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Library Data Storytelling: Obstacles and Paths Forward

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ABSTRACT

Data storytelling holds much potential to positively impact public perceptions of libraries. However, realizing the potential of library data storytelling will require understanding practical and cultural obstacles within public and other library contexts that range from prioritizing data collection over communication to fearing regulatory and assessment uses of data. Based on mixed qualitative methods (34 interviews, a questionnaire, a ranking exercise, post-workshop discussions) and six years of iteratively developed data storytelling workshops, this article explores common obstacles – emotions and attitudes; time, tools, and training – to library data storytelling and proposes ways to overcome them.

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Introduction

Data storytelling is any presentation of data that uses narrative strategies. It is used for making sense of data to inform decision making and has sparked new interest in stories, visualization, infographics, and more across many sectors. Library data storytelling should focuses not only on the data but on the human context and the stories we tell. While there have been some notable developments in approaches to library data collection, sharing, and analysis for libraries (Magnuson 2016), data analysis and presentation are still niche areas of expertise that have yet to see widespread adoption in the library world. While there are many obstacles to this necessary transformation of the field of librarianship, there is great potential. Storytelling is profoundly human, and data storytelling could inspire new approaches to data collection practices and advocacy for libraries.

Stories have elements – character, setting, plot – that can be repurposed as strategies for data story building. Narrative strategies for data storytelling are ways of looking at data that draw from story concepts, both functionally and metaphorically. A good data story must of course be accurate to its data, a tale as truthful as possible within the limits of honest representation. At the same time, a good data story must also be constructed to activate and hold the audience's attention. Whether detailed plots or snippets of narrative structure are used to make

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presentations more memorable, storytelling connects with the basic tendencies of our human minds (Armstrong 2020).

In order to make the most of the time and effort of data collection, library data must become story. By prioritizing storytelling as a practice that precedes data storage – or simply story before storage – we can better understand what we are accomplishing. Libraries that are directly supported by tax dollars – especially public and community college libraries – face ongoing challenges in demonstrating their public value. Data storytelling can communicate the impact of libraries to governing boards and taxpayers just like businesses use data storytelling for shareholders. Despite its over 130-year history in children's librarianship, most librarians still struggle to engage the power of stories and storytelling in captivating audiences and making messages both memorable and retellable (McDowell 2018, 2020).

Background

The storytelling approach defined here is based on 15 years of teaching storytelling, 8 years of storytelling consulting, and 5 years of co-teaching data storytelling. Relevant subsets of this material have been shared in interactive workshops with regional, state, and national organizations of librarians starting in 2018. Now in its sixth year, the data storytelling course taught at the School of Information Sciences at the University of Illinois Urbana Champaign was the first of its kind. It was based on a collaboration between the author and an expert in visualization of massive data sets in the field of astronomy. Recently, courses in data storytelling have emerged across multiple fields, including business and journalism, and the topic cuts across all forms of information professions (iSchool News 2022).

A recent internal survey of employers at the School of Information Sciences revealed that "data storytelling" was the most in-demand skill; the time has come to consider what these emerging areas could mean for librarianship (Michele Plante, Assistant Director of Employer Communications, e-mail to author, September 14, 2022). In the ongoing quest to demonstrate their value, libraries increasingly practice the gathering of data. Unfortunately, in many cases, the stories told from that data are about individual impact, leaving untold important tales about collective impact at scale. In some cases, the relevant data are collected but not analyzed, and so the value of collecting remains limited. Similarly, much library data are collected by and for a department and is not even shared internally except at moments of top-down oversight, as discussed in the findings below. Most crucially, these data are not consistently transformed into stories that bolster both internal communications and public understanding.

There are some excellent established data sources in librarianship. Perhaps the premiere source for public librarianship is the Public Libraries Survey (PLS) data, collected by the Institute of Museum and Library Services (IMLS) for over 25 years. This is the most recent sustained iteration of a longer tradition that

goes back to 1876 (United States Bureau of Education 1876), and to the earliest national surveys in the field in the 1880s and 1890s, when a group of women led by Caroline Hewins conducted national surveys to gather systematic evidence of library services to youth and produced the Reading of the Young reports from 1882 to 1898. These reports changed the discourse of the field, moving away from a model of expert leaders' views and toward a research practice of surveying the field (McDowell 2009). Their work was both research and advocacy, as is so much data storytelling today, but it was written out of the history of librarianship when statistical methods came to predominate in the early 20th century. In this sense, data storytelling connects with the oldest tradition of research in LIS, led by women advocating for youth services in public libraries.

Many changes in recent years have increased focus on training for data collection and use in public libraries specifically. A field-wide shift occurred with the 2013 Public Library Association launch of Project Outcome (Public Library Association, Project Outcome n.d..), closely followed by the IMLS-funded 2015 Research Institute for Public Libraries (Research Institute for Public Libraries n.d..). Both projects advocated retooling the data collection process to focus on measuring the outcomes achieved by library work. This shifted data practices from collecting numbers that demonstrate "who/what/when" of library services, to collecting data that can be used to show "how" libraries impact their communities. The launch of the Public Library Data Alliance (PLDA) in July 2020 signals another stage in making data meaningful in library conversations and cultural expectations (Measures that Matter n.d..). 2020–21 RIPL Data Boot Camp events regularly saw over 200 participants per session and those activities recommence in summer of 2023. Such IMLS-funded projects have contributed greatly to understanding the importance of data collection in the library field, instigating a culture shift by supporting librarians in the analysis, interpretation, and promotion of the data they collect. The projects are complemented by research on organizational storytelling in library leadership (Marek 2011), in libraries as organizations (Colón-Aguirre 2015), and librarians' attitudes toward storytelling (Sturm and Nelson 2016).

This article explores, through qualitative interviews and pilot studies, the primary obstacles that stand between library data and the telling of effective library data stories. The focus is predominately but not exclusively on public libraries. Over years of teaching diverse cohorts, we have a robust set of teaching materials for future librarians that supports professional data storytelling. However, this pedagogical frame is quite different from the needs of working professionals already in the field. To address this gap, this team is developing the Data Storytelling Toolkit for Librarians, an IMLS-funded guide that combines our years of teaching knowledge with a rigorous understanding of the obstacles libraries and librarians face every day when they seek to tell high-impact stories through and with data.

Definitions

Data storytelling requires a process of transformation. Data are transformed into information in story with the intervention of human analysis and interpretation. Information becomes knowledge when it aligns with actions to be taken. Knowledge becomes wisdom if it aligns with a broader purpose, often represented for organizations in articulations of mission and vision. Great storytelling requires careful attention to the audience and context, which may seem vastly different in different libraries as organizations – but this study demonstrates that there are strong commonalities at the highest levels in both what works and what obstacles exist in many libraries that prevent this data storytelling process from occurring. Those range from disconnected data collection practices, which can be scattered and widely varying even in one institution, to unrealistic expectations that a data analysis will somehow drive decisions without the need for interpretation as information, communication as knowledge, or alignment with vision and community needs as wisdom.

Storytelling, in the library tradition, is a dynamic interaction. Imagine over 90 preschoolers and a librarian in a typical story time, where story-based interactions – participation games, songs, guessing what comes next – add up to positive literacy-building experiences in the library. The story told (or read or sung) is not conveyed flatly as a transmission from librarian to audience, but instead the story is an emergent property of the interaction between teller and audience. As the preschoolers leave, they are repeating the words, acting out the story, singing the song, and pretending to be the characters. Could we imagine data storytelling having a similar energizing effect, inspiring librarians to imagine, engage, and retell the stories they have heard? Whether a story is told that way only once or is recorded on video, flyers, social media posts, and more, the story is a result of an exchange between teller and audience. It is not merely a delivery of story; storytelling does not exist without a direct and active relationship and exchange between teller and audience. However, these exchanges need not be in real time, they can be a series of back-and-forth communications, such as announcements of new programs from the librarian-as-storyteller and attendance or survey responses from the patron-as-audience, and the new forms of programming and services that emerge through that sustained dynamic exchange.

Analysis of the qualitative data collected relied on the S-DIKW framework (Table 1), which posits a set of storytelling abilities, building on data to create information, knowledge, and, to make possible, wisdom (McDowell 2021).

Table 1. The S-DIKW framework.

S-Data	Ability to identify and interpret data from which information emerges that can be communicated in story
S-Information	Ability to inform audiences by communicating data with context as story, in both form and narrative experience
S-Knowledge	Ability to convey knowledge as complex actionable information through the construction and telling of a story, incorporating cultural and contextual cues. S-knowledge is shared frequently in innovative or experimental contexts
S-Wisdom	Ability to know which story to tell—including when, how, and to whom—in order to convey wisdom.

Although there is great interest in data storytelling for libraries, there are still many barriers to instituting practices of data collection and communication. Story-first approaches to data storytelling have the potential to lead to accurate and compelling stories and storytelling experiences for librarians and their public audiences.

Methods

Data storytelling engages new practical and intellectual territory. Qualitative mixed methods allowed for gathering the richest possible data. Funded by a seed grant from Center for Social and Behavioral Science at the University of Illinois, this research took a stories-first approach and identified obstacles to data storytelling, which has led to a Public Library Association workshop on data storytelling as advocacy[1] and an IMLS-funded planning project to collaboratively and iteratively develop a Data Storytelling Toolkit for Librarians.[2]

Methods included interviews (34 participants recruited via snowball sampling and self-selection via social media recruitment, 2016–2022), a questionnaire (28 participants recruited via the Measures that Matter Google group, September 2021), a ranking exercise (25 participants, April 8, 2021) and workshop discussions (942 participants, 6 workshops, 2021–2022). The author and several research assistants conducted interviews with librarians from several types of libraries (public, school, community college, academic). When early interview findings included significant obstacles to data storytelling, we modified the questions to better understand obstacles. Because of the potential vulnerability of disclosing data storytelling obstacles, participants' identities are protected with maximum care. Some interviewees also contributed to one or more of the other activities, depending on how they voluntarily chose to participate. Questionnaire respondents, when they shared their job title, were most frequently library directors, managers, or data specialists. The interface allowed the ranking exercise to be anonymized from the outset. No identifying information was collected during workshop discussions.[3]

Analysis of qualitative data relied on two kinds of processes, theoretical and rich thematic description. The analysis employed theoretical (deductive) analysis first, based on the S-DIKW framework, taking

a constructionist perspective. Because initial analysis revealed emergent latent themes – obstacles to data storytelling – the author consulted with the research team to develop a broader analytic strategy for analyzing patterns as themes (inductive). We crafted a rich description of the obstacles, using close reading and hermeneutic revisiting of the texts collected as data. This approach to thematic analysis (Braun and Clarke 2006) blends deductive and inductive approaches, and both strategies are used to organize the findings. Even though storytelling was the main topic of the semi-structured interview questions (Appendix A), it was necessary to focus on latent concepts in the data because of a general cultural reluctance for people to claim "storytelling" as a skill, similar to hobbyists who humbly claim, "Oh, I'm not an artist, I just paint." Additional themes (obstacles, transitions, emotions) were added inductively during the coding process to reflect the richness of the data, and themes were identified and refined based on input from two coders.

Each kind of data collected provided additional richness to the topic of data storytelling obstacles, and the data collection processes overlapped in time (especially from 2021 to 2022). Interviewees were from every level of library role, from director to frontlines staff, and they started first and continued through and after the workshops. Interviews allowed for conversations about lived experiences of data storytelling obstacles. The questionnaire provided a one-time snapshot from library staff already engaged with library data as participants in the Measures that Matter group (https://measuresthatmatter.net/). The online ranking exercise combined the collaboration of workshop conversations with the anonymity of the platform and ability to upvote responses (described in detail below), providing a second one-time snapshot. Finally, six workshops that took place from 2018 to 2021 with three library consortia (ranging from 32 to 385 participants in each workshop, total of 942 participants) allowed for semi-public (large groups by invitation only) collaborative conversations in which ideas could build on each other in live time.

Results

Table 2 provides a brief overview of results, before going into detailed analysis of each data source.

Table 2. Overview of findings.

Qualitative Data Sources	Primary Obstacles Identified
Interviews	Fear of data, too little time, lack of story strategies
Questionnaire	Tools, training, connecting to audience, lack of time
Ranking Exercise	Time consuming, data are misread, data are not used, narrow focus on "the number"
Workshop Discussions	Data collected but not used, unclear how to tell the story of the library, unsure how to tell stories

These findings are detailed below in analysis of data from (1) interviews, (2) a questionnaire, (3) an online ranking exercise, and (4) workshop discussions. They are then refined as three key takeaways for later workshops.

Interviews

Interviews were semi-structured, and the 34 participants received a set of questions in advance (see Appendix A). Conversations in the interviews emerged from the questions – which were presented as "talking points," – with an emphasis on listening to what participants were already doing and know about data storytelling in libraries. Most interviewees came from public libraries, but librarians from four types of institutions participated in interviews, as seen in Table 3 below.

Table 3. Number of interviewees from types of libraries.

Types of Libraries	Number of Interviewees
Public	20
School	5
Community College	2
Academic	7

Primary obstacles identified via interviews included fear of data, too little time, and lack of story strategies.

Fear of data

One of the most striking findings in the interviews were the attitudinal obstacles to data, meaning both the term itself and data use. Fear of data was shared by the interviewees and observed about colleagues. Perceptions that "data" is for "higher up academics" and "I don't know how to approach that" demonstrated an emotional obstacle. One interviewee described difficulties attracting librarians to workshops: "We don't even use the word data in our workshops, because they won't come." Others noted attitudes like "this sense of apprehension of data" or "I don't do math" or "I don't know how to use Excel." One interviewee pointed toward the need for better data storytelling: "when somebody puts statistics in front of me, and it's just a chart with numbers, it's for me very difficult. I have to have some sort of context to go with it." Another person described the difficulty of fully understanding data related to budgets: "I'm not super confident in my knowledge of how all those budgets work because, as with many libraries, this funding comes from here, this funding comes from here, this funding comes from here." On the other hand, some interviews showed that fear of data was a factor in describing the

importance of overcoming this obstacle: "you have to be able to use it and you have to be not afraid of it."

Some fears were about being able to convey data in equitable ways. Thinking of both coworkers and public audiences, one person asked: "How do we make sure that there's a comfort in learning data, because, I don't like labels, but for an individual who has a learning disability, and who struggles with math, and all of that." Many other interviewees pointed out difficulties with data literacy itself, which has not been a traditional part of all information literacy practices. Concerns centered around accessible understandings of data. One person put it this way: "First there needs to be some understanding of what is data, at a level that, I hate to say it, I don't like to use the word average at the level that people that may not go into getting their Master's or whatever, can understand." Concerns about how data would connect with audiences were also clear: "nobody wants to see your statistics on your Facebook feed." These obstacles – fear of data and fear of inequitable access to understanding data – both point to the ways that librarianship needs greater data literacy, including clear, consistent, and accessible understandings of what data are and what the word "data" means.

Too little time

While this research focused on storytelling use in libraries, a number of related library data training programs came up in the findings, here anonymized. There was genuine praise for existing tools, but they were often mentioned as overly time-consuming. One interviewee described the time barrier this way: "There is great training. And then they go to the training, and they're like, 'Wow, this is awesome. There's so much I could do.' And then they come back to their library, and they're like, 'I don't have time to do that. Who has time to do that?'" Another person described the problem this way: "Because we have so many untrained librarians, having them understand the value is the hurdle that (some trainings) just can't get over. They'll go in and they'll look at it and they'll say, 'Oh, this is too much trouble,' and they won't bother."

Some described time barriers as part of a larger context of problems with control over work. "It's very difficult to get librarians to buy in to using data for both reasons that are outside of their control. Like lack of resources, lack of time." Others were unwilling to spend the time because of uninspiring past practices: "Because I think libraries are also notorious for asking lots of questions and doing lots of surveys, and then doing nothing with that data." Some obstacles to investing time result from past experiences of being unable to accomplish goals, such as inabilities to make funding changes: "my library is kind of chronically underfunded, and we have gone up for a tax increase six times and failed all six times, which is super fun."

There were also many mentions of lack of uptake of available tools. One person had invested significant time: "So, I've created a dashboard so that they can take that to their city manager and say," Hey, this is how we stack up."I don't know that anybody's used it yet." While there was genuine praise for a number of existing library data tools, including those disseminated by Project Outcome, interviewees described time as a major challenge. There was also a clear disconnection between data and storytelling, which were seen as separate disconnected steps, heightening the challenge of time constraints.

Lack of story strategies

Librarians struggle with how to move from data to the basics of a story. As one person said, "we then don't have a mechanism for making meaning of what we do have." There was also a general sense that the communication of data collected was a struggle, specifically "how to tell the story with data. The how to tell part probably needs to be something of a more of a focus." Interviews revealed feelings of discouragement about taking the role of storyteller: "I think this is very difficult for librarians, because it is like creating fictionalized nonfiction. It feels awkward." Without clearer story strategies, such as those we have been teaching in storytelling for 15 years and data storytelling for 5, librarians will continue to be discouraged by this lack as a major obstacle.

There were other obstacles related to storytelling dynamics, externally and internally. Externally, there were barriers to listening to library users as audiences, which centered on presuming to know the desired result. In one example, an interviewee described this listening problem:

> The library is often really rigid on how it sees its services, and so we go out with a menu and we tell people this is what we've got and they say, "I've got a two year old." And you're like, "Great, I've got a story time," without actually asking them anything about that two-year-old, or about their schedule, or about their life.

In this sense, library practices may be overly transactional and not nuanced enough to context.

Internally, obstacles included leadership not listening to data stories, indicating some problems with bad audience dynamics within libraries. As one librarian actively engaged in data collection and public communications said of library leadership: "Do they make decisions based on the data or stories we tell them? I would say absolutely not. I wouldn't say that publicly." Whether external or internal stories, understanding the dynamics of storytelling – that story emerges from interaction between teller and audience – could be beneficial.

The interviews also revealed an overall sense of lack of coherent story strategies for libraries. One experienced storyteller described the issue this way:

> But I don't think as a whole we've figured out what our story is yet. And so it makes it harder to tell our story when we don't really know what it is. We're telling lots of stories and we're using storytelling techniques, but we haven't quite worked our way to what our story is.

There were a few examples of retelling success stories about library use.

> At the legislative hearing, (public) library brought a man to testify that basically, he had educated himself to become an architect through their collection, through interlibrary loan. He learned enough to pass the test. If that is not a powerful story, I do not know what is.

This is a perfect example of the strategy of positioning the library as helper, described below. But examples like these were rare. Without clear guidelines or templates for what kind of story to make of the data, the emphasis in libraries seems to fall on data collection rather than story-driven connection with audiences.

Questionnaire

A qualitative questionnaire (Appendix B) was designed to be a tool for refining insights gleaned from the ongoing interview processes with greater precision. Of the 28 respondents, nine had library director titles and two worked in positions with "data" in the job title. Respondents ranked example obstacles, which were intended to prime their thinking about what obstacles impact them most in the open-ended questions. However, the forced ranking also limited their abilities to respond when obstacles were equally important (or not important at all). The top ranked responses, selected from our pre-generated list were: too little time; don't have data they need; too little focus on storytelling; not enough data. Because several participant comments that the forced ranking methodology was limiting, the analytic focus was on coding the open-ended responses, and the most valuable data were found in the open-ended responses to questions about obstacles. The top coded open-ended data storytelling obstacles were:

- Lack of or difficult tools
- Training
- Connecting to Audience
- Lack of time

Although they were mentioned less frequently, some of the more interesting additional obstacles noted in open-ended responses were: storytelling anxiety; perception of data as threatening; too little face time with stakeholders; need for good models for effective storytelling; and inefficient data gathering and misalignments (for example, data produced for accrediting bodies was not most important for the library). All factors deserve consideration, but this section will explore the top-coded obstacles.

Tools

Most responses indicated a need for better tools. Simply put, the obstacle was: "Time and tools for analysis, including parsing needed data." Unmet needs included graphic design skills and "tools to help visualize the data." Responses revealed presumptions that data storytelling would require analytic skills, platforms, and chronological modeling that are beyond the capacity of staff, for example:

> Lack of understanding on how to challenge our understanding of what is happening and why. Very low analytic skill among most staff. No understanding of how to develop and create platforms that show how the story evolves over time - always a fixed perspective.

As with the interview findings, some responses mentioned current library data tools. Because our study was not seeking to evaluate such tools, these findings should be seen as descriptive and not evaluative. However, exploring the uptake and use of library data tools that have seen broad dissemination would be valuable future research. More accessible and rapid tools could help.

Training

Training issues related to a mix of skills and processes. The difficulties creating buy in to data collection processes often involved lack of skills. One response reads: "It's very hard for us to extract data from our software system; requires specialized training." Another respondent added issues of motivation: "Library staff not interested or lack skills for data collection." Most of the obstacles related to problems with data skills or processes.

But there were also process issues related to storytelling, specifically with knowing how to tell a compelling story using the data available:

> Data can be interpreted so many ways. What is the best story to tell that is relevant to the institution? There are times when the story I think is important does not land the way I wish it would. I'm not sure if it has to do with the way I told the story, or whether the story was irrelevant.

Although it was not named as necessary training, a fear of storytelling appeared in a few responses. For example: "I think the comfort of the storyteller with telling stories is a factor. Some people, no matter how much they rehearse, find telling stories to be stressful, let alone stories with data." This indicates that training in storytelling could also be beneficial. As one respondent stated, "No good models of effective storytelling."

Connecting to audience

Obstacles in connecting to audiences included both metaphorical and literal "language barriers" between the author and audience. As a respondent said: "If

audience has a different background, it can be hard to connect with them," and this included simply lacking a library background. This may indicate a need for more skill in researching audience interests and crafting a story to engage those interests with accurate data. This obstacle sometimes took the form of questions in responses: "How do you craft stories for particular audiences? How do you know what to emphasize for each audience?" Respondents were clearly curious about how to do this well, but lacked guidelines, strategies, and examples.

Lack of time

As with the analysis of interviews, lack of time was a critical factor in the questionnaire responses. This time pressure prevented fruitful analysis: "Lack time to learn tools/skills to combine and visualize data sources, which can lead to insights." The elliptical wording of one response demonstrates: "Can gather data, but I don't have time to synthesize and tell the story. Library small; staff cover operating functions."

Whether related to tools, training, audience connections, or time constraints, there is a need for more direct and efficient approaches to telling library data stories. After the questionnaire results were in, the next step was a follow-up exercise at the next workshop to build on the benefits of the open-ended questions and learn more about obstacles directly from librarians.

Ranking exercise

This exercise for a webinar-style data storytelling workshop was crafted to better understand the top obstacles. During this workshop for a professional organization of community college librarians, 25 participants completed a ranking exercise that provided an interactive way to collect and reflect on the best and worst aspects of data collection for librarians. The online app Padlet (https://padlet.com) was used to first collect experiences – anonymously and in real time – and then to pause, reflect, and upvote the most important descriptions of best/worst aspects. Upvotes allowed participants a simple and clear way to endorse the comments of others with a "thumbs up" symbol. This provided a means of quantifying which reflections were the most important to participants in a ranked list by number of upvotes.

Although there were options to provide examples of both, the contributions were mostly about the worst elements of library data collection. There were only 5 "best" examples (and 4 upvotes), but there were close to 20 "worst" examples with over 60 upvotes. Few responses were difficult to read or code as a best (positive) or worst (negative), but one that could be read either way was: "It takes critical analysis." This data was analyzed deductively based on the S-DIKW framework. The below chart provides a summary of findings, summarized as themes with the upvote counts.

Table 4. Best and worst aspects of data Collection.

S-DIKW Framework	Best	Worst
S-Data	Helps people see (3)	Time consuming (18) Inconsistent format (7) Difficult to obtain the data (2) Time pressure: "I need it in 2 hours"
S-Information	Having data confirm what you think. (1) Understanding the IRB process.	Data are misread (6) "They focus on the wrong data points" (1) Not being able to get data Lack of representative response
S-Knowledge	Seeing what is being used. "Numerical data speaks to my administration. If I can prove it with numbers, they go for it."	Data not used (11) Collected with no goal (5) No support (3)
S-Wisdom	Getting the big picture.	Narrow focus on "the number" (5)

Upvotes appear as numbers in parenthesis, e.g. (3), and direct quotations from the data are indicated with quotation marks to illustrate the themes. Table 4, below, provides a summary of the best and worst aspects of data collection, according to participants.

The first clear finding from this anonymous exercise was the overwhelming focus on obstacles. This will be useful for leaders who task librarians with collecting data.

At the S-Data level, the most upvoted barrier was the time needed to do this work well. The "cumbersome and time consuming" work involved in collecting data was assigned but not valued. As one participant wrote, "Not understanding how difficult to obtain the data and oh i need it in 2 hours." The second biggest barrier was that of the inconsistent format and collection practices.

At the level of S-Information, or informing audiences with data, those who were collecting the data experienced barriers in communicating what they had learned. As they made attempts, they encountered obstacles when leadership would "focus on the wrong data points." In some cases, the message that was intended was not the message received: "They only pay attention to the parts we don't want them to."

When it comes to S-Knowledge, or what actions to take based on collected data and interpretation as information, the worst result was that data were collected but not used. Data was collected "without an actual goal or need," and with no connection to storytelling or even communication generally. One person shared: "My administration never uses data in decision making even though they ask for it." (This statement had 5 upvotes). The lack of action taken based on data was a major barrier to motivation. When librarians come to expect that "no one uses it once it is collected," data storytelling will not be motivating, so feelings of having "no support" are amplified. Again, leaders may need to emphasize data collection as an iterative process of exploration and discovery to create buy-in.

Finally, at the level of wisdom, the key obstacle was related to meaning making. Storytelling is inherently contextual, and in the context of a data storytelling workshop, librarians reflected that there was too much of a narrow focus on data as a number, without context. Rather than looking at data within the big picture, the number itself was elevated to a level of importance that it did not deserve: "It's just numbers." Librarians are often in the middle, between frontlines staff and administration, meaning they have a continuous role in translating the story of the day-to-day to those tasked with strategic decision-making. Storytelling, in this sense, involves more than data and story, it also involves intra-organizational diplomacy.

Workshop discussions

Finally, six workshops on data storytelling concluded with open discussion sessions. Participants asked questions of presenters at the start, but this turned into discussions of what goes right and wrong while trying to tell the story of the library in data. The author and four research assistants contributed to observations of six workshops with 32–385 participants each (total of 942). The workshops all occurred virtually via Zoom, and attendance is approximate because some participants only attended parts of sessions or watched recordings later, which was not possible to track given the range of audiences and organizations.

While each workshop was tailored to the specific audience, a typical agenda included four sections:

(1) Defining storytelling and case studies
(2) Strategies: developing data stories (finding a data character)
(3) Structures: designing data stories (information and emotion, easy to tell)
(4) Coda: By heart – or wisdom – from 130+ years of library storytelling

The workshops themselves were based on data storytelling course curriculum content, modified with a story-first focus. They presented story strategies, including what aspects make a story easier or harder to tell, such as a single protagonist or setting (easier) or multiple protagonists and settings (harder). Other content presented included the interconnection of information and emotion in a story arc; the rising action of a story moving from trouble to struggle, or from difficulty to action; tips for sustaining audience attention; and ideas for keeping stories simple. Workshops centered on narrative strategies and structures that have become standardized through repeated teaching, including three effective narrative structures (here termed "strong story structures") and their emotional impacts, shown in Table 5.

Librarians do not need to become narrative theorists or experts themselves to recognize or create these kinds of stories. All of these narrative structures

Table 5. Strong story structures.

Narrative Structure	Example	Emotional Impact	Originating Theory
Continuity	Sustaining services despite global pandemic challenges	Stability and resilience despite challenges, reassurance of continuity	Tsvetan Todorov's *The Fantastic*, and the story "The Stonecutter" by Andrew Lang, attributed as Japanese but actually Dutch in origin
Transformation	Changing services because of global pandemic	Awe at transformation, joy of watching a hero triumph	Joseph Campbell's *The Hero with a Thousand Faces*
Discovery	Embarking on a process of surveying patrons and what was learned	Mystery, suspense, intrigue, and satisfaction of coming to understanding	Roland Barthes' hermeneutic or enigma code, one of five semiotic codes in *S/Z*

connected immediately and often intimately with librarians' knowledge of stories and great narratives as accomplished readers.

Six occurrences of data storytelling workshops over time saw variations and improvements for different workshop participants, and a number of insights emerged. Some obstacles discussed in earlier workshops were captured and refined as three librarian-specific takeaways for later workshops. The three emergent takeaway obstacles were: 1) data are collected but not used, 2) it can be unclear how to tell the story of the library, and 3) participants were unsure how to tell stories.

Developing ways to address these obstacles was part of the workshop process, so finding them was an outcome from the analysis of transcripts. But crafting the takeaways emerged through a practice of the art of pedagogy, and the resulting collection reflects an intention to be forward-looking, engaging what librarians need to do next. The takeaways were also used in ongoing curriculum improvements and introduce some ideas about how to mobilize the increasingly common and compelling tool of data storytelling for the benefit of libraries everywhere. Additional paths forward are examined in the discussion section. Table 6 shows the relationship between obstacles identified in earlier workshops and takeaways developed for later workshops.

Story before storage emerged as a simple way of communicating to librarians that data are for communication first. In other words, data should be communicated in memorable (story) form as much or more than it is collected and stored for some future undetermined use. As a field, LIS has strong traditions of collection that also, unfortunately, are somewhat misapplied or overapplied in the case of collecting data. The purpose of data collection is creating information, of story, rather than mere storage.

Table 6. Obstacles from workshop discussions and takeaways developed.

Obstacles	Takeaways
Data collected but not used	Story before storage
Unclear how to tell the story of the library	The library is the helper, not the hero
Unsure how to tell stories	Strong story structures

Understanding that t*he library is the helper, not the hero* relates to typical ways that library storytelling has been ineffective in the past. Many public-facing library stories lose audiences because they presume that the audience shares the same values – but in fact it is difficult for many audiences to see the library as the hero of a story. For this reason, in effective library stories, typically the library is the helper, not the hero. This insight emerged from interactive exercises in workshops, asking the question: What is the library in a story? Ideas presented included the protagonist, a character, a setting, and an element of the plot. The library as helper means that the library's role is analogous to folkloric figures who are encountered along the way, *helpers* who provide the protagonist with key resources, valuable treasures, magical objects, and essential knowledge.

Strong story structures are critical for helping librarians to build stories that are meaningful and memorable. Love of narrative is a frequent motivation for entering such a reading-focused field, and so this approach to teaching data storytelling is accessible to this audience. However, structures alone are not enough. In order to fully address data storytelling obstacles, librarians will also need examples of stories with strong structures and guidance on how to use them.

Discussion

This study reveals a need for better approaches to library data as it becomes story. Included in these approaches should be accessible and inviting ways of telling library stories, especially those standard stories of justification that so many libraries routinely strive (and struggle) to tell as they seek to retain or expand funding. In summary, obstacles to data storytelling fall into two categories: 1) emotions and attitudes, and 2) time, tools, and training.

Emotions and attitudes

Obstacles that stem from *emotions and attitudes* relate to fear of data, fear of storytelling, and sometimes discomfort with the connections between data, story, and storytelling. Findings include mistrust of data, not only as content but also because of previous experiences when data were used to threaten the library's mission. Requirements to collect data without a goal, at least in how the collection processes were perceived, have contributed to dislike of data. Even when it is possible to overcome divides within library staff, mistrust of data collection may linger based on past experiences and/or on how data have historically been employed to (over)regulate libraries.

Some negative attitudes stem from lack of confidence in using or even approaching data as a source of information. Before data can inform a story, it must inform the library staff working with it. Even in cases where the skills and abilities might be present, if staff don't have confidence in their ability to interpret

or analyze data, they will be reluctant to present it. Examples that have worked previously are important. Without examples, it could seem to take endless time to create a data story, and that is something that librarians simply do not have.

Time, tools, and training

Time, tools, and training are interrelated obstacles. Time cannot be effectively used without training and accessible tools. Tools alone may function as obstacles if they are not accompanied by both time and training. Training takes time, and it is effective to the degree that it makes tools more accessible and usable. Any one of these obstacles alone may lead to reluctance to take up data storytelling, but these obstacles can also build on each other. For example, a lack of time may be exacerbated by time-intensive trainings that don't result in future time-saving use of data tools.

When tools are developed, they are created by people who are passionate about data, who make a tremendously valuable contribution to our field. However, there is a need for wider research about uptake of the tools, including both deeper exploration of these obstacles and further inquiry about when, where, and why data tools are successful. Without asking when tools become obstacles, leaders may overlook a large portion of librarian audiences who are dealing with fear, avoidance, and even aversion.

It is no doubt uncomfortable to see evidence of these gaps in our own field, especially for those who have been diligently working with data for much of their library careers. Public librarians were predominant but not exclusive in this research, in part because it was important to be clear that these issues pertain across many kinds of libraries. However, in order to advance the field, it is vital to grasp these gaps as thoroughly as possible. Great leaders remove obstacles; first, it is necessary to understand what the obstacles are.

Fundamentally, this research reveals a need for closer connections between data and storytelling. Librarians need to know how to use data in story through wholistic story-first approaches. That way librarians can see example stories in action and understand typical ways that those stories – and their strong narrative structures – connect with specific types of data and across audiences to effectively advocate for library resources (staffing, activities, facilities, etc.). They also need to engage real storytelling dynamics, which involve not only telling stories but also listening as an essential part of that complex dynamic triangle.

In a sense this research is its own way of listening, an effort outside of the usual power dynamics within particular organizations, and one aimed at understanding how librarians think and what they feel about the challenges that data storytelling presents. This research is also a preliminary investigation toward the development of a stories-first approach to library data storytelling called the Data Storytelling Toolkit for Librarians (DSTL), an initiative funded by the IMLS. Since lack of time is a major finding, it will be important to develop plug-

and-play data visualization tools based on standard data types that libraries already collect. Since time, tools, and training can all be obstacles, it will be important to provide short, clear examples of how data can be framed persuasively in stories to help stakeholders understand how libraries have impact.

One interview turned into a conversation about the broader DSTL project. The interviewee responded positively to our promise of the now in-development toolkit: "I'm going to show you something you can just plug and play . . . that you can adapt to your library, that sounds super useful." Clearly that goal resonates widely, as the launch workshop on September 30, 2022 (Data Storytelling for Librarians 2022) had 675 registrants. Future efforts by the Core Design Team of librarians will include a series of workshops that identify and emphasize key genres and structures of stories that libraries need to tell. Building on and cognizant of our field's long-term history of storytelling, this project aims to give library professionals back their own "folklore," classic stories that need to be told again and again, along with easy ways of incorporating typical patterns found in relevant data.

Conclusions

Appreciation of story, narrative, and storytelling constitute a kind of commons in our professional thinking. This shared value should be mobilized as a strength-based approach that connects data storytelling with love of narrative. There also needs to be more efforts made to take strengths-based approaches that leverage what librarians know – as readers and as humans – for the benefit of their work and workplaces. Love of narrative as a strength creates potential for a stories-first approach that broadly motivates librarians to richly engage with data. Data on its own can seem abstract and impersonal, while storytelling with data implies a connection between teller and audience.

It may be possible to mobilize the increasingly common and compelling tool of data storytelling for the benefit of libraries everywhere. Two visions of the future help point the way. First, what if data were only ever collected as a means of telling an ongoing story to our public audiences? What if we made clear precisely which changes were made to the library because of what the public told us? What if that story wasn't just recited but told as a form of listening in action, an interactive practice made evident through the ways this ongoing story responds to its audiences over time? Our future could be redefined by developing a more robust lifecycle of library data, one that attends not just to data collection but through story connection as a fundamental part of library processes.

Second, librarians of the future can be data storytelling experts. As we wrote in the Data Storytelling Toolkit for Librarians grant proposal: "The long-term vision is to cultivate data storytelling expertise as a signature expertise of our field, so that when communities have data storytelling needs they are met at libraries and by librarians." This is where education for librarianship needs to

step up, in formal and informal ways, to actively instill confidence and address emotional and attitudinal barriers. Looking forward, empowering librarians as data-confident professionals will grow the percentage of practitioners in our field who are or become strong at data analytics. Introducing a richer storytelling approach, which is the heritage of our field, has great promise for addressing data storytelling obstacles.

Notes

1. Recorded as an on-demand webinar from the American Library Association, https://elearning.ala.org/local/catalog/view/product.php?productid=269
2. IMLS funding number RE-250094-OLS-21.
3. Approved as "exempt 2 (ii)" by the Office for the Protection of Research Subjects, protocol number 23,158, protocol title "Storytelling in Information Professions," University of Illinois Urbana-Champaign.

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driven era. McDowell is an associate professor at the School of Information Sciences at the University of Illinois Urbana-Champaign, USA. Her teaching on both storytelling and data storytelling was internationally celebrated with the ASIS&T Outstanding Information Science Teacher Award in 2022.

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Appendix A

This excerpt from the standard interview invitation and scheduling email shows the semi-structured interview questions that were sent to participants in advance, described to make it clear that the conversation was not bound by these questions alone:

"Here are my starting-point interview questions, though I welcome a more emergent conversation:

- When have you used storytelling in (your field of work)?
- What type of stories does your organization tell internally?
- What type of stories does your organization tell externally?
- How do you use storytelling in your work?
- In your opinion, is your storytelling effective?"

Follow-up questions frequently included topics like:

- When have you needed to communicate about data in your field of work?
- How do you use data to communicate, and who are your audiences?
- How do you know that stakeholders, internal or external, understand your data?

Appendix B

Data Storytelling Obstacles questionnaire:

(1) What are the obstacles to your organization telling better data stories? (Selecting from examples such as: Not enough data, too little time to gather data, too little focus on story, etc.)
(2) Are there other important obstacles not listed here? If so, please describe them.
(3) Are there successful data stories that you would like to share, examples that might demonstrate a desirable end-product of a data storytelling process? If so, please share a link and/or description here.
(4) Would you like to be contacted to receive and review the next iteration of the Data Storytelling Toolkit?
(5) Would you like to share your experience in an interview in order to help develop this toolkit for nonprofits?