beneficial model for both standards companies and libraries as it would help expose students to standards used in their job fields while providing libraries access to standards in the face of stagnant and shrinking budgets. As libraries continue to work towards a way to manage the ideal standards collection, it will lead to students being more successful, knowledgeable, and prepared to enter the workforce.

One key conclusion from this survey is directly related to budgets. Figure 2 shows the juxtaposition of questions 2 and 3 in terms of budgets versus spending in 2019. When looking at the results of these questions it becomes apparent that many librarians get creative with how they may purchase requests. With 60% of the responding libraries saying they do not have a separate budget for standards, it appears that the use of departmental firm order funds is needed to purchase individual standards while relying heavily on the online platforms provided by databases for access to the vendor's specific discipline. Even when not budgeted, acquisitions money is coming from somewhere and further research into this is needed to say definitively how money is formally being spent and transferred.

Further limitations include question 4, How long have you had a separate Standards budget, the survey was largely left blank or shown to be not applicable to the respondents. Due to this lack of information, the results are not discussed in this paper and the authors feel like it could have been transformed into a question about cataloguing practices. Though a question was asked about if standards are catalogued, no follow-up information was asked to glean further details. A final limitation is that the pool of responses, while statistically significant, was still smaller than what the authors would have liked. A next step would be to replicate the study but open it up to other engineering librarians and include follow-up interviews to gain a better understanding of standards acquisitions at multiple institution types.

While this paper began with a bunch of questions, it has not found the final answer. Rather it is a formal starting point for conversations about standards acquisitions to bridge the information needs of libraries and their researchers. Another important aspect of this research, based on Figure 8, is that more education on standards access needs to be happening between librarians and their administration and institutions. Overall, the authors are confident that the survey questions posed and resultant findings are enlightening to their readers as they show the importance of standards in the ecosystem of knowledge access.

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Appendix A

Accessing Engineering Standards: A Study in ARL Best Practices for Acquiring and Disseminating Standard survey questions.

1. Do you have a set budget each year for purchasing Standards?
 - a. Yes
 - b. No
 - c. It is part of the firm order budget
2. What is your yearly Standards budget?
3. In the last year, how much would you estimate that you spent on Standards?
4. How long have you had a separate Standards budget?
5. What departments/campus organizations request Standards?
6. Where does your Standards budget money come from?
7. What databases/companies do you procure Standards from?
8. Do you feel the usage of Standards at your institution is:
 - a. Increasing over time
 - b. Decreasing over time
 - c. Staying about the same
 - d. Unsure
9. Are your Standards catalogued?
 - a. Yes
 - b. No
 - c. Unsure
10. Do you feel like your Institution understands the need for Standards access?
 - a. Yes
 - b. No
 - c. Unsure
11. Do you feel like your Library Administration understands the need for Standards access?
 - a. Yes
 - b. No

c. Unsure

12. Can you describe more about your Standards access model? (include if you use print Standards or online Standards and how you get them to the requestor, if applicable)