Libraries Engaging BIPOC Communities with STEMM: A Scoping Review

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Abstract

Academic and research libraries historically lack intentional engagement with Black, Indigenous and People of Color (BIPOC) communities. This scoping review examines how academic and research library literature address social justice issues by engaging BIPOC with science, technology, engineering, mathematics, and/or medicine (STEMM) disciplines in North America. The review included published and unpublished literature by all types of library workers from varying education levels and used resources found within education databases and sources known as “grey literature.” Findings identified a prevalence of BIPOC engagement via health topics with off-campus communities in comparison to limited interaction with BIPOC college and university students. A variety of engagement strategies and activities are discussed as unique opportunities and avenues for libraries to address issues related to social justice, diversity, equity, inclusion, and belonging.

Keywords: Engagement, Academic library, Research library, Black, Indigenous and People of Color (BIPOC), Science, Technology, Engineering, Math and/or Medicine (STEMM)

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Introduction

Most public libraries and museums have robust engagement programs to enhance community experiences. Their ability to communicate the content of their collections
and services is at the center of their work. Though programs vary, their role to impart information or knowledge is valued and often relied upon by their communities. Alongside public libraries and museums, academic and research libraries also offer programming to engage their communities. With a focus on fulfilling institutional goals and community needs, these libraries must continually evaluate different ways to develop and expand the knowledge of their collections and services through an informed understanding of the people they hope to serve.

This review will examine recent literature discussing how North American academic and research libraries interact with Black, Indigenous, and People of Color (BIPOC), specifically using topics related to science, technology, engineering, mathematics and/or medicine (STEMM). The three concepts underpinning this review – engagement, BIPOC and STEMM - are defined in this article and highlight the work libraries and library workers are doing in social justice, diversity, equity, inclusion, and belonging. This review will also discuss gaps in the literature and identify inclusive strategies for use in academic libraries.

Library engagement with BIPOC is the connection between social justice and outreach to these communities. Through their work, academic and research libraries are in a unique position to acknowledge their historical lack of intentional engagement with BIPOC through STEMM by facilitating access to information that impacts areas such as health, wellness, and inclusive education.

Defining Terms

While scholars define academic library engagement for their research (Gibson & Dixon, 2011) there is no agreed-upon definition in the field. And though community engagement and public engagement are used interchangeably within the framework of academic libraries, each has a different definition. Gruber (2017) emphasized the use of Carnegie’s definition of community engagement for colleges and universities as a “collaboration between institutions of higher education and their larger communities for the mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity.” Similarly, the American Library Association’s (2018) definition of community engagement centers on collaboration but goes a step further than Gruber and Carnegie in defining what a “community” is. The ALA views community engagement as “the process of working collaboratively with community members – be they library patrons, residents, faculty, students, or local organizations – to address issues for the betterment of community.” Community engagement with a focus on mutuality with specific groups is distinct because it involves interaction between communities to attain desired outcomes for all involved.

Engaging the public is defined differently but is also used within libraries and research centers. Beere, Votruba, and Wells (2011) emphasize the use of public engagement as involving “a partnership in which there is mutually beneficial, two-way interaction between the university and some entity within the metropolitan region.” The National Co-ordinating Centre for Public Engagement (2020) views engagement as “a two-way process, involving interaction and listening, with the goal of generating mutual benefit” alongside the American Association for the Advancement of Science (2022) defining
public engagement with science as “intentional, meaningful interactions that provide opportunities for mutual learning between scientists and members of the public.” Finally, the Association of College & Research Libraries (2019) framework for community engagement views engagement as “a process where an organization works to build lasting relationships in order to apply a collective vision that benefits the community. Community engagement is executed in concert with the community for relationship building” and exemplified by Ippoliti’s (2019) image.

At the heart of each definition is mutuality. And while these definitions emphasize different audiences, the author notes that they intersect and parallel one another, and are therefore used interchangeably. Thus, to clarify how “engagement” is used in this scoping review, the author has embraced components of both community engagement and public engagement due to their strong similarities.

Also in this review, STEMM reflects The U.S. Department of Education’s National Center for Education Statistics (NCES) definition of a “science, technology, engineering and mathematics (STEM) field” with the author using the STEM Designated Degree Program List as reference when selecting literature for inclusion within the search strategy (U.S. Department of Homeland Security, 2016a, 2016b). STEMM evolved from the acronym STEM, which originated with the National Science Foundation in the early 2000s. Though medical topics appear within STEM like other fields in science, STEM’s additional “M” seeks to improve representation and inclusivity for this field of work.

**Review Questions**

This scoping review will examine how academic and research libraries engage BIPOC communities with STEMM subjects. It will consider resources of any design or methodology in addition to grey literature from industry and professional organizations published between 2013-2022. The review will employ EndNote to analyze, code, and calculate model frequencies to determine overall themes.

The review questions were:

1. What strategies and activities do academic and research libraries use to engage BIPOC communities with STEMM?
2. Which BIPOC communities are engaged?
3. What STEMM subjects are most prevalent when engaging BIPOC?

**Methods**

The search strategy focused on published and unpublished studies in English available between 2013-2022 from databases, repositories, and professional organizations. Specific databases containing library, scientific, and education literature employed for the search included: Education Resources Information Center (ERIC), Library and Information Science Source (LISS/EBSCO), Professional Development Collection (EBSCO), Education Full Text (H.W. Wilson/EBSCO), Cumulative Index to Nursing and Allied Health Literature (CINAHL/EBSCO), Web of Science Core Collection (Clarivate), and Scopus (Elsevier). Figure 1's first phase (Identification) groups ERIC,
LISS/EBSCO, EBSCO, H.W. Wilson/EBSCO, and CINAHL/EBSCO together and are labeled as “Academic Search Ultimate.” Search strategies for all databases utilized in this review are available in Appendix I.

Inclusion Criteria

For this review, “communities” are defined as Black, Indigenous, and People of Color. “Engagement” is defined as a mutually beneficial collaboration between an academic or research library and a defined community with access to STEMM materials. This review was not limited to engagement with STEMM majors or students studying STEMM subjects and included all types of library workers who have researched engagement in North America. Thus, it included those with varying levels of education, knowledge, and experience within and outside of the information sciences.

Exclusion Criteria

Clinical trials, scoping reviews, systematic reviews, and literature reviews are excluded.

Identifying Literature

A three-step search strategy, recommended by The Joanna Briggs Institute (Peters, et al., 2020), was followed to build the database searches. First, the author conducted an initial search of two relevant databases (ERIC & LISS) using the terms “library” “higher education” “bipoc” “stem” and “outreach or engagement”. Second, the resulting text words within the title and abstract were analyzed, then conducted a new search with these additional terms (by adding them to the string) across ERIC, LISS, Professional Development Collection, Education Full Text and CINAHL to select and extract a larger group of relevant articles.

To search for unpublished or grey literature, terms used for database searches were also used for web searches (Eysenbach et al., 2001). And because search interfaces of web resources differ, the author sought to ensure a consistent strategy by “conducting several searches of the same resource using different combinations of search terms” (Lefebvre et al., 2022). Documentation of searches using web resources are listed in Appendix II.

Data Extraction

Citations were exported from ERIC, LISS, Professional Development Collection, Education Full Text, CINAHL, Web of Science and Scopus and imported into separate EndNote folders labeled for each database. Copies were then combined into one folder named “References Identified through Database Searching (including duplicates)” to hand identify duplicate records. To identify duplicates from this group, records were sorted in alphabetical order by title as well as author and were moved to a folder named “Duplicates.”
Results

After searching all databases, 305 English items were identified. After duplicates were removed, 246 documents remained. The author reviewed titles and abstracts while applying their inclusion criteria and this yielded twenty-six documents for full-text analysis. Fifteen met the inclusion criteria with specific references to academic or research libraries engaging BIPOC communities with STEMM subjects.

Ten resources were excluded from this review after analysis of the full-text. Though these resources were originally eligible for inclusion, they did not incorporate all inclusion criteria (combined discussions on academic libraries, BIPOC communities and STEMM subjects).

![Identification of studies](image-url)

Figure 1. Identification of studies
Page et al., (2021) discuss the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement to emphasize the use of a detailed reporting of findings that elaborate and provide transparency during reviews. To report the number of records found and retrieved, the author completed a PRISMA diagram (Figure 1) to illustrate their process.

To characterize resources that had all inclusion criteria, the author relied upon this review’s overarching concepts – engagement, BIPOC and STEMM – to group the resources into specific communities. BIPOC community groups were clustered to emphasize the ways in which libraries segment their activities to attract certain demographics.

The criteria identified four different BIPOC communities within these results and categorized them as “Off-campus BIPOC Community” (2), “BIPOC Student Community” (4), “Combination of BIPOC Off-Campus & BIPOC Student Community” (3), and “BIPOC K-12 Community” (6). General descriptions of these four communities are explained below.

- **Off-campus BIPOC Community**: Individuals who identify as BIPOC and live or work in the land spaces outside of a college or university are part of this group. Individuals are not students, faculty or staff of a college or university.
- **BIPOC Student Community**: Students who identify as BIPOC and attend college or university courses are part of this group. An example of this group could be Native American students planning a community meal during the semester.
- **Combination of BIPOC Off-Campus & BIPOC Student Community**: This group is a combination of BIPOC students attending courses and BIPOC communities living or working near a college or university. They can be characterized by their interactions together like collaborating to host speaker series either on or off campus.
- **BIPOC K-12 Community**: This community has BIPOC students that attend learning institutions intended for kindergarteners through the final year of high school.

Similarly, to document the strategies that libraries used to engage BIPOC Communities, the author searched for each engagement activity discussed in the literature to summarize how libraries made a variety of connections with BIPOC through STEMM topics. The author grouped these activities into five overall engagement strategies:

- Relationship building
- Programming
- Instruction Services
- Collections
- Exhibitions

**Resources**

Two resources with a focus on engaging “Off-campus communities” that identify as Asian, Black, Latinx and Indigenous, were included in this review (Table 1). Each of
these resources engaged communities with medical or health subjects alongside similar community engagement strategies.

Please note, the demographic categories listed in the following tables are those used by the resource authors and do not reflect the author’s preferred vocabulary.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Year</th>
<th>Strategy</th>
<th>Activity</th>
<th>BIPOC Community</th>
<th>STEMM Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>El-Khayat et al.</td>
<td>2022</td>
<td>Relationship building</td>
<td>Train-the-trainer/ Database search training; medical librarians trained community health workers to facilitate community learning</td>
<td>Latinx Native American</td>
<td>Health</td>
</tr>
<tr>
<td>Kranich</td>
<td>2021</td>
<td>Relationship building</td>
<td>Listening sessions; university &amp; public libraries hosted community conversations about health &amp; wellness</td>
<td>African American Asian Latinx</td>
<td>Health</td>
</tr>
</tbody>
</table>

Resources categorized as engaging their “BIPOC Student Community” emphasized collaborations with non-library entities such as peer mentors, student groups and faculty (Table 2). Only one was a study.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Year</th>
<th>Strategy</th>
<th>Activity</th>
<th>BIPOC Community</th>
<th>STEMM Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannon et al.</td>
<td>2021</td>
<td>Collections</td>
<td>Using digital archives within research guides</td>
<td>Native American</td>
<td>Archaeology</td>
</tr>
<tr>
<td>Christe et al.</td>
<td>2015</td>
<td>Programming</td>
<td>Library led program that used research-based learning</td>
<td>Minority ethnic groups</td>
<td>Engineering</td>
</tr>
<tr>
<td>Langhoff &amp; Enriquez</td>
<td>2017</td>
<td>Instruction services</td>
<td>Conducting literature reviews</td>
<td>Hispanic</td>
<td>Engineering</td>
</tr>
<tr>
<td>McMonigle &amp; Struble</td>
<td>2021</td>
<td>Programming</td>
<td>Collaborative exhibit creation &amp; planning</td>
<td>Black</td>
<td>Engineering</td>
</tr>
</tbody>
</table>

The author found three resources which co-mingled engaging a “Combination of BIPOC Off-Campus & Student Communities” through exhibits, trainings, and direct outreach programming (Table 3). All three emphasized engaging through topics around health.
Table 3. Resources describing a combination of BIPOC off-campus & BIPOC student community engagement

<table>
<thead>
<tr>
<th>Resource</th>
<th>Year</th>
<th>Strategy</th>
<th>Activity</th>
<th>BIPOC Community</th>
<th>STEMM Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bradley et al.</td>
<td>2017</td>
<td>Exhibitions</td>
<td>Traveling health exhibit to make community connections via outreach</td>
<td>Native American</td>
<td>Health</td>
</tr>
<tr>
<td>Dutcher &amp; Scott</td>
<td>2021</td>
<td>Relationship building</td>
<td>Outreach projects to increase library interactions</td>
<td>African American</td>
<td>Health</td>
</tr>
<tr>
<td>Murray et al.</td>
<td>2020</td>
<td>Programming</td>
<td>Peer navigators improve health literacy through outreach</td>
<td>Indigenous people</td>
<td>Health</td>
</tr>
</tbody>
</table>

Six resources engaged their kindergarten to 12th grade (K-12) school communities (Table 4). Libraries and archives engaged broadly with this community using various tools and STEMM topics while emphasizing interactive activities.

Table 4. Resources describing BIPOC K-12 community engagement

<table>
<thead>
<tr>
<th>Resource</th>
<th>Year</th>
<th>Strategy</th>
<th>Activity</th>
<th>BIPOC Community</th>
<th>STEMM Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mack &amp; Draper</td>
<td>2019</td>
<td>Programming</td>
<td>Hands on workshop Exhibitor fair Interactive activity</td>
<td>Minority students</td>
<td>STEM fields</td>
</tr>
<tr>
<td>Masucci et al.</td>
<td>2016</td>
<td>Relationship building</td>
<td>Educate youth in cultural and historical geography (through archival collections) while motivating them to study STEM topics</td>
<td>African American</td>
<td>Geographic Information Systems (GIS)</td>
</tr>
<tr>
<td>Mendez et al.</td>
<td>2019</td>
<td>Relationship building</td>
<td>Provide access to internet &amp; iPads to increase access to information</td>
<td>Latinx</td>
<td>Health</td>
</tr>
<tr>
<td>Pittman</td>
<td>2015</td>
<td>Programming</td>
<td>Summer transition program using research databases</td>
<td>African American Hispanic Native American</td>
<td>Engineering</td>
</tr>
<tr>
<td>Rossini et al.</td>
<td>2013</td>
<td>Relationship building</td>
<td>Develop curriculum to support searching skills</td>
<td>Minority racial groups</td>
<td>Health</td>
</tr>
<tr>
<td>Schellinger et al.</td>
<td>2020</td>
<td>Programming</td>
<td>Outreach via interactive activities</td>
<td>African American Asian Hispanic Native American</td>
<td>Medicine</td>
</tr>
</tbody>
</table>

All resources selected for review qualified STEMM engagement as beneficial to BIPOC communities and their library or institution.
Discussion

Academic and research library use of STEMM topics to engage BIPOC communities extends beyond institutional walls. Partnerships between libraries and communities leverage different engagement activities to address mutually beneficial needs. This review identified four groups of communities, five strategies, and six STEMM subjects used in tandem by libraries to engage Black, Indigenous, and People of Color.

BIPOC Communities

Overall, intentional engagement with Black communities was most prevalent, followed by Latinx and Indigenous communities. Engagement with Asian communities occurred less frequently.

K-12

The majority of accounts document library engagement with K-12 BIPOC communities compared to those in academia or non-campus communities. Additionally, half of the K-12 citations reviewed focused on engaging Black students, illustrating that libraries focus on exposing young Black students to STEMM. Evidence shows that libraries actively engage via pipeline programs, interactive activities, and facilitated use of collections. Unfortunately, four out of the six items in this review did not discuss a rationale for Black student engagement.

While access to K-12 education is a requirement by law in the U.S. and Canada, such access is not required for a college or university education. Existing financial disparities and achievement gaps impact attaining education beyond high school and affect racially minoritized people the most. While academic and research libraries use resources to engage K-12, literature does not discuss how or if engagement with this community impacts their involvement with STEMM subjects.

College/University Students

Libraries engage with Black, Indigenous, and Latinx student communities, with engagement occurring primarily through STEMM-related student organizations and STEMM-based collections. Silos exist within institutions and often discourage libraries from collaborating directly with STEMM departments. This may explain why libraries engage with K-12 BIPOC communities to a greater extent. It is not clear why engaging Asian students are not documented.

Off-Campus Community

Off-campus BIPOC communities were engaged, with only one resource detailing interaction with Asian communities. When engaging off-campus BIPOC communities, libraries engaged them in multiple BIPOC groups, but when engaging a combination of students and non-campus communities, libraries engaged them as specific identity groups. This noteworthy distinction is likely due to the library’s lack of familiarity with off-campus demographics, which leads to generalized interaction.
Engagement Strategies

Findings (Figure 2) show a prevalence in the literature of engagement involving relationship building, with 40% of resources discussing relationship building with an entity having close ties to specific groups. The use of relationships as the strategy to engage BIPOC included different library types and campus student groups. Regardless of the relationship, all engagement with the Off-campus BIPOC Community occurred with financial support from the National Library of Medicine (NLM).

The prominence of published literature focused on engaging the Off-campus BIPOC Community is not surprising. Funding provided by the NLM typically requires a published narrative or report describing project impacts and illustrating the library’s pivotal role in delivering health education to minoritized groups.

The use of programming (40%) to interact with K-12 and college/university student groups included summer transition and enrichment programs that focus on building library skills. Collections (6%) and instruction services (7%) were used to engage K-12 and relied upon brief age-appropriate workshops, while engagement via an exhibition (7%) relied on a day-long community visit with university students.

![Figure 2. Engagement strategies with BIPOC communities](image)

STEMM Subjects

Forty-six percent (46%) of resources engaged with the health discipline and 7% with the medical discipline (Figure 3). Thirty-eight percent (38%) of these projects were funded by The National Library of Medicine or The National Institutes of Health (NIH) and likely influenced the availability of engagement in this area.
Interaction through engineering sciences (27%) was primarily with college/university students.

Archaeology (6%), general STEM fields (7%), and geographic information systems (GIS) (7%) were used to engage K-12. The author finds it interesting that there is no documented use of GIS with college/university students or the off-campus community, and believes libraries are in the initial stages of engaging with these sciences.

![Figure 3. Engagement with BIPOC communities by topic](image)

**Engaging BIPOC College/University Students with STEMM**

Initiatives are emerging to engage BIPOC college and university students. Conference papers demonstrate a desire to expand library engagement with students and efforts are under development for implementation. Established efforts to connect with students occur primarily through partnerships and programs. Partnerships with student groups and national associations that focus on engineering sciences are in the forefront. It is unclear why libraries focus heavily on engineering when there are a multitude of STEMM subjects where students have interest and study.

Programs for student groups serve to welcome and retain students (Cannon, 2021; McMonigle & Struble, 2021) and provide substantial research experiences and information literacy skills students can use immediately for class assignments (Christe et al., 2015; Langhoff & Enriquez, 2017). Although programs occurred less frequently, the opportunities libraries create address barriers to student success.

Though there are few resources discussing college and university students, there is evidence that libraries seek to engage BIPOC students. It is unclear if this gap in the
literature is a result of limited work within libraries or is a result of slow to emerge published works on the topic.

**Limitations & Further Work**

The author acknowledges that there are limitations in using what is published as proxy for actual engagement work in academic and research libraries.

**Conclusion**

Library use of STEMM subjects to engage BIPOC communities is an emerging effort to address social justice, diversity, equity, inclusion, and belonging while uniquely increasing awareness of health issues and local history. In addition, engagement serves to attract people from diverse racial and ethnic groups to STEMM education and careers. This scoping review identified fifteen resources focused on engaging BIPOC communities with STEMM subjects, with engagement through relationships and health topics being the most utilized activities that reach an array of communities. BIPOC communities are receptive to academic and research library engagement, though specific engagement strategies using STEMM subjects are necessary to connect with different demographics.

**Appendices**

Appendix I search strategy and Appendix II grey literature search list are available at [https://journals.library.ualberta.ca/istl/index.php/istl/article/view/2797/2758](https://journals.library.ualberta.ca/istl/index.php/istl/article/view/2797/2758)

**References**


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