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Equity, Diversity, and Inclusion in STEM Academic Librarianship: Perspectives and Practices in Canada

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Abstract

This research explores the perspectives and practices of Equity, Diversity, and Inclusion (EDI) in Canadian Science, Technology, Engineering, and Mathematics (STEM) academic librarianship. Research data were collected from Canadian STEM librarians through an online survey and one-on-one interviews. Findings indicate that the majority of participants' libraries and institutions have integrated EDI into their strategic plans, policies, or guidelines. These STEM librarians shared their perspectives, experiences, opportunities, and challenges in achieving their EDI goals. Besides providing examples of practices, the research sheds light on potential improvements to encourage STEM academic librarians to effectively integrate EDI into their professional practices. Establishing a supportive organizational culture for EDI is identified as a crucial motivational factor.

Keywords: STEM librarianship, Equity, Diversity, and Inclusion (EDI), Indigenous initiatives, Accessibility

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Introduction

In recent years, there has been increased attention on Equity, Diversity, and Inclusion (EDI) in Canadian higher education, government funding agencies, and professional organizations. Academic librarians provide services and resources that support their institutions' teaching and research missions. They align their efforts with the libraries' and parent institutions' priorities in addressing these missions, with government funding agencies and professional organizations serving as stakeholders. The authors, both Canadian academic librarians supporting Science, Technology, Engineering, and Mathematics (STEM) subjects, are working in institutions and libraries that have established strategic directions in EDI and Indigenous initiatives. Their organizations have implemented initiatives in various areas, and individual librarians are encouraged to integrate EDI into their professional practices. However, there is a small set of research on EDI and STEM librarianship in academic libraries. To understand the impact of EDI on STEM librarians' daily work and within the broader field of STEM librarianship in Canada, the authors launched this research study. The study explores the actions, thoughts, and plans of academic librarians serving STEM disciplines at Canadian universities in response to the important undertaking of EDI, with the findings reported in this paper. Below are the research questions:

1. What EDI initiatives have STEM librarians' institutions or libraries taken?
2. What actions, thoughts, and plans do STEM librarians have to integrate EDI into their work?
3. What challenges do STEM librarians face in aligning their professional practice with the EDI initiatives in their institutions or beyond?

Literature Review

Discrimination in Canadian Higher Education and Libraries – Gender and Identity

Academia discriminates against female, racialized, and sexual minority faculty, resulting in systemic inequities throughout their careers in Canada (Henry et al., 2017; Wijesingha, 2021). Lesbian, gay, bisexual, transgender, and queer (LGBTQ) academics experience microaggressions, isolation, and discomfort (Beagan et al., 2021). Dhamoon (2020) argues for addressing racism as a workload issue through collective bargaining, especially focusing on Black faculty, faculty of color, and Indigenous faculty. In the STEM field, this discrimination is exacerbated by the historical exclusion of marginalized communities. In Canada, more than 50% of immigrants with STEM degrees were employed in non-STEM fields, with only around 20% of these positions requiring a university degree, and there was a significant wage disparity between STEM-educated immigrants and native-born Canadians (Picot & Hou, 2020). Libraries

perpetuate systemic discrimination by upholding systemic whiteness (Galvan, 2015), and this is evident in Canada where the academic library workforce is predominantly white (Cho et al., 2022; Revitt et al., 2019). Within academic libraries, racism is deeply rooted in a culture of whiteness (Brook et al., 2015), contributing to systemic and structural barriers that have led to the underrepresentation of minority librarians in leadership positions (Kumaran, 2023).

EDI Initiatives in Canadian Higher Education, Government Funding Agencies, and STEM Organizations

Efforts to combat discrimination have spurred actions and initiatives at multiple levels. Universities Canada (2017) endorsed the *Inclusive Excellence Principles* to promote EDI in higher education. Its 2019 national survey (Universities Canada, 2019) reveals progress in EDI action plans and diverse talent recruitment, but obstacles persist, including resource limitations, leadership diversity gaps, and a need for guidance on best practices.

The federal research funding agencies have taken significant steps to enhance EDI within the Canadian research ecosystem. Government of Canada (2022, 2023) published the *Tri-Agency Statement on EDI* and developed the *Tri-Agency EDI Action Plan for 2018-2025*, which aims to drive a system-wide transformation. The Natural Sciences and Engineering Research Council of Canada (2023) provides guidelines for incorporating EDI considerations into STEM research.

In STEM fields, Canadian professional organizations and accreditation bodies are actively promoting diversity and inclusion. The Chemical Institute of Canada (2024) and its affiliated societies have championed numerous EDI initiatives. These efforts include conducting self-identification surveys to gauge the diversity within their membership and assessing ways to support and improve this diversity. Engineers Canada (n.d.-a) emphasizes the significance of diversity in the engineering field, acknowledging the contributions of women, Indigenous peoples, and internationally educated professionals. An online course has been developed for engineering and geoscience professionals to learn about EDI topics in the workplace (Engineers Canada, n.d.-b).

EDI Initiatives in Library Associations and Academic Libraries

In 2023, the American Library Association (2023) incorporated the social justice and EDI concepts into its *Core Competences of Librarianship* for the first time. The Association of Research Libraries (ARL) published *SPEC Kit 356* for diversity and inclusion (Anaya & Maxey-Harris, 2017). Over half of ARL libraries have established diversity statements and plans (Anaya & Maxey-Harris, 2022; Dozier et al., 2022).

The Canadian Association of Research Libraries (CARL) published *Definitions for Equity, Diversity, Inclusion, and Belonging* (2022), and released a report based on its *2021 Diversity Census and Inclusion Survey* in member libraries (CCDI Consulting, 2022). The report underscores the pressing EDI concerns within CARL, stressing the urgency of addressing issues such as racism, sexism, ableism, and workplace bullying. It also

emphasizes the need to dismantle systemic barriers impeding underrepresented groups and calls for stronger leadership commitment to foster a more inclusive and respectful organizational culture.

Academic libraries have implemented various initiatives to bolster EDI within their institutions (Lee et al., 2022). These initiatives encompass recruitment, professional development, collegial networks, reinforcing EDI messages, organizational change, and assessment strategies. In Canada, the needs of Indigenous peoples play a significant role in EDI initiatives. Government of Canada (2024) states that the term "Indigenous peoples" collectively refers to the original inhabitants of North America and their descendants, and includes three distinct groups: First Nations, Inuit, and Métis. Edwards (2019) discusses the role of academic libraries in acknowledging past assimilation practices and striving for improved relations between Indigenous and non-Indigenous peoples. Canadian libraries, including the University of Toronto and the University of Manitoba, are implementing extensive programs under the guidance of Indigenous leaders, responding to the Truth and Reconciliation Commission's call to educate government employees on the history of Indigenous peoples (Callison & Ford, 2022; Harrison et al., 2022). These programs involve cultural competency training, metadata adjustments, policy evaluations, and the creation of Indigenous library service resources.

Visible minority librarians have taken steps to promote EDI and amplify diverse voices to help address the substantial lack of racial diversity in Canadian libraries, including academic libraries. The Visible Minority Librarians Network of Canada, established in 2011, and the Canada Chapter of the Chinese American Librarians Association, formed in 2018, have been advocating for EDI and supporting visible minority professionals in the field (Jin et al., 2023; Kumaran, 2013). The Chinese American Librarians Association also created a peer-reviewed journal to encourage publishing by diversified scholars and to amplify underrepresented voices in the library and information field (Liu et al., 2023).

EDI and Academic Librarianship

Abundant studies in the literature focus on information literacy and EDI issues, including the universal design approach for accessible and inclusive library instruction (Pionke & Rutledge, 2021; Whitver, 2020), critical librarianship and equity and inclusion in information literacy (Ferretti, 2020; Folk, 2019), as well as critiques of the one-shot instruction model for its "faux-equity" with challenges in supporting learners with disabilities (Bastone & Clement, 2022) and for its failure to address deeper systematic issues such as racism and misinformation (Nicholson & Seale, 2022).

Open access is regarded as a social justice movement that can advance EDI, and efforts discussed in the literature include: library publishing contributing to bibliodiversity for equitable knowledge production (Berger, 2021; Ma et al., 2023), librarians and faculty co-creating open educational resources (OER) with diversified perspectives (Seiferle-Valencia, 2020), and OER-enabled open pedagogy enhancing inclusive teaching and learning (Schultz & Azadbakht, 2023; Sergiadis et al., 2024; Thomas et al., 2021).

Other topics addressed in the literature cover EDI strategies for recruitment and retention (Kung et al., 2020), inclusive workplaces for disabled library workers (Manwiller & Pionke, 2022), minority librarians and library leadership (Kumaran, 2023), inclusive collections (Hendricks & Springs, 2022; Williams & Deyoe, 2015), information accessibility (Bass et al., 2022), and library services and environments for marginalized users (Robinson & Anderson, 2022; Stewart & Kendrick, 2019).

In recent years, EDI and STEM librarianship have been extensively studied. In their series of columns in *Issues in Science and Technology Libraries*, Bussmann et al. (2020a, 2020b, 2021, 2022) provide a comprehensive exploration of social justice concepts at different levels, from fundamental to capstone, aiming to foster discussions on how EDI can be incorporated into science librarianship and the broader challenge of integrating social advancements into scientific and library disciplines during a time of increasing interest in creating a fairer and more just society. These columns have led to the publication of a special issue on social justice in science librarianship (Altamirano et al., 2024). In this issue, researchers studied various aspects of EDI and STEM librarianship. Regarding equity and inclusiveness in STEM education, Campbell and Wallace (2024) and Chase (2024) address the development of culturally relevant instructional materials and an intersectionality-centred information literacy module to enhance inclusive and equitable learning. Park and Ramos (2024) explore partnerships between librarians and diversity support programs to aid marginalized students. In the areas of STEM librarianship and collections, Magid and Torres (2024) discuss strategies for fostering inclusivity among librarians of color, Giles and Young (2024) tackle the practical challenges of diversifying collections, and Dhyne and Nance (2024) investigated discriminatory practices in STEM catalog records. For Black, Indigenous, People of Color (BIPOC) support, de la Cruz et al. (2024) focus on recruiting BIPOC graduate students into health science data librarianship internships, while Shearer (2024) conducts a scoping review on social justice and BIPOC engagement with STEM and medicine (STEMM) disciplines.

Several additional papers also addressed EDI and STEM librarianship. Sterner (2020) offers an updated snapshot of science/STEM library opportunities in academic libraries in the United States, highlighting the growing importance of EDI in job requirements and responsibilities. In their 2019 study of a first-year engineering course in an American university, Johnson and Mentzer (2019) examined information literacy scores, and found underrepresented minorities improved more between assignments, underscoring the importance of diverse and inclusive instruction.

In Canada, earlier studies related to STEM librarianship have focused on information literacy for international students (Liu, 2021; Xie & Savory, 2022; Zhao & Mawhinney, 2015). Two publications released this year address different EDI topics in this field. Gupta et al. (2024) developed a toolkit and conference at the University of Victoria Libraries to enhance communication skills in STEM featuring BIPOC speakers. Weaver et al. (2024) examined the intersection of critical theory, information evaluation, and critique in STEM education. They discuss incorporating historically excluded voices into STEM information critique and applying these concepts in engineering design classes to challenge social structures.

Methods

The human research ethics application for this study was approved by the Office of Research Ethics at the University of Western Ontario (the Primary Investigator's institution during the project) on January 23, 2023, and by the Office of Research Ethics at the University of Windsor (the Co-investigator's institution) on February 14, 2023. This study includes two components: a survey and interviews.

Recruitment

The research participants were Canadian academic librarians serving STEM disciplines. Besides screening the librarians in their networks, the authors visited the websites of Canadian academic libraries from member universities of both Universities Canada (https://univcan.ca/about-universities-canada/our-members/) and CARL (https://www.carl-abrc.ca/about-carl/members/) to find librarians with job responsibilities in STEM disciplines and obtain their email addresses. All member universities are in the ten provinces, and none are in the three territories. French-language universities were excluded from this study due to the authors' language limitations.

Survey participants were recruited via emails, and two approaches were employed to recruit interview participants: (1) survey participants were provided with a link to another form at the end of the survey where they could share their names and emails if they were willing to participate in an interview; (2) the authors emailed invitations to STEM librarians in their networks.

Research Instruments and Data Collection

An online survey was created and administered using Qualtrics. It was disseminated to targeted librarians via email in early March 2023 and was effective for one month. The survey consisted of eight questions, with the possibility of additional follow-up questions based on the initial responses, resulting in a maximum of 14 questions for each respondent. See Appendix A for the online survey.

Interviews were conducted via Zoom or written response depending on participants' preferences. The interviews were conducted April - July 2023. The durations of the Zoom interviews were between 25 and 45 minutes. See Appendix B for the interview guide.

Results

Demographics

Survey

The recruitment email for the online survey was disseminated to 301 academic librarians across Canada. Seventy-eight participants attempted the online survey, but only 66 provided valid responses. The response rate was 21.9%. According to the

geolocations documented by Qualtrics, 64 of the respondents were in eight of the ten Canadian provinces and two were abroad while answering the survey (see Table 1).

Table 1. Survey respondent geographic locations

Provinces / abroad	Number of respondents
Alberta	4
British Columbia	11
Manitoba	5
Newfoundland and Labrador	2
Nova Scotia	5
Ontario	26
Quebec	6
Saskatchewan	5
Abroad	2
Total	66

Approximately 48.5% (n=32) of the respondents were working under a hybrid model of subject liaison and functional teams, 36.4% (n=24) were working under the subject liaison service model, and 15.1% (n=10) were working under the functional team model. A majority of respondents (approximately 63.6%, n=42) were responsible for science disciplines, 24.2% (n=16) were responsible for the disciplines in both science and engineering, 9.1% (n=6) were responsible for engineering disciplines, and 3.1% (n=2) did not answer this question. Most of the respondents (83.3%, n=55) were working in one or more of the four areas listed (collections, instruction, liaison, and reference), 13.6% (n=9) were working in at least one of these areas plus other areas, and 3.1% (n=2) were working in other areas outside the listed areas. Other working areas included management (e.g., two respondents held the manager position at a STEM Library), outreach, research data management, scholarly communication, and library systems.

Among the respondents, 28.8% (n=19) came from underrepresented and marginalized groups (see Figure 1). Of these 19 respondents, nine identified as sexual/gender minorities (LGBTQA+), nine as racialized people/visible minorities, two as Indigenous peoples, two as having disabilities, and one did not identify with any of the listed groups. Several respondents identified themselves in multiple identity groups.

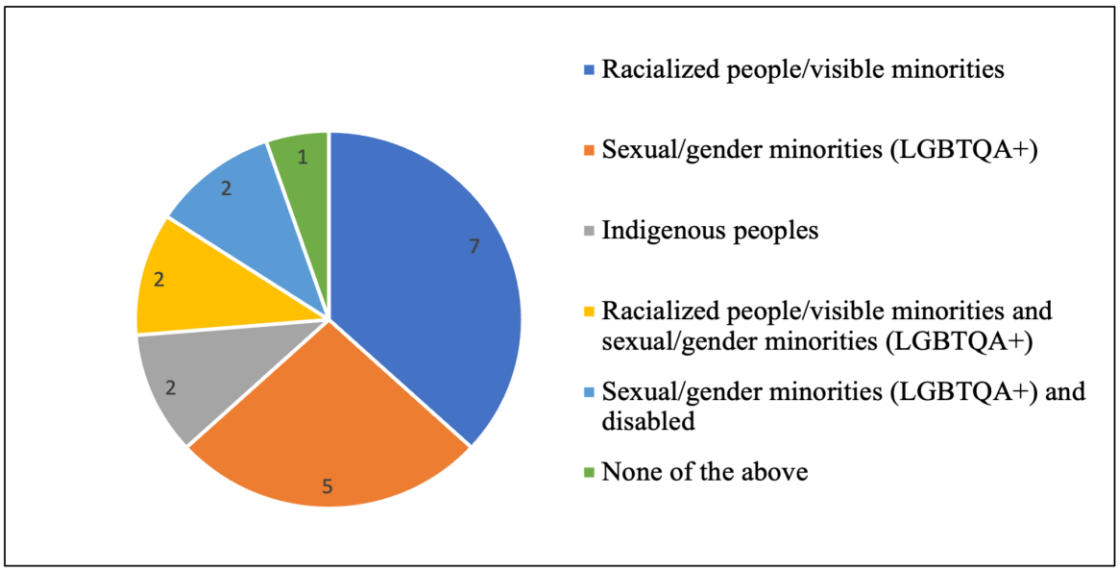

Figure 1. Survey respondents from underrepresented or marginalized groups

Interviews

Between April and July 2023, the authors conducted interviews with 11 librarians. These participants represented eight Canadian universities: five large research-intensive universities and three undergraduate-focused universities.

Of the interview participants, seven served as STEM subject liaison librarians, responsible for library liaison, collections, instruction, and reference, while four held functional roles, including collection strategy, research data management, scholarly communications, and instruction. Their work experience with STEM librarianship ranged from 3.5 years to over 30 years. Eight participants had work experience related to STEM beyond their current positions, while three did not. Table 2 presents academic librarian demographics for the interview participants.

Four out of the 11 participants identified themselves as belonging to underrepresented or marginalized groups: two with mental health disabilities, one from a visible racial minority group, and one from the aging demographic. Additionally, one participant mentioned feeling marginalized over 20 years ago as the only woman in her undergraduate science class.

Table 2. Academic librarian demographics for the interview participants

	Institution Type	Position	Number		STEM Librarianship Work Experience	Number
Interview Participants	Research-intensive	Subject Liaison Librarian	4	Interview Participants	3.5-10 Years	7
		Functional Librarian	4		11-20 Years	1
	Undergraduate-focused	Subject Liaison Librarian	3		21-30 Years	1
					Over 30 years	2

Organization-level EDI Initiatives

To explore organizational initiatives in EDI, the study inquired about the EDI initiatives implemented by participants' institutions and libraries. Both sets of results indicate most of the institutions and libraries have incorporated EDI into their strategic plans, policies, and practices. The survey results briefly outline organizational EDI initiatives, while the interviews provide more in-depth information.

Among the 66 survey respondents, 60 (90.9%) reported that at least one of the commitments or initiatives in the list of choices (including: EDI in strategic planning, EDI in library policies, guidelines for library practices, EDI-related projects, EDI-focused training) have been taken on by their library or institution. Two of these respondents also selected "Others" to add that their organizations had become more inclusive in hiring practices, e.g., specific positions were created for underrepresented groups, such as Black and/or Indigenous librarians, and hiring practices were improved with an EDI perspective. One respondent (1.5%) only selected "Others" to report that no initiatives on EDI had been taken at their institution or library. Five respondents (7.6%) did not respond to this question.

All eleven interview participants shared that their libraries and parent institutions have incorporated EDI initiatives into their strategic plans, goals, and guidelines. Their institutions have established offices for EDI and Indigenous initiatives, providing training on topics like anti-racism and microaggressions, and hosting events and seminars. Some have introduced academic programs in Black Studies and Indigenous Studies, hiring additional faculty and staff to support these programs. These efforts are part of a broader commitment to decolonization and anti-racism, aiming to recognize and address the needs of historically marginalized groups. Other on-campus EDI initiatives include Indigenous-themed public art, equity censuses for faculty and staff, and inclusive spaces for students from underrepresented groups.

Participants shared that their libraries actively participate by designating inclusive spaces, joining institutional EDI committees, diversifying research impact measurements, collaborating with the EDI office to launch a peer-reviewed EDI journal, and incorporating EDI into research data management strategies. Most participants

noted that their libraries have dedicated EDI committees to organize events and address related issues. These librarians contributed to a variety of EDI-focused library projects and initiatives as part of their libraries' collective efforts, such as diversifying collections, decolonizing library curricula, updating subject headings, ensuring web accessibility, and creating inclusive language guides. Most of their libraries provide library staff with EDI-focused training, programs, and workshops, covering topics like inclusive language, Indigenous learning, and EDI in information literacy instruction. Their libraries also host events, speakers, and workshops in observance of occasions such as Pride Month, Black History Month, Indigenous History Month, and the National Day for Truth and Reconciliation. Some of their libraries actively seek diverse candidates through targeted job postings on platforms like BlackJobs.com.

It is worth noting that individuals' personal circumstances and experiences influenced their perceptions of organizational EDI initiatives, based on how these initiatives impact them. One participant initially experienced a sense of belonging in her workplace. However, after being diagnosed with a mental health illness, she began to notice accessibility and inclusivity issues within her organization, deficiencies in the organization’s initiatives, and biases in people's minds. Another participant, an immigrant and a member in a visible minority group, specifically mentioned that his institution offered training programs on intercultural practices, which helped him understand his own culture better and foster mutual respect for other cultures.

Personal-level EDI Initiatives

To understand the current practices of individual STEM librarians in EDI, participants were questioned about receiving EDI-related requests from their academic or local communities. Those who received such requests were asked to describe their activities and thoughts, and those who had not received requests were asked about their thoughts and plans regarding EDI integration into their work. The findings indicate that while some participants responded to specific EDI requests, a larger number proactively integrated EDI into their work without specific demands, outlined below. Additionally, interview participants were invited to share their understanding of EDI and its significance in academia.

EDI-related Requests

Among survey respondents, 68.2% (n=45) reported no EDI-related requests, while 30.3% (n=20) reported receiving such requests. One respondent (1.5%) did not provide a response. Among those who received EDI-related requests, 60% (n=12) mentioned teaching-related requests, 45% (n=9) mentioned research-related requests, 30% (n=6) mentioned learning-related requests, and 40% (n=8) specified requests in other areas, including accessibility, collections, services, and space. In the interviews, five participants reported receiving no specific requests from STEM departments, while six others shared their EDI requests: some were related to STEM and others spanned across disciplines based on the librarians' functional duties.

Some participants played a crucial role in supporting EDI-focused projects in collaboration with various campus partners. This involvement ranged from responding

to consultation requests from faculty members conducting research on women's contributions to science to actively participating in diversity consultations for research data management strategy. Some librarians collaborated with the office for indigenous initiatives to increase awareness and incorporation of traditional knowledge labels. Furthermore, one librarian partnered with a Black alumni group to develop a website and data portal highlighting the Black experience at their university, demonstrating a commitment to promoting diversity and inclusion.

Additionally, these librarians were actively engaged in requests promoting openness and equitable access to research and teaching materials. They assisted faculty and staff in making their research openly accessible, aided instructors in finding open educational resources to ensure students more equitable access to required course readings and supported open education projects by providing advice on open licensing and technology. Some librarians also responded to accessibility requests, such as providing slides in advance for library sessions.

Study participants highlighted additional EDI-related requests, with some libraries receiving requests about space allocation for EDI initiatives, particularly from faculty or students belonging to EDI and Indigenous groups. Some STEM departments requested the establishment of an EDI book collection in their departmental buildings, reflecting a growing recognition of the importance of diverse voices in academia. Moreover, a librarian responded to teaching requests related to science research for an Indigenous Studies class, focusing on Indigenous knowledge and how this knowledge has historically been disregarded in science and showcasing a commitment to inclusivity in academic content moving forward.

EDI-related Work

In terms of integrating EDI into their work, 66.7% of survey respondents (n=44) reported "Yes," 31.8% (n=21) reported "No," and 1.5% (n=1) did not respond. Those who answered "Yes" were asked to describe their relevant activities and thoughts, while respondents who answered "No" were asked to outline their thoughts and plans in this aspect. Many responses in both groups spanned multiple themes. For example, a response like "professional development around EDI in instruction and collection development" falls into both "teaching and learning" and "collections" categories. Figure 2 illustrates the main themes identified in the 65 survey responses, and qualitative data related to these themes are presented below, along with insights from the interviews. Some responses from those who answered "No" are relevant to the categories of "teaching and learning" and "collections," while others from this group are more general and not relevant to these themes.

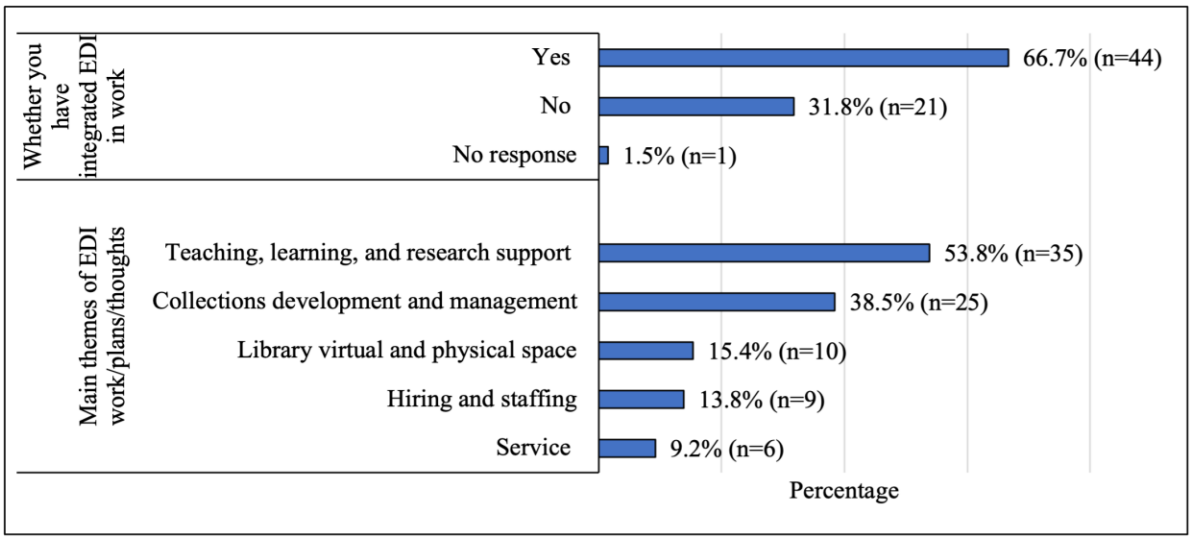

Figure 2. Survey respondents' EDI-related work

All interview participants confirmed integrating EDI into their work, with some planning to make further contributions. In addition to the EDI-related contributions mentioned above based on requests, many study participants have proactively taken initiatives in diverse activities aligned with their institutional strategies. The following sections outline the five main themes identified from both the interviews and the survey responses about librarians' thoughts, activities, and plans for EDI-related work.

(1) Teaching, Learning, and Research Support

In library instruction, the participants employed EDI-focused library curriculum, integrated inclusive language, introduced EDI topics, and recommended relevant materials for course readings. These STEM librarians shared examples that address sexism or racism in science in their classes. With accessibility in mind, some participants created learning objects with subtle EDI principles, applying Universal Design for Learning (UDL) and following accessibility best practices in instructional material. This included actions such as adding live captions to online tutorials, providing content in multiple formats, choosing suitable colours and fonts, and offering alt text for images. Some librarians utilized tools to collect anonymous feedback from students or workshop participants, encouraging a diversity of voices without disclosing their identification. Most librarians engaged in professional development opportunities focused on inclusive practices to enhance their teaching by integrating EDI effectively. It is worth noting that one study participant, who also served as an adjunct professor in a library school, redesigned a course in Science and Engineering Librarianship to incorporate EDI and social justice, intending to educate the next generation of STEM librarians.

In their commitment to advancing EDI in research support, the librarians actively contributed to various projects, collaborating with Indigenous communities and supporting gender-equity initiatives on campus. Some of these projects received funding from government or research agencies. These STEM librarians not only worked to diversify the publishing landscape but also assisted researchers in disseminating their work through multiple formats beyond traditional peer-reviewed articles. They

supported these research initiatives with expertise in data management, digitization, open access platform, and licensing. Additionally, some librarians emphasized diverse representation and use inclusive language in their own research works.

Some study participants applied critical theory to their professional practices, including library instruction and research support, by engaging in self-reflection, challenging social structures, and promoting EDI. This aligns with the critical librarianship movement in academic libraries that emphasizes "there are numerous opportunities for librarians to fight inequity, racism, sexism, and other problems through concrete action" (ACRL Research Planning and Review Committee 2021-22, 2022, p. 249). These librarians also engaged in critical dialogue by using inclusive language, respecting diverse perspectives, and prioritizing active listening and learning to empower colleagues and patrons from marginalized and underrepresented groups.

Some respondents who did not integrate EDI shared their thoughts. For example, one librarian, who has often observed the gender imbalance in STEM classes, wondered what contribution they could make to EDI measures in this regard. Another librarian applied EDI into disciplines outside the sciences, highlighting limited teaching in STEM fields and noting that the science departments are highly self-sufficient. Additionally, one respondent mentioned their intention to learn more about how to apply EDI to their teaching.

(2) Collections Development and Management

The study participants proactively curated diverse and representative collections across various subject areas. Examples of such collections included LGBTQ+ health, BIPOC representation in health, diversity in authorship, geographical content, and Indigenous information resources. Some librarians advocated for financial support for small, mission-driven, diamond open access publishers, due to their inclusive approach with no fees for readers or authors. Some STEM librarians shifted from traditional approval plans to Demand-Driven Acquisition (DDA) and Evidence-Based Acquisition (EBA), allowing patrons to assess resource value and decreasing potential biases from collections librarians. Moreover, the librarians responsible for metadata undertook subject and authority work projects with EDI goals, such as addressing biases in existing records and applying inclusive descriptions.

Other collections initiatives included support for EDI-themed months, events, or relevant campus initiatives. Librarians curated browsing collections with an EDI focus within the library and created virtual collections in the library catalog. Several participants mentioned that their EDI collections aimed to promote themes related to equity, diversity, inclusion, anti-racism, and accessibility. Many librarians actively engaged in professional development opportunities focused on EDI in collections development, including workshops on diversity audits.

Those who did not include EDI in their collections work were unsure how to apply it. The librarians who handled medicine or other fields felt they could make valuable contributions in those areas but were unsure how to apply EDI to STEM. One librarian

suggested that open access collecting in STEM could enhance equity of access but was unsure where to start and what resources might be helpful.

(3) Library Virtual and Physical Space

The study participants included EDI elements on their library guides or webpages, such as land acknowledgements, pronouns, accessibility surveys, and topics related to Indigenous knowledge and EDI. Moreover, these STEM librarians worked towards making the library website accessible to their communities. This involved conducting accessibility audits across the library website, translating content into multiple languages, and revising language to be more inclusive.

In terms of physical space, many libraries renovated their areas, incorporating Indigenous or other EDI-themed art and accommodating academic needs, while also considering accessibility. Participants in management roles took EDI into account when allocating library space for teaching, learning, and research. They also collaborated with campus partners to provide library space for EDI-related initiatives. Individual STEM librarians aimed to make their offices welcoming for consultations by providing items like fidget spinners and toys during appointments, and by displaying pride flags.

(4) Hiring and Staffing

EDI has been integrated into hiring practices at several participants' academic libraries, and they were actively involved in related activities. Many study participants commented that a majority of STEM students come from minority backgrounds, whereas the faculty, staff, and librarians supporting them do not reflect this diverse student population. Some STEM librarians shared that they created more hiring equity for groups traditionally excluded from librarianship by rewriting hiring guidelines to incorporate EDI considerations into staff recruitment. Providing interview questions in advance was regarded as part of equity hiring practices.

Besides creating more equity for candidates from non-primary groups, participants' libraries strived to complement their staffing with more expertise related to EDI. Some participants noted their academic libraries appointed Indigenous librarians or Director of Indigenous Initiatives to lead relevant research and share Indigenous knowledge with both library staff and patrons. Additionally, some established the position of Director of EDI to offer overall guidance on library-level EDI initiatives and practices. A few participants also noted that accessibility librarians were hired in their libraries to provide expertise on accessibility practices and lead relevant projects.

(5) Service

Study participants served on EDI committees at various levels, including university, academic faculty or department, library, and professional association. On these committees, librarians made efforts on a wide range of EDI initiatives, such as equity hiring, pay equity, library climate action for social justice, and even writing EDI reports of research and graduate studies. Some librarians were asked to support Indigenous-

related and anti-racist initiatives within their assigned departments, and they considered this work as a form of service.

Librarians' Understanding of EDI

Interview participants were invited to share their understanding of EDI. The results show all of them had a comprehensive understanding of EDI, recognizing its importance not only in addressing biases and inequality but also in fostering an inclusive and equitable academic environment for the people working and learning within it. They believed that EDI efforts should be implemented in a variety of aspects, including hiring practices, gender pay equity, promotion and tenure evaluations, admission policies, and other anti-racism measures. Many participants advocated for diversity hires to bring all kinds of perspectives and voices into academic institutions, as they believed "academia was built on colonialism and white supremacy, and our current systems uphold these roots." There was a consensus among the responses that the librarian population is not diverse. However, one participant shared that faculty members in their union were concerned that the hiring from EDI groups could be seen as "reverse racism." Accessibility was a key focus for some participants, and they emphasized the importance of creating an inclusive environment where everyone, not just those from marginalized groups, can feel a sense of belonging. Furthermore, these STEM librarians believed that academic institutions should be a leader in practicing EDI. This would not only enhance the core teaching and research functions of universities but also encourage the full potential of every member of the academic community.

EDI Challenges

To explore the challenges that librarians encounter when integrating EDI into STEM librarianship, the study invited both survey and interview participants to share their insights on this matter. Around 75.8% (n=50) of the survey respondents provided their challenges and discussed whether these challenges were unique to STEM or common across disciplines, while 24.2% (n=16) did not provide a response. Figure 3 illustrates the responses and the main themes of challenges identified in the 50 survey responses. Qualitative data related to these themes are presented below with insights from the interviews.

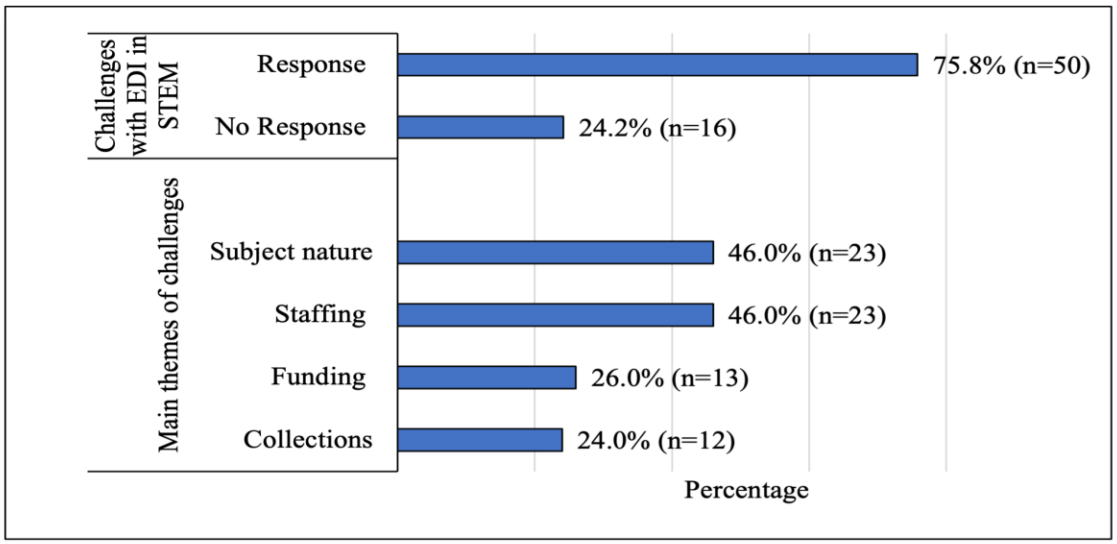

Figure 3. Survey responses for challenges with EDI in STEM library practice

Interview participants were also invited to share their challenges in undertaking EDI initiatives for STEM subject areas. Since the interviews were semi-structured, participants had the flexibility to discuss challenges while responding to various questions. Therefore, insights from the interviews could also be derived from their responses to other inquiries. The following section outlines four main themes identified from both the interviews and survey responses regarding EDI challenges faced by STEM librarians. In addition to these themes, study participants emphasized the general challenges they face in assessing EDI efforts, particularly due to the lack of examples, best practices, or applicable guidance.

(1) Subject Nature

The subject nature of STEM posed a significant challenge for many study participants when implementing EDI into their library practices. Participants iterated that STEM fields, known for their adherence to ideas of objectivity, neutrality, and a Western/European approach, often perceive EDI issues (which value positionality, recognize bias is present at all times, and welcome a variety of non-Western/European approaches) as counterproductive and conflicting with the ethos of STEM and objective inquiry. Their experiences indicated that some faculty and students in STEM lack awareness of the relevance and critical value of EDI and demonstrate resistance. They described STEM courses as typically content-heavy in a way that does not traditionally integrate EDI concepts, making it challenging to allocate time for separate EDI discussions, including during course-integrated library instruction sessions. Some librarians were uncertain about the steps to take for implementing EDI in STEM, while other disciplines appeared more advanced in applying EDI. Additionally, it was noted that researchers in STEM fields often leaned on traditional research metrics, which they saw as potentially disadvantaging equity-seeking scholars, especially on a global scale of publishing. Moreover, it was observed that the integration of EDI into library practices may vary across different STEM subjects. Some participants noted the importance of diversifying collections was emphasized, especially in fields like civil engineering, geology, and environmental science, where understanding land use is

crucial. For example, while incorporating Indigenous perspectives was found to be effective in environmental science, it was not as obviously applicable in some physical sciences fields.

Unlike the views mentioned above that EDI is difficult to implement in STEM fields in general, some study participants believed EDI affects the practice of sciences similarly to humanities and social sciences, and the challenges they identified were not unique to STEM. Some participants noted that EDI is often viewed as supplementary rather than integral to STEM research, but they argued that this perspective should be questioned, emphasizing the central role of EDI. This involves evaluating elements like research ethics, methodologies, limitations, and accessibility considerations. Additionally, several participants stated that racialized scholars are more represented in STEM fields compared to the humanities and social sciences, which are predominantly influenced by white Western culture.

(2) Staffing

Staffing was identified as a significant concern in integrating EDI into the library practices. While some libraries required experts in specific EDI fields, finding these experts proved challenging. In some cases, libraries opted to assign relevant tasks to committees. However, committee members faced difficulties learning without effective leadership and guidance. Although many universities had a Vice President with EDI in their portfolio, most were still new to the role and in the process of learning how to provide helpful guidance to the university community. The absence of relevant expertise made it challenging for these librarians to effectively conduct certain EDI work. Some participants felt uninformed about what the unique needs were for EDI initiatives in STEM areas and how they could make an impact, partly due to the absence of relevant requests, posing a challenge. To address this, they hoped to seek expert support within the institution, such as examples in incorporating EDI into library instruction. In addition, some received support for accessibility in their teaching materials and library guides because of the accessibility experts available in their organization. Some participants also recommended creating more librarian job opportunities for "equity-deserving groups," as they felt that academic librarianship is "too white."

Workload was as another challenge relevant to staffing. Libraries often operated with limited staff, and the workload of individual STEM librarians was already substantial. Some perceived that incorporating EDI could add more responsibility, making it difficult to balance their "regular" tasks. They noted their libraries' insufficient coordination/organizational efforts resulted in individual librarians taking on a significant portion of EDI work. A few participants even mentioned that gaining support from their librarian colleagues for EDI initiatives was challenging, as concerns about capacity and workload hindered active participation. The participants who identified workload as a challenge highlighted that implementing change, especially for new initiatives like EDI, required time, resources, and support. The lack of these elements posed a challenge to successful EDI implementation. Some participants indicated that the workload challenge related to EDI work was not unique to STEM.

(3) Funding

Securing adequate, permanent funding posed a challenge for EDI initiatives. While funding opportunities existed for various programs and projects, such as training Ph.D. students from underrepresented groups in engineering and Indigenous digitization projects, the participants frequently noted that the distribution of funds was inconsistent. Many initiatives relied on one-time project grants, lacking sustainable funding for long-term impact. In some institutions, funding for new librarian roles focused on EDI often came from general budgets for replacing retirements rather than from additional resources, though these new roles were essential for advancing library EDI initiatives. Insufficient funding also impacted the acquisition of EDI collections, as librarians had to balance the budget between developing general STEM collections and acquiring EDI-related STEM collections. In addition, the collections utilized by the participants' libraries often had a North American focus, making it challenging to advocate for increased financial support for resources with a global scope.

(4) Collections

Library collections are a cornerstone at academic libraries, and the collection challenges shared by study participants went beyond budgets. As observed by many participants, there was a shortage of EDI-related resources in STEM. Although there is a movement to increase EDI content in the STEM fields, such as books about EDI related to teaching or minority experiences in STEM, some participants thought the content tended to align more with social science subjects than STEM-specific topics. A few noted that it was challenging to rely on for-profit large academic publishers to cover EDI topics in alignment with Canadian discussions. A participant with experience interacting with smaller EDI-focused publishers shared that these publishers may not be suitable for academic libraries due to constraints, such as the inability to establish IP-based institution access. Additionally, defining the meaning of EDI in STEM collections was challenging for some STEM librarians. One respondent even remarked, "Some libraries identify Black STEM authors, but this seems impractical to do on a large scale and with questionable value." In addition, several mentioned the open access movement as being associated with equitable access, but they experienced barriers hindering the realization of open access for different types of content, such as textbooks and academic books that are costly to produce.

Discussion

Many Canadian academic institutions have undergone a cultural shift to prioritize and support EDI. From the results of this study, this shift emphasizes the role of individual employees in actively pursuing established EDI goals, which motivates librarians to engage in EDI work and collaborate with campus partners. Importantly, the study highlights that the cultural shift has resulted in increased resources and support to address challenges, including staffing, workload, and funding. For instance, universities that strongly emphasized accessibility strategically hired staff with the expertise to effectively support EDI goals regarding accessibility. On the other hand, institutional culture hindered progress in EDI work particularly when EDI or specific initiatives were not prioritized by the institution. For example, a university with little interest in

investing in inclusive scholarly communication discouraged individual librarians in their relevant efforts.

The demographic data of the study participants show that only a small portion of STEM librarians come from underrepresented and marginalized groups. This finding aligns with existing literature, which highlights the ongoing lack of diversity within the Canadian academic library workforce. However, the study also indicates a trend towards more inclusive practices within some universities and libraries. These institutions have begun to enhance diversity by implementing more inclusive hiring practices. In addition, some positions related to EDI now require candidates to have lived experiences alongside other qualifications. This shift reflects a growing recognition of the value that diverse perspectives bring to the workplace and suggests a positive movement towards greater inclusivity in the field.

Another finding is that many STEM librarians encountered barriers specifically related to integrating EDI within STEM disciplines, rather than social sciences or humanities. Participants noted that STEM's emphasis on objectivity and Western perspectives often conflicts with EDI principles that value positionality, acknowledge inherent bias, and embrace diverse approaches. Thus, gaining faculty buy-in is a major challenge due to their limited awareness of EDI's role in STEM, constrained time for library instruction in content-heavy courses, and reliance on traditional metrics for research output. Suggestions from study participants included emphasizing the role of EDI in STEM, particularly in research ethics, methodologies, limitations, and accessibility considerations. Additionally, they recommend incorporating critical theory in STEM librarianship to use inclusive language, respect diverse perspectives, and challenge systemic barriers. This approach aligns with the critical librarianship movement, which encourages librarians to combat inequity and discrimination through concrete actions.

Last but not least, the study also reveals that most participants proactively sought to integrate EDI into their work, driven by personal commitment rather than merely responding to requests from their STEM disciplines. In fact, many did not receive any EDI-related requests. These librarians encountered the challenge of lacking clear directions due to the absence of established examples and best practices in the field. While the issue could potentially be addressed if relevant experts were available within the organization, many organizations lack these resources. Some librarians reported difficulties their organizations face in hiring experts for specific EDI aspects. Additionally, in some participants' universities leaders in EDI roles were still new to their positions, which made it difficult for them to provide clear guidance and effective support. Moreover, study participants expressed uncertainty about the impact of their EDI initiatives on their communities and patrons. Therefore, effective assessment measures are needed to evaluate the outcomes and effectiveness of librarians' EDI efforts and to support informed improvements.

Limitations

Limitations in this study are due to the research scope and participant recruitment, as outlined below:

- The study focused on librarians' initiatives in EDI, broadly including decolonization and accessibility but not necessarily specifically stating them. New terms like "EDI-D" and "EDI-DA" have emerged, with the second "D" representing decolonization and the "A" representing accessibility. These new terms can be found in university or library plans and policies. Because the study did not use the terms "EDI-D" or "EDI-DA," some participants were unsure about the study's inclusion of decolonization or accessibility. This could have been clarified during interviews, but the authors were unaware of the issue beforehand, potentially leading to the loss of relevant survey responses.
- Although the study's goal was to investigate academic STEM librarians across Canada, only those affiliated with English-speaking universities were approached. Because of the authors' language limitations, the study did not invite academic STEM librarians in French-speaking institutions.
- Recruiting study participants beyond the authors' networks relied on professional profiles available on library websites. Identifying STEM librarians was challenging, as not all profiles specified this role. In addition to librarians with a clear STEM focus, those in related roles that may cover STEM, such as entrepreneurship librarians, first-year experience librarians, and research data management librarians, were also included. This recruitment approach may still have overlooked potential participants.
- The categorization of STEM disciplines varies across institutions, also impacting the recruitment of study participants. For instance, health sciences may be considered part of STEM. The categorization of economics differs even between the authors' institutions where it falls under Social Sciences and STEM, respectively.
- Additionally, the STEM librarians who volunteered for the study might be those more engaged with EDI issues and work, which could result in findings that are more skewed towards a positive view of EDI activism rather than apathy.

Conclusion

The study's findings indicate widespread integration of EDI into Canadian academic libraries and their parent institutions, involving commitments such as creating EDI administrative roles, fostering workforce diversity, providing relevant training, and funding EDI-focused projects. A critical factor for successful EDI implementations is a supportive organizational culture, characterized by an active, persistent commitment to EDI and open communication. While some STEM librarians received few or no requests from STEM disciplines, most actively engaged in EDI initiatives, participating in projects, committees, training sessions, and various activities. Despite specific challenges in STEM, such as a lack of buy-in for the value of EDI, insufficient EDI collections, and a preference for traditional research metrics, these librarians faced common obstacles like time constraints, heavy workloads, and limited resources. They also sought examples of best practices and effective assessment approaches to measure the impact of their EDI efforts and identify areas for improvement. Administrative support proves essential for STEM academic librarians to achieve their EDI goals, particularly concerning organizational culture, workload, training, funding, and assessments.

The present study serves as an environmental scan in the field. Future research could explore the effectiveness of EDI initiatives impact STEM librarianship and STEM disciplines. This includes investigating how EDI policies affect the recruitment, retention, and career development of STEM librarians, as well as exploring how diverse library services, collections, and inclusive practices support teaching and research in STEM subject areas.

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Appendix A. Online Survey Questions

Q1. What service model is currently operated in your library?

- ☐ Subject liaison (e.g., physical sciences and engineering, life sciences, social sciences, etc.)
- ☐ Functional teams (e.g., teaching and learning, collections, research support, etc.)
- ☐ A hybrid model of the two above
- ☐ None of the above

(Display the following question:
***If** What service model is currently operated in your library? = None of the above)*
As you answered "None of the above," please specify: _____

Q2. What disciplines are you serving as an academic librarian? Select all that apply.

- ☐ Science
- ☐ Engineering

Q3. What area(s) are you working in for the STEM disciplines? Select all that apply.

- ☐ Collections
- ☐ Instruction
- ☐ Liaison

- Reference
- Others

(Display the following question:
***If** What area(s) are you working in for the STEM disciplines? Select all that apply. = Others)*
As you answered "Others," please specify: _____

Q4. Are you from an underrepresented or marginalized group?

- Yes
- No
- Prefer not to disclose

(Display the following question:
***If** Are you from an underrepresented or marginalized group? = Yes)*
How do you identify yourself?

- A member of Indigenous peoples
- A member of racialized people/visible minorities
- A member of sexual/gender minorities (LGBTQA+)
- A person with disabilities
- None of the above
- Prefer not to disclose

Q5. What EDI commitments/initiatives have been taken in your library/institution?

- EDI in strategic planning
- EDI in library policies
- EDI guidelines for library practices
- EDI-related projects
- EDI-focused training
- Others

(Display the following question:
***If** What EDI commitments/initiatives have been taken in your library/institution? = Others)*
As you answered "Others," please specify: _____

Q6. Have you received any EDI-related requests from faculty, staff, or students? If so, what areas are the request(s) related to?

- Teaching
- Research
- Learning
- Others

(Display the following question:
***If** Have you received any EDI-related requests from faculty, staff, or students? If so, what areas are the request(s) related to? = Others)*
As you answered "Others," please specify: _____

Q7. Have you integrated EDI into your work?

- Yes
- No

(Display the following question:
***If** Have you integrated EDI into your work? = Yes)*
As you answered "Yes," please describe your activities and your thoughts on this aspect. _____

(Display the following question:
If Have you integrated EDI into your work? = No)
As you have not integrated EDI into your work, do you have any thoughts and plans on this aspect? Please describe them. _____

Q8. Do you face any challenges in terms of taking EDI initiatives in serving STEM subject areas? Are these challenges unique to STEM or commonly existing across disciplines?
_____

Appendix B. Interview Questions

Part one: Background Information

Q1. What type of university/library are you working at now?

Q2. Do you have any roles and responsibilities related to any STEM disciplines?

Q3. What STEM disciplines are you serving as an academic librarian, such as chemistry, engineering, etc.?

Q4. What area(s) are you working in for the STEM disciplines, such as collections, instruction, liaison, reference or others?

Q5. How long have you been in these roles related to STEM?

Q6. How long have you been an academic librarian?

Q7. Do you have other work experiences related to STEM other than current positions?

Part two: Personal Information and Experience with EDI

Q1. Are you from an underrepresented or marginalized group? If so, how do you identify yourself?

Q2. Do you feel a sense of belonging in your workplace? Are your perspectives valued in your work unit or department?

Q3. Does your library promote a diverse and inclusive work environment?

Q4. How do you understand EDI and its importance in academia?

Part three: Institutional Information

Q1. What service model is currently operated in your library, for example, Subject Liaison, Multiple Function Groups, or Hybrid?

Q2. What EDI initiatives have been taken in your library? For example, EDI in strategic planning, library policies, EDI guidelines for library practices, EDI related training or EDI related projects, etc.

Q3. What EDI initiatives have been taken in your institution?

Q4. Is there any campus or local support for implementing your institution or library's EDI initiatives?

Part four: EDI-related Practices, Thoughts, or Plans

Q1. Have you received any EDI-related requests from faculty, staff, or students? If so, could you please share any details about the requests?

Q2. Have you integrated EDI into your work? If so, could you please share your activities and outcomes? If not, do you have relevant plans or thoughts?

Q3. Do you face any challenges in terms of taking any EDI initiatives in serving STEM patrons? If so, are these challenges unique to STEM or commonly existing across disciplines?