

# Troubleshooting the IT Leadership Gap

*Melissa Cherry and Craig Boman\**

## Introduction

Information technology (IT) departments in academic libraries are falling behind in the race to meet the growing technological expectations of patrons.<sup>1</sup> To contribute to this larger failure, many library IT departments are struggling internally to diversify staff in terms of race/ethnicity and gender, recruit and retain leadership and qualified staff, and integrate those staff into the library culture at large. Some of these observations are supported by scholarly research; however, many of these challenges have not been systematically investigated by rigorous quantitative methodologies within the library field specifically. This article attempts to fill this gap by offering a review of literature from various disciplines like women's studies, higher education leadership, and computer science and reporting on the results of the researchers' 2018 national survey of library IT workers and leaders that investigates a claim present in the current scholarly literature: women's lack of confidence is influential in the low sense of belonging of IT organizations within the larger library culture. Although the survey data show differences in levels confidence and empowerment between men and women, ultimately, little evidence was found, either in the review of literature or in the analysis of the data collected in the survey, to support this claim.

## Literature Review

One might assume that, because the library profession as a whole is dominated by women, library IT departments do not suffer gender inequalities to the extent seen in the tech field. However, according to a recent Association of Research Libraries survey, a mere 30% of library IT positions are filled by women,<sup>2</sup> which is on par with the statistics seen in the tech industry.<sup>3</sup> In spite of this finding, of the library directors surveyed, 65% believe their libraries are gender inclusive and only 11% consider gender a significant barrier to hiring a diverse staff.<sup>4</sup> Sadly, the gender gap issue appears to be failing to garner the attention it deserves from both the perspectives of administration and within libraries and library IT departments themselves.

In an attempt to shed more light on this situation, in their issue brief, "Finding a Way from the Margins to the Middle: Library Information Technology, Leadership, and Culture", Dale Askey and Lisa Hinchliffe acknowledge the disproportionately high representation of white men as one factor among many which culminate in the "siloeing" of IT departments. On the whole, the anecdotal evidence presented in this issue brief rings true. One particular challenge that the authors raise is related to library IT culture: "[t]he culture that tends to emerge in information technology clusters, even in libraries and regardless of how well humored it may be, repels people (men and women alike) who do not want to participate in objectionable and destructive cultures."<sup>5</sup> In short, Askey and Hinchliffe suggest that, despite being couched in a field that is predominantly composed of women, library IT culture is not resistant to the ills of toxic workplace dynamics that are prevalent in the tech industry.<sup>6</sup>

While demonstrably problematic workplace cultures certainly negatively affect recruitment and retention, psychology literature suggests a less overt, more nuanced understanding of people's choices to participate in

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certain workplace cultures. In their article, “Ambient Belonging”, Cheryan et al. argue that “[e]nvironments can act like gatekeepers by preventing people who do not feel like they fit into those environments from ever considering membership in the associated groups.”<sup>7</sup> In other words, people who perceive that they do not fit the IT worker stereotype can feel a low sense of belonging to that group which, in turn, lowers their interest in becoming a part of it. Askey and Hinchliffe confirm the existence of these types of environments in libraries: “all male units, where information technology work happens in a club-like environment...where women and people of color may be unwelcome or even harassed.”<sup>8</sup> It follows that people do not actively choose not to participate in toxic cultures because they are destructive, but rather because they believe themselves to not belong because they do not conform to the stereotype that characterizes those who belong to the club. These types of cultures that undermine women’s interest in joining are not necessarily outwardly unwelcoming or toxic, rather they simply “signal a masculinity that precludes women from ever developing an interest in computer science.”<sup>9</sup>

In addition to IT cultures that are deterrent to women working with technology, Lori Ricigliano and Reneé Houston note that, in academic libraries “[g]endered division of labor favors men because organizations place greater value on positions associated with masculinity.”<sup>10</sup> Melissa Lamont echoes this, adding that increasing the number of women in these highly valued, masculine-perceived positions will result in their devaluation, both financially and culturally.<sup>11</sup> Krista Scott-Dixon confirms this phenomena in the tech field more generally, remarking that “[a]s jobs become female typed, workers performing them are more likely to be paid less and face limitations on their opportunities for advancement.”<sup>12</sup> Lamont argues that attempting to change IT culture by only increasing the number of women will not necessarily change the culture and may potentially decrease the value of those positions, so another tactic should be used. While they suggest this in different terms, Lamont and Scott-Dixon both come to the conclusion that, because of the hybridization of traditional tasks with technology work, reevaluating the definition of IT worker will be necessary to create change in IT culture. In particular, Scott-Dixon suggests the adoption of a new understanding that moves beyond the dichotomy between technical and non-technical and toward viewing technology work as a continuum.<sup>13</sup>

The “gendered division of labor” that Ricigliano and Houston describe also applies to library leadership more broadly. Emmett Lombard remarks that “female leadership is devalued or inhibited regardless traits or behaviors.”<sup>14</sup> McGee also describes this catch-22 in the tech industry more generally: “Women face criticisms when they display agentic qualities inherent in many leadership roles, such as asserting authority over others. However, if they exhibit communal qualities such as being supportive of others they often experience disapproval and devaluation of their contributions.”<sup>15</sup> In other words, in their role as leader, women are placed in a no-win situation: either behave as society expects of their gender or behave as society expects of a leader. These “unconscious stereotypes about females often mire their leadership” and create an inhospitable environment for women, similar to library IT.<sup>16</sup> To make matters even worse, McGee notes that “people judged women as less effective than men in leadership positions occupied by more men.”<sup>17</sup> So not only do women in IT leadership face a doubly difficult task to overcome both sets of stereotypes, but their leadership skills are also perceived more negatively when they are tasked with leading teams of mostly men.

Implicit in Askey and Hinchliffe’s suggestion to prioritize the promotion of people with library experience into library IT leadership roles is the idea that that effort would be facilitated by increasing the proportion of women in the library IT workforce. However, advancement into IT leadership roles is a difficult path in the technology field,<sup>18</sup> and especially so for women. Askey and Hinchliffe acknowledge that “[l]ibrary and information technology staff are generally blocked from entering library leadership roles” and that, instead, “positions...are often filled with men drawn from information technology management ranks or computer science programs, i.e., outsiders.”<sup>19</sup> This phenomenon is also true in the larger tech industry. Kimberly McGee points out that “[a]ssuming that advancement in

IT is a natural result of time in grade also ignores how IT culture and gender stereotypes affect advancement.”<sup>20</sup> It follows, then, that the path to IT leadership in libraries is also more difficult for women. Because of these barriers, merely hiring more women into technical roles will not suffice to increase the proportion of women in leadership roles because these positions do not necessarily provide a path to leadership in these departments.

However insightful the majority of their points, Askey and Hinchliffe’s perspective on the role of women’s confidence in the dearth of female IT leaders and applicants is problematic. The authors point to “differences between men and women with regard to self-assessment of expertise and fit for a particular job” as a contributing factor in the excess of unfilled IT leadership positions.<sup>21</sup> In support of this claim, the authors cite two popular sources, *The Atlantic* and *Harvard Business Review*, that state women’s lack of confidence is to blame for their underrepresentation in fields dominated by men.<sup>22</sup> The impact of women’s confidence on career choice has been investigated in other disciplines;<sup>23</sup> however, Askey and Hinchliffe’s claim has been countered by more recent articles from *The Atlantic* and *Harvard Business Review* and resoundingly refuted in feminist literature.<sup>24</sup> In “The Confidence Cult(ure)”, Rosalind Gill and Shani Orgad argue that the “focus on confidence is partly predicated on the supposedly ‘pragmatic’ view that masculine domination and gender inequality are virtually impossible to challenge at the structural level ...and, thus, the only way to challenge them effectively is for women to internalise both the responsibility for the problem and the program required to resolve it.”<sup>25</sup> In other words, Askey and Hinchliffe are, perhaps unwittingly, laying the blame for not achieving gender balance in both technology and leadership positions squarely on the shoulders of women rather than on the organization. It was this assumption that the researchers sought to examine through a national survey of library IT workers and leaders.

## Methodology

For this study, the researchers distributed a survey to subscribers of the Code4lib and Library Information Technology Association (LITA) email list; approximately 7000 people.<sup>26</sup> These listserv groups are comprised mostly of library staff and faculty whose responsibilities are technology-focused in some way. 150 individuals responded to the survey but not all participants completed all questions and in some cases submitted partial responses, including completed responses ( $n=134$ ). Although this research attempts to generalize findings to the entire library population of 126,800 librarians,<sup>27</sup> the researchers are primarily concerned with analyzing responses from the smaller, subset population whose responsibilities are primarily technology-focused or leadership oriented.

The survey instrument of 27 questions (see Appendix 1) included a mix of five-point Likert questions, categorical questions, and open ended text fields. To gather gender and race/ethnicity data, the researchers used an open-ended text box, which allowed participants to report their own gender and race/ethnicity rather than having a label prescribed to them. The open-ended gender responses were standardized to make them compatible for data analysis. Because too few respondents ( $n=2$ ) fell outside of the gender binary, the researchers are unable to reach meaningful conclusions about that sample group. Participants who identified themselves as women accounted for the majority of respondents (women=83), where men accounted for on a smaller percent (men=45).

In addition to demographic questions, fifteen questions were dedicated to asking the participants about their technology and leadership confidence, as well as their feelings of belonging. Only nine questions were tested for statistical significance. Tests of variance and non-parametric Mann Whitney U tests were conducted, allowing researchers to compare group means to examine how women and men responded to the survey instrument.

Given the large variance among institutions in the existence and size of formal IT departments and differences in understandings about what qualifies as technical work,<sup>28</sup> the researchers were intentionally broad in their definition of “IT worker” so as to be inclusive of those librarians or staff members who perform technology work but do not fall within a concrete IT department.<sup>29</sup>

Using Cheryan et al.'s understanding of how stereotypes affect belonging and career choice, the researchers reframed Askey and Hinchliffe's idea of "siloeing" in terms of a department-wide lack of belonging to the larger library culture. To test the Askey and Hinchliffe's claim that women's lack of confidence is influential in the low sense of belonging of IT organizations within the larger library culture the researchers developed a number of questions:

1. Is there a difference in the levels of confidence between men and women?
2. Is there a difference between men and women in the likelihood to apply for a job?
3. Is there a difference between men and women's sense of belonging to the larger library culture?

## Results & Data Analysis

When testing for homogeneity of variance between men and women, variances for confidence in technology skills ( $F(2, 120) = .762, p=0.001$ ) and women's empowerment to give their opinion on library IT topics ( $F(2, 100) = 3.98, p=0.004$ ) both failed; equal variances cannot be assumed.<sup>30</sup> Because the two sample groups (women and men) were different sizes and these tests failed for homogeneity of variances, the researchers were unable to fully meet the assumptions necessary to justify parametric tests.

When evaluating the output from the Mann Whitney tests, the researchers found statistically significant differences between the group mean of women and men, and responses to their confidence in their own technology skills (Q12) ( $U=1248, p=.001$ ) and how empowered they felt to give their opinion on library IT topics (Q13) ( $U=1354, p=.009$ ). There were no differences between their career optimism (Q21) ( $U=1628, p>.05$ ), likelihood to apply for jobs for which they do not meet all the qualifications (Q22) ( $U=1693, p>.05$ ), nor was there a difference between how much they felt a part of their library culture (Q24) ( $U=1700, p>.05$ ). From these data the researchers conclude that the group means for technology confidence of women and their empowerment towards giving their opinion on library IT topics were significantly lower than the group means for men in the survey.

## Discussion

Preliminary results of the data analysis answer the first research question affirmatively: differences do exist in the levels of confidence in technology skills between men and women. This finding confirms results from other studies. Askey and Hinchliffe assert that this discrepancy in levels of confidence has a corresponding effect on individuals' likelihood to apply for a job. However, this correlation does not necessarily follow. In fact, based on the analysis of the data regarding the second research question (Is there a difference between men and women in the likelihood to apply for a job?), the researchers found no statistically significant difference between men's and women's likelihood to apply for a job. This suggests that there is not a relationship between confidence in IT skills and the likelihood to apply for a position in the manner that Askey and Hinchliffe suggest. Because of this finding, the researchers reject the first claim that differences in confidence have a significant impact the disparity of women in library IT positions. This finding is well situated amongst other literature regarding confidence, demonstrating that the onus to create gender balance in library IT should not be placed on individual women, rather that change needs to be sought at the institutional and cultural levels.

Results of the survey also show that there is no statistically significant difference in feelings of belonging between men and women to the larger library culture. Askey and Hinchliffe argue that "siloeing" is the cause of negative and toxic IT cultures within libraries; however, the researchers propose the opposite: negative cultures contribute to the perceived lack of belonging of these units. Perhaps it is the fact that "men more often associate their positions with IT; women tend to identify with a larger more encompassing group within the organization, not specifically IT" that makes it appear as though IT departments are separate from the larger library culture.<sup>31</sup>

In other words, men don't necessarily feel a stronger belonging to the IT department than the library at large, but rather that they are inclined to primarily identify themselves with that unit first because of the prestige that accompanies that designation. Because the sense of belonging to the library as a whole is relatively equal between men and women, increasing the number of women in IT roles will not, of its own accord, cause any change in the overall sense of belonging of IT departments in libraries. In other words, filling IT roles with more women, will not in and of itself, improve organizational culture. The second claim that differences between men and women's sense of belonging has an effect on the overall belonging of the IT department to the larger library culture should also be rejected.

Difficulties in recruiting and retaining staff regardless of gender point more to an issue with organizational culture than women's lack of confidence. The survey results show that women feel less empowered than men to give their opinion on library IT topics, which corroborates the existence of a problematic library IT culture. Low feelings of empowerment to give opinions is an indicator of a poor culture that tends to silence women's opinions. This complicates Askey and Hinchliffe's call for efforts to increase the pool of potential library IT leaders and move IT into the library mainstream. It is clear that the de-siloing of library IT will not be accomplished until library IT culture has changed such that women feel equally empowered to participate in and contribute to technology work.

It is perhaps easy to see, given all of the obstacles placed before them to enter library IT leadership, how women might become discouraged about their career potential in libraries. Askey and Hinchliffe claim that leaving to find better opportunities is often a considerable contributing factor in turnover rates in library IT: "[t]alented staff find that they must leave the organization in order to grow their careers and find the work that they want to do."<sup>32</sup> However, respondents to the survey were optimistic about their careers regardless of gender. While the question did not specify about optimism regarding remaining in librarianship, it is still a good indicator that library workers see potential in their careers.

Askey and Hinchliffe offer a few solutions to the problem of "siloing", one of which focuses on changing structures to distribute IT workers throughout the library. They argue that this will "thwart the formation of the all-male IT cluster that displays some of the negative traits endemic to such work environments."<sup>33</sup> The researchers argue, however, that IT work in libraries is already more distributed than Askey and Hinchliffe suggest. It is not uncommon to see hybrid positions throughout the library. For example, many e-resources librarians perform technology heavy duties but are not considered to be IT workers and typically fall outside of the formal IT department. Given this anecdotal evidence, one can surmise that Askey and Hinchliffe's proposed solution to spread IT workers throughout the library will not be enough. Stereotypes and belonging play a considerable part in the definition of roles and expectations within an organizational culture. In other words, our own definitions and presumptions of what it means to be an IT worker or a leader are barriers to creating change.

## Limitations & Further Research

Typically when sampling does not match the intended population statically, as is the case with the proportions of women and men in the results of this survey, a greater weight can be given to one group in order to improve the analysis. During the data analyses, no weighting was given to the either group in the sample data, though this could have improved the confidence of the conclusions.

Due to the low response rate (n=2), the researchers were not able to reach meaningful conclusions about the group of participants that reported a non-binary gender. To resolve this limitation, the researchers would like to repeat this study but take into a great account for gender as a spectrum, rather than the gender binary. This would allow for gender research in libraries that is more inclusive. Since library staff who identify as gender non



binary or gender non conforming make up a small percent of the total library population, a phenomenological study would yield better results.

Because this study investigated women as a group, it was not conducted in such a way that affirmed the intersectionality of women's experiences and identities, and thus, it overlooks the impact of other indicators of "social location" such as age, immigration status, or ethnic background.<sup>34</sup> As such, the researchers were unable to paint a picture of gendered IT work in libraries with the desired level of nuance. Future qualitative research might investigate more closely the effect of these influences and how they interact with gender. The researchers highlight the continued need for the library community to expand its understanding of how belonging contributes to the library's ability to attract and retain candidates in library technology and leadership roles. The findings of this study are only a small part of the larger discussion concerning recruiting and retaining diverse candidates for positions regardless of gender. The researchers recommend expanding research into how confidence and belonging play a role in recruiting and retaining diverse candidates as well as a deeper investigation into the importance of intersectionality among these other types of diversity and gender.

## Conclusion

Based upon the investigation of the data from the study performed, the researchers reject the claim that women's lack of confidence accounts for the low sense of belonging of IT organizations within the larger library culture. While the data analysis showed that there are differences in IT confidence between men and women, there was no corresponding discrepancy in the likelihood to apply for a job. This finding, in combination with the results that showed the level of feelings of belonging between the two groups are not statistically different, calls into question the validity of Askey and Hinchliffe's claim. The researchers also propose that the central issue of their article, the "siloing" of IT within the library, is a symptom of a toxic culture rather than the cause. The finding that women feel less empowered than men to give their opinion on library topics gives further credit to the idea that library IT cultures are not welcoming towards women.

One way to go about changing stereotypes about library IT workers, and thus improving the culture, is to broaden the definition of who is an IT worker. By being more inclusive of who belongs in this group, libraries can simultaneously be more generous in their support of technological exploration by librarians who do not formally belong to the IT department and make significant efforts to change our stereotypes of what it means to be an IT worker. Disregarding and minimizing the technologically skilled work that librarians are doing in areas outside of formal systems or IT departments creates a divide that makes their work harder and hinders collaboration and, therefore, slows technological adoption and innovation. To motivate a change in library IT culture, the profession needs to broaden its definition of what it means to be a library IT worker. By acknowledging that both the technical and non-technical work that these staff do are of equal importance and prestige libraries can move toward breaking down the perceived barrier between IT staff and non IT staff.

# Appendix A. Survey Instrument

## Technology and Leadership in Academic Libraries

### Consent

#### Research Consent Information: Technology and Leadership in Academic Libraries

The purpose of this research is to examine the relationship between library information technology (IT) staff, leadership and belonging. This study is being conducted by researchers from the Miami University Libraries. Open invitations to complete this online survey have been posted on professional listservs and websites such as LITA and Code4Lib. Participation in this research is restricted to persons 18 years of age or older. Completing the survey should take about 10 minutes. Your participation is voluntary, you may skip questions you do not want to answer, and you may stop at any time. The survey does not request information that would explicitly identify you. If you inadvertently include identifying information, such information will be removed from stored data. Only the researchers will have access to individual responses. Results of the survey will only be presented publicly as aggregate summaries. If you would like to receive a report of the general results of this project, you have any questions about this research, or you feel you need more information to complete this survey, you can contact the lead researchers at [cherrymk@miamioh.edu](mailto:cherrymk@miamioh.edu) or [bomanca@miamioh.edu](mailto:bomanca@miamioh.edu). If you have questions or concerns about the rights of research subjects, you may contact our reviewing body: the Research Ethics and Integrity Office at Miami University at (513) 529-3600 or [humansubjects@miamioh.edu](mailto:humansubjects@miamioh.edu).

Thank you for your participation,

Melissa Cherry and Craig Boman

### Demographics

Q1 Age

▼ 18-19 (1) ... 90-99 (9)

Q2 Gender

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Q3 Race/Ethnicity

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Q4 Highest Degree Earned

- ☐ High school (1)
- ☐ Bachelor's (2)
- ☐ Master's (3)
- ☐ PhD (4)
- ☐ Other (5) \_\_\_\_\_

Q5 Department in Library (select all that apply)

- ☐ Circulation (1)
- ☐ Reference (2)
- ☐ Technical Services/cataloging (3)
- ☐ Information Technology (4)
- ☐ Management (5)

- ☐ Special Collections/Archives (6)
- ☐ Other (7) \_\_\_\_\_

## *Leadership*

Q6 Please select the statement that best describes you:

- ☐ I am currently working in a library leadership position (1)
- ☐ I have previously held a library leadership position, but no longer hold one (2)
- ☐ I am actively pursuing a library leadership position (3)
- ☐ I have previously applied for a library leadership position, but am no longer actively searching (4)
- ☐ I have considered applying for a library leadership position, but have not applied (5)
- ☐ I have never considered applying for a library leadership position (6)

Q7 How confident are you in your leadership skills?

- ☐ Extremely confident (1)
- ☐ Very confident (2)
- ☐ Moderately confident (3)
- ☐ Slightly confident (4)
- ☐ Not at all confident (5)

Q8 How empowered do you feel to give your opinion on library leadership topics?

- ☐ Extremely empowered (1)
- ☐ Very empowered (2)
- ☐ Moderately empowered (3)
- ☐ Slightly empowered (4)
- ☐ Not at all empowered (5)

Q9 Do you feel that your education adequately prepared you for a role in leadership?

- ☐ Yes (1)
- ☐ No (2)
- ☐ Maybe (3)

Q10 Do you believe that you currently receive enough professional development to advance in library leadership?

- ☐ Yes (1)
- ☐ No (2)
- ☐ Maybe (3)

## *Technology*

Q11 Please select the statement that best describes you:

- ☐ I am currently working in a library technology position (1)
- ☐ I have previously held a library technology position, but no longer hold one (2)
- ☐ I am actively pursuing a library technology position (3)
- ☐ I have previously applied for a library technology position, but am no longer actively searching (4)
- ☐ I have considered applying for a library technology position, but have not applied (5)
- ☐ I have never considered applying for a library technology position (6)

Q12 How confident are you in your technology skills?

- ☐ Extremely confident (1)



- ☐ Very confident (2)
- ☐ Moderately confident (3)
- ☐ Slightly confident (4)
- ☐ Not at all confident (5)

Q13 How empowered do you feel to give your opinion on library IT topics?

- ☐ Extremely empowered (1)
- ☐ Very empowered (2)
- ☐ Moderately empowered (3)
- ☐ Slightly empowered (4)
- ☐ Not at all empowered (5)

Q14 Do you feel that your education adequately prepared you for a role in technology?

- ☐ Yes (1)
- ☐ No (2)
- ☐ Maybe (3)

Q15 Do you believe that you currently receive enough professional development to advance in library technology?

- ☐ Yes (1)
- ☐ No (2)
- ☐ Maybe (3)

### *Library Culture*

Q16 My library's leadership is composed of:

- ☐ No people with an IT background (1)
- ☐ Some people with an IT background (2)
- ☐ Many people with an IT background (3)
- ☐ All people with an IT background (4)
- ☐ I don't know (5)

Q17 How confident are you in your library's leadership to make decisions about technology?

- ☐ Extremely confident (1)
- ☐ Very confident (2)
- ☐ Moderately confident (3)
- ☐ Slightly confident (4)
- ☐ Not at all confident (5)

Q18 What statement most accurately describes your IT staff?

- ☐ Mostly focused on fixing (1)
- ☐ Slightly focused on fixing (2)
- ☐ Equally focused on fixing and innovating (3)
- ☐ Slightly focused on innovating (4)
- ☐ Mostly focused on innovating (5)

Q19 When thinking about your library IT staff's relationship to other units in your library, which of these options best describes how they interact?

- ☐ Mostly reactive (1)
- ☐ Somewhat reactive (2)

- ☐ Equally reactive and proactive (3)
- ☐ Somewhat proactive (4)
- ☐ Mostly proactive (5)

Q20 How gender diverse is your library IT staff?

- ☐ Entirely men (1)
- ☐ Mostly men (2)
- ☐ Equal (3)
- ☐ Mostly women (4)
- ☐ Entirely women (5)
- ☐ I don't know (6)

Q21 How optimistic are you about your opportunities for growth in your career?

- ☐ Extremely optimistic (1)
- ☐ Somewhat optimistic (2)
- ☐ Neither optimistic nor pessimistic (3)
- ☐ Somewhat pessimistic (4)
- ☐ Extremely pessimistic (5)

Q22 How likely are you to apply for a job that you don't meet all of the qualifications for?

- ☐ Extremely likely (1)
- ☐ Somewhat likely (2)
- ☐ Neither likely nor unlikely (3)
- ☐ Somewhat unlikely (4)
- ☐ Extremely unlikely (5)

Q23 How empowered do you feel to give your opinion on general library subjects?

- ☐ Extremely empowered (1)
- ☐ Very empowered (2)
- ☐ Moderately empowered (3)
- ☐ Slightly empowered (4)
- ☐ Not at all empowered (5)

Q24 How much do you feel you are a part of your library culture?

- ☐ A great deal (46)
- ☐ A lot (47)
- ☐ A moderate amount (48)
- ☐ A little (49)
- ☐ None at all (50)

## Appendix B. Case Processing Summary

		N	%
Cases	Valid	134	95.7
	Excluded <sup>a</sup>	6	4.3
	Total	140	100.0
<sup>a</sup> Listwise deletion based on all variables in the procedure.			
<b>Reliability Statistics</b>			
Cronbach's Alpha	N of Items		
.744	9		

## Appendix C. Mann Whitney U Test

<b>TABLE 1</b>				
<b>Ranks</b>				
	<b>Gender_num</b>	<b>N</b>	<b>Mean Rank</b>	<b>Sum of Ranks</b>
How confident are you in your technology skills?	1	82	56.60	4641.50
	3	45	77.48	3486.50
	Total	127		
How empowered do you feel to give your opinion on library IT topics?	1	82	58.02	4757.50
	3	45	74.90	3370.50
	Total	127		
How optimistic are you about your opportunities for growth in your career?	1	78	62.63	4885.00
	3	44	59.50	2618.00
	Total	122		
How likely are you to apply for a job that you don't meet all of the qualifications for?	1	78	61.79	4819.50
	3	44	60.99	2683.50
	Total	122		
How much do you feel you are a part of your library culture?	1	79	62.48	4936.00
	3	44	61.14	2690.00
	Total	123		

**TABLE 2**

Ranks				
	Gender_num	N	Mean Rank	Sum of Ranks
How confident are you in your leadership skills?	1	83	65.15	5407.50
	3	45	63.30	2848.50
	Total	128		
How empowered do you feel to give your opinion on library leadership topics?	1	83	62.42	5181.00
	3	45	68.33	3075.00
	Total	128		
How confident are you in your library's leadership to make decisions about technology?	1	79	62.05	4902.00
	3	44	61.91	2724.00
	Total	123		
How empowered do you feel to give your opinion on general library subjects?	1	78	62.05	4840.00
	3	44	60.52	2663.00
	Total	122		

**TABLE 3**

Test Statistics <sup>a</sup>					
	How confident are you in your technology skills?	How empowered do you feel to give your opinion on library IT topics?	How optimistic are you about your opportunities for growth in your career?	How likely are you to apply for a job that you don't meet all of the qualifications for?	How much do you feel you are a part of your library culture?
Mann-Whitney U	1238.500	1354.500	1628.000	1693.500	1700.000
Wilcoxon W	4641.500	4757.500	2618.000	2683.500	2690.000
Z	-3.276	-2.620	-.497	-.130	-.208
Asymp. Sig. (2-tailed)	.001	.009	.619	.896	.836

<sup>a</sup>Grouping Variable: Gender\_num

**TABLE 4**

Test Statistics <sup>a</sup>				
	How confident are you in your leadership skills?	How empowered do you feel to give your opinion on library leadership topics?	How confident are you in your library's leadership to make decisions about technology?	How empowered do you feel to give your opinion on general library subjects?
Mann-Whitney U	1813.500	1695.000	1734.000	1673.000
Wilcoxon W	2848.500	5181.000	2724.000	2663.000
Z	-.296	-.901	-.023	-.239
Asymp. Sig. (2-tailed)	.767	.368	.982	.811

<sup>a</sup>Grouping Variable: Gender\_num

## Appendix D. Levene's Test

<b>TABLE 1</b>					
<b>Group Statistics</b>					
	<b>Gender_num</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Std. Error Mean</b>
How confident are you in your leadership skills?	1	83	3.37	.744	.082
	3	45	3.27	.751	.112
How empowered do you feel to give your opinion on library leadership topics?	1	83	3.22	1.001	.110
	3	45	3.33	1.243	.185
How confident are you in your technology skills?	1	82	3.45	.788	.087
	3	45	3.96	.796	.119
How empowered do you feel to give your opinion on library IT topics?	1	82	3.46	.945	.104
	3	45	3.93	.837	.125
How confident are you in your library's leadership to make decisions about technology?	1	79	3.09	.977	.110
	3	44	3.14	.955	.144
How optimistic are you about your opportunities for growth in your career?	1	78	3.36	1.006	.114
	3	44	3.23	1.159	.175
How likely are you to apply for a job that you don't meet all of the qualifications for?	1	78	3.50	1.214	.137
	3	44	3.52	1.089	.164
How empowered do you feel to give your opinion on general library subjects?	1	78	3.72	.992	.112
	3	44	3.61	1.205	.182
How much do you feel you are a part of your library culture?	1	79	3.59	1.104	.124
	3	44	3.52	1.171	.177

**TABLE 2**

**Independent Samples Test**

Levene's Test for Equality of Variances		t-test for Equality of Means							95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference		Lower	Upper
How confident are you in your leadership skills?	.013	.910	.773	126	.441	.107	.138		-.167	.380
Equal variances assumed										
Equal variances not assumed			.771	89.714	.443	.107	.139		-.168	.382
How empowered do you feel to give your opinion on library leadership topics?	4.946	.028	-.576	126	.565	-.116	.202		-.516	.283
Equal variances assumed										
Equal variances not assumed			-.541	75.348	.590	-.116	.215		-.546	.313
How confident are you in your technology skills?	.678	.412	-3.437	125	.001	-.504	.147		-.795	-.214
Equal variances assumed										
Equal variances not assumed			-3.426	89.887	.001	-.504	.147		-.797	-.212
How empowered do you feel to give your opinion on library IT topics?	3.026	.084	-2.788	125	.006	-.470	.169		-.804	-.136
Equal variances assumed										
Equal variances not assumed			-2.889	100.466	.005	-.470	.163		-.793	-.147
How confident are you in your library's leadership to make decisions about technology?	.337	.563	-.262	121	.794	-.048	.182		-.409	.313
Equal variances assumed										
Equal variances not assumed			-.264	90.740	.793	-.048	.181		-.407	.312
How optimistic are you about your opportunities for growth in your career?	1.028	.313	.657	120	.512	.132	.200		-.265	.529
Equal variances assumed										
Equal variances not assumed			.632	79.345	.530	.132	.209		-.283	.547
How likely are you to apply for a job that you don't meet all of the qualifications for?	1.620	.206	-.103	120	.918	-.023	.221		-.460	.414
Equal variances assumed										
Equal variances not assumed			-.106	97.647	.916	-.023	.214		-.448	.402
How empowered do you feel to give your opinion on general library subjects?	2.198	.141	.515	120	.607	.104	.202		-.296	.505
Equal variances assumed										
Equal variances not assumed			.488	75.974	.627	.104	.214		-.321	.530
How much do you feel you are a part of your library culture?	.195	.659	.340	121	.734	.072	.212		-.348	.492
Equal variances assumed										
Equal variances not assumed			.335	84.653	.739	.072	.216		-.357	.501



## Endnotes

1. Dale Askey and Lisa Hinchliffe, "Finding a Way from the Margins to the Middle: Library Information Technology, Leadership, and Culture," *Ithaka S+R*, Last Modified 18 May 2017. <https://doi.org/10.18665/sr.303501>.
2. Roger Schonfeld and Liam Sweeney, "Inclusion, Diversity, and Equity: Members of the Association of Research Libraries: Employee Demographics and Director Perspectives," *Ithaka S+R*, Last Modified 30 August 2017. <https://doi.org/10.18665/sr.304524>, Fig. 7.
3. Kimberly McGee, "The influence of gender, and race/ethnicity on advancement in information technology (IT)," *Information and Organization* 28, no. 1 (2018): 2.
4. Schonfeld and Sweeney, Fig. 18
5. Askey and Hinchliffe, 9.
6. McGee, 7. McGee notes that symptoms of toxic workplace culture often found in the tech industry are "dissatisfaction, stress and turnover", and "isolation and outsider status".
7. Sapna Cheryan, Victoria C. Plaut, Paul G. Davies, and Claude M. Steele, "Ambient belonging: How stereotypical cues impact gender participation in computer science," *Journal of personality and social psychology* 97, no. 6 (2009): 1045.
8. Askey and Hinchliffe, 6.
9. Cheryan et al., 1046.
10. Lori Ricigliano and Renee Houston, "Men's work, women's work: The social shaping of technology in academic libraries," *Association of College and Research Libraries 11th Annual National Conference, Charlotte, NC*, vol. 1. 2003.
11. Melissa Lamont. "Gender, technology, and libraries," *Information Technology and Libraries* 28, no. 3 (2009): 141.
12. Krista Scott-Dixon, "From digital binary to analog continuum: Measuring gendered IT labor: Notes toward multidimensional methodologies," *Frontiers: A Journal of Women Studies*(2005): 38.
13. Scott-Dixon, 39.
14. Lombard, Emmett. "Gender and Leadership in Academic Libraries." *The Journal of Academic Librarianship* 44, no. 2 (2018): 226-230.
15. McGee, 8
16. Lombard, 228
17. McGee, 8.
18. McGee, 2.
19. Askey and Hinchliffe, 7.
20. McGee, 2.
21. Askey and Hinchliffe, 7.
22. Katty Kay and Claire Shipman, "The Confidence Gap," *The Atlantic*, (2014) <http://www.theatlantic.com/magazine/archive/2014/05/the-confidence-gap/359815/>; Tara Sophia Mohr, "Why Women Don't Apply for Jobs Unless They're 100% Qualified," *Harvard Business Review*, (2014) <https://hbr.org/2014/08/why-women-dont-apply-for-jobs-unless-theyre-100-qualified>.
23. Correll, Shelley J., "Gender and the career choice process: The role of biased self-assessments," *American journal of Sociology* 106, no. 6 (2001): 1691-1730; Ming-Te Wang and Jessica L. Degol. "Gender gap in science, technology, engineering, and mathematics (STEM): Current knowledge, implications for practice, policy, and future directions." *Educational Psychology Review* 29, no. 1 (2017): 119-140.
24. Thomson, Stéphanie, "A Lack of Confidence Isn't What's Holding Back Working Women" *The Atlantic*, September 20, 2018, <https://www.theatlantic.com/family/archive/2018/09/women-workplace-confidence-gap/570772/>; Guillen, Lauren, "Is the confidence gap between men and women a myth?" *Harvard Business Review*, March, 26, 2018, <https://hbr.org/2018/03/is-the-confidence-gap-between-men-and-women-a-myth>.
25. Rosalind Gill and Shani Orgad, "The confidence cult (ure)," *Australian Feminist Studies* 30, no. 86 (2015): 330.
26. Jenny Levine, Email message to author, October, 8, 2018; Code4lib, distribution auto-reply email to author, October, 16, 2018
27. Bureau of Labor Statistics, *Occupational Employment and Wages, May 2017: 25-4021 Librarians*, Last modified March 30, 2018, <https://www.bls.gov/oes/current/oes254021.htm>.
28. Askey and Hinchliffe, 4. The authors note that "regardless of formal structure, there exists in most libraries a group of individuals whose work is highly technical and tends to be regarded *in toto* by most of the organization and certainly by its leadership as the information technology group."
29. Scott-Dixon, 36. The author claims that "women in particular are less likely to self-define as technical workers" so the researchers attempted to word questions with this in mind in an attempt to lessen the effect of this on the results of the survey.
30. Appendix D: In preparing the data, the nine questions comprising the data analysis were reverse coded from the way they appear in the survey instrument. This changed the order of the responses, positioning answers with most agreement to the right and least agreement to the left.
31. Lamont, 140
32. Askey and Hinchliffe, 8
33. Askey and Hinchliffe, 11
34. Scott-Dixon, 33.

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