



Addressing social issues in informal STEM learning: a review of progress, potential, and gaps

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ABSTRACT

This research synthesizes recent literature about the ways the informal learning field is engaging with social issues, with a specific focus on the position of STEM knowledge in those efforts. Through a systematic review of peer-reviewed articles, research reports, and graduate theses, we found many topics highly ranked in public surveys were being addressed with many notable exceptions. Much of the research examined presents social issues isolated from complex, intertwined societal structures, although some emerging efforts did focus on the societal context of social issues. Our analysis suggests a strong role for the field as knowledge brokers for understanding social issues, but also a need to broaden the range of topics and to more deliberately and transparently include the societal context and structural nature of social issues. The review concludes with a call for more cross-disciplinary and cross-sector efforts.

KEYWORDS

Informal learning; social problems; social change; research synthesis; STEM learning; museum impact

Introduction

Addressing social issues has become a priority for the field of informal learning (De Los Santos et al., 2018; Janes & Sandell, 2019; Morrissey et al., 2014; Murawski, 2021; Sandell & Nightingale, 2012; Worts, 2011). This commitment is reflected in the statements of professional organizations that represent the field. The American Alliance of Museums' Strategic Framework starts with the belief that museums help "society address many of our most pressing issues, from the climate crisis to racism and economic disparity" (American Alliance of Museums, 2021). The Association of Science and Technology partners "to tackle global and local challenges" (ASTC, 2022); the Visitor Studies Association Diversity Statement supports "equity, inclusion, and racial justice in all our communities and across the world" (Visitor Studies Association, n.d.). These principles, which became particularly evident and publicly articulated in response to the COVID-19 pandemic and social movements, such as Black Lives Matter, are also reflected in journals such as *Museums and Society* (f. 2003) and *Museums & Social Issues* (f. 2007), as well as recent publications such as *Museum Activism* (Janes & Sandell, 2019), *Museums as Agents of Social Change* (Murawski, 2021) and *Museums, Sexuality, and Gender Activism* (Adair & Levin, 2020).

How do these publicly stated intentions play out in practice? Are museums advancing equity and social justice? Is the field addressing pressing societal issues? Which issues are

addressed and which are ignored? Are there opportunities, barriers, or gaps that could be addressed? Along with these questions, we were also interested in the role of STEM knowledge in these efforts because so many of today's critical social issues call for a certain level of science, technology, engineering, and math (STEM) knowledge. In the age of misinformation, the ability to reason and apply a scientific, engineering, or mathematical mindset could bring clear benefits.

Methodology

To address these questions, we conducted a research synthesis of literature published between 2000 and 2019. A research synthesis is a particular type of literature review, most often used to answer questions about what works and what doesn't, or what's been tried and what hasn't (Booth et al., 2016; Cooper, 2017; Gough et al., 2012; Onwuegbuzie & Frels, 2016). A research synthesis can inform strategic decisions about policies, funding priorities, and practices by providing a "more comprehensive and stronger picture based on many studies and settings than a single study" (Cooper et al., 2019, p. 3).

The Handbook of Research Synthesis and Meta-Analysis describes a research synthesis as: "A review of a clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise relevant research, and to collect and analyze data from the studies that are included in the synthesis" (Cooper et al., 2019, p. 535). The authors of the handbook suggest that a research synthesis is characterized by six variables:

- *Focus* (findings, methods, theories, or practice);
- *Goal* (criticism, identification of central issues, or integration);
- *Perspective* (neutral or position);
- *Coverage* (exhaustive, selective, representational, or pivotal);
- *Organization* (historical, conceptual, or methodological);
- *Audience* (e.g. scholars, practitioners, public, policy makers).

The goal of our research synthesis was to identify central issues and themes for an audience of museum practitioners, evaluators, and researchers. Our search protocols were designed to yield a corpus that was representative rather than exhaustive, and the organization of the analysis was conceptual. The research perspective was motivated by a position that museums can and must engage with social issues to fulfill their mission and their responsibilities to the public.

Selection of literature

We searched for relevant literature within three sources: peer-reviewed journals, graduate theses, and evaluation reports of nationally funded projects posted on informalsci.org. We selected these sources to provide a broad and diverse view of current practices, assuming that each provided a different lens on the practices across the field. Our definition of a social issue was informed by our earlier work creating the journal *Museums & Social Issues*, as well as research about public understanding of social problems (e.g. Best, 2013; 2016; Ennis & Tofa, 2020; Kramer & Pfitzer, 2016; Kania & Kramer, 2011; Senge et al., 2015). We define a social issue as conditions that are: (1) publicly recognized as

harmful or limiting to a significant proportion of society; and (2) complex, systemic, and enduring. To identify relevant literature, we searched for work that:

- Included one or more institutions of informal learning; and,
- Was described by the authors as addressing social issues using terms such as “social issues,” “social problems,” “social justice,” or,
- Addresses an issue or topic that has been identified in national opinion polls as an important issue to Americans.

To identify topics that were important to the public, we selected a set of polls that had been evaluated based on their methodology, their accuracy in reflecting national opinions and their political bias (Silver, 2018). For instance, we included the ABC News/Washington Post (rated A+, leaning Democratic) and the Marist Polls (rated A, leaning Republican). From those polls, we identified topics that were consistently listed as top concerns in multiple polls, such as climate change, immigration, incarceration rates, abortion, economy (and jobs), and healthcare. For pragmatic reasons, we often collapsed similar terms into topical categories (e.g. “abortion” and “reproductive rights”).

Using the terms identified from the polls, we created a set of keywords and then searched for literature combining keywords with terms that referred to informal learning (e.g. museum, zoo, science center, etc.). We searched for peer-reviewed literature through university libraries with access to more than 100 research databases. To search for graduate dissertations and theses, we used the ProQuest database, purportedly the most comprehensive collection of dissertations and theses in the world. To find evaluation reports, we relied on the informal.science.org repository. We recognize that these sources may not reflect all the work taking place across the field, but our goal was to produce a representative, not exhaustive, sample. Our process for selecting the literature was lengthy, difficult, and sometimes messy but we attempted to be systematic, transparent, and consistent in our protocols and decisions, which are described in detail elsewhere (Morrissey, 2021).

Assessing and classifying the literature

To determine whether each publication was useful and valid for the synthesis, we confirmed that the projects described within the paper included informal learning organizations within the United States. We limited the scope of the review to the United States in part for pragmatic reasons but also because we recognize the unique ways that social problems are influenced by national norms, policies, and even language. We also noted if methodologies and results were clearly identified and supported in each paper. We did not want to exclude papers that didn’t describe research methodologies because they could help us answer our research questions about the topics being addressed. But we could not include those publications to address our research questions about the impacts of this work. Therefore, we sorted and classified each paper by the utility to our research synthesis:

Empirical. Publications that: (1) identified research or evaluation questions; (2) described a method of collecting or analyzing data; and (3) presented results. Evaluation and research reports largely fell into this category.

Descriptive. Publications that described an exhibit, a program, or other product or practice. Data from an evaluation might be referenced, but not described.

Expository. Publications that stated opinions about the field or recommendations for practices but did not include empirical data.

The final inventory included 237 studies published between 2000 and 2019, including 110 peer-reviewed articles, 50 reports from informal.science.org (primarily evaluation reports), and 77 dissertations or theses from ProQuest database (See Table 1). We used the full set of studies to identify the range of topics addressed and to examine any gaps between topics addressed and those of public concern. The expository studies were mainly used to understand the priorities and the rhetoric applied to social issues. The analysis of impacts focused on reports and studies which were empirical.

We further classified articles by their environment. We had initially intended to only focus on STEM-based institutions as we were interested in the ways that STEM knowledge and STEM-based reasoning was situated within social problems. However, it was not always possible to objectively identify an institution as STEM-based and we found that examining STEM-based institutions within the larger context of informal learning environments yielded a different set of observations. So we defaulted to describing all sites broadly as sites of informal learning (IL) unless they were described as a STEM-based informal learning institution (ISL) such as zoos, science centers, natural history museums, etc. In our analysis, we clarify whether we are using the full set of studies (most cases) or the subset of STEM-based studies. We did not include terms such as “art” or “gallery” in our search for literature and we do not claim that our analysis reflects the work that takes place within that sector.

Analysis of literature

The papers selected were recorded on a spreadsheet along with the meta-data, which included date of publication, keywords and sometimes subject categories provided provided by the author, our classifications for type of article (expository, empirical, descriptive) and environment (informal learning or specific to informal STEM learning). That spreadsheet was the source of much of the descriptive analysis. We also uploaded all the papers and the associated spreadsheet to NVIVO, an analytical research tool. NVIVO provided the ability to explore the data using visualization tools, such as word frequency or concept charts and maps. NVIVO also allowed us to classify each article by associating it with the information on the spreadsheet. We could then sort by any of the categories and find, for example, all the publications that dealt with climate change or all the studies that took place in zoos. Our initial analysis primarily involved creating tables

Table 1. Breakdown of final inventory of research synthesis.

Source	Empirical	Descriptive	Expository	Total
Peer reviewed articles	35	59	16	110
ProQuest dissertation & theses	67	10	0	77
InformalScience.org repository	2	48	0	50

Table 2. Coding used to indicate impacts.

Code	Description	Example
Understanding, Knowledge, Awareness	Knowing about something, learning facts or information	"Visitors will understand that race is a human invention"
Action, Behavior, Progression	What people do or intend to do, change in behavior, progression	"stimulate visitors to lead healthier lives"
Enjoyment, Inspiration, Fun	Positive experiences, feeling inspired, hopeful, having fun	"offered visitors a fun and engaging environment"
Reasoning & Decision Making	Recognizing and using evidence in decisions and arguments, applying concepts	"Utilize critical thinking skills to explain that the first amendment emerged out of debate"
Attitudes & Values	understand natural and social environment	
	Opinions, feelings, or attitudes towards others or towards phenomenon	"more concerned about climate change and ocean acidification, and more hopeful"
Building Capacity	Developing resources, relationships, or infrastructure that increase ability to address missions.	"relationships that increase the knowledge and capacities of all partners so they can better fulfill their missions and serve their publics"

using the spreadsheet (particularly pivot tables), as well as queries and word frequencies with NVIVO to look for patterns or anomalies in the data.

We then dove into the content of the publications and coded for intended audience (e.g. public, adult, youth, intact groups, professionals, other), types of interventions (e.g. exhibits, programs, collections, dialogue programs, research, other), and intended and achieved impacts. To understand the impacts of projects, we developed a coding system that was adapted from the Generic Learning Outcomes (GLOs) developed by Arts Council England and the Six Strands of Informal STEM Learning identified by the National Research Council (NRC, 2009). The GLOs were useful because indicators and coding samples had already been developed and validated to assist researchers in using the coding system. The six strands were chosen because of the direct implications to our research interest in the positioning of STEM knowledge. After testing for redundancy and clarity, we collapsed the 12 categories to five and added the category "building capacity" to capture projects that were explicitly designed to build capacity of institutions or the field (see Table 2). We compared intended impacts with achieved impacts and looked for relationships between impacts, topic areas, audiences, and types of interventions. For this part of our analysis, we only looked at studies that included STEM-based institutions because we were looking specifically at the role of STEM in addressing social issues and the impact of that work.

Results

Reporting results from a research synthesis is uniquely difficult because the individuals conducting the review are using research conducted by other people as their source of data. The challenge is to synthesize the results to a degree that they are useful and provide insights beyond a summation of the individual studies and yet maintain fidelity to the original studies. This may be particularly important in research about social problems where issues that surfaced in the original research could be misunderstood or simply missed by the person conducting the synthesis, inadvertently perpetuating norms or inequities. To ameliorate these risks as much as possible, we frequently elicited reactions from our project advisors (a group of professionals and researchers who focus on

informal STEM learning) and from other professionals at national conferences. Below we present a brief synthesis of what we saw in the literature.

What topics are addressed or missing?

The projects discussed in these publications addressed many of the topics identified in the opinion polls, such as climate change, immigration, and incarceration. However, many issues that were high on polls of public concern were rare or non-existent in the literature. For example, health was a common topic but the opioid epidemic, health-care policy, reproductive choices, and depression - all issues related to health and commonly understood as social problems - were largely absent. Race and racial equity issues were addressed in a number of articles, most based on the traveling exhibit *Race: Are We So Different?* Gun control was a high priority on most opinion polls but we found no examples within this body of literature. A few studies looked at gender disparities in audiences or within the museum workforce, but surprisingly few projects focused on public understanding of gender or social issues related to LGBTQIA+ rights. The few examples exploring gender issues were almost always found within graduate research.

We also noticed differences between the topics that were addressed by STEM-based institutions and those addressed by other sites of informal learning sites. Discussions related to immigration or incarceration were frequent but rarely found in STEM-based institutions. References to climate change almost all occurred in STEM-based institutions. In zoos and aquariums, climate change and conservation-related issues were largely the only social issues addressed. These differences between types of institutions might be expected given the different missions and areas of expertise. However, given the multidisciplinary nature of social issues, the "siloing" of topics raises questions of opportunity, agency and risk taking.

How is STEM knowledge situated within social issues?

When STEM knowledge was included within projects, the knowledge base largely fell within the broad category of science with references to "natural science", "current science", "science of climate change", "earth science", "science expertise", "science information", "scientific practices", "ocean science", "social science", "science communication", "science production", "science concepts", "science research", "scientist", "space science", "atmospheric science", and others. But the disciplines associated with engineering, technology, and math were rarely explicitly acknowledged. In fact, the term "science" and variations of the word (e.g. scientific) occurred more than 13,000 times compared to engineering or technology, which each had fewer than 500 occurrences, or math, which had fewer than 100 (see Figure 1).

An earlier review of literature posted on informalscience.org, resulted in a blog post entitled "Where's the 'M' in STEM when Addressing Social Issues" (Morrissey & Johnson, 2014). Our current review of a much larger and diverse corpus similarly finds math rarely engaged, and the few instances we did find were largely focused on youth audiences and not adults. The place of technology as a discipline was particularly difficult to parse because it was sometimes the topic of a project (e.g. nanotechnologies), but

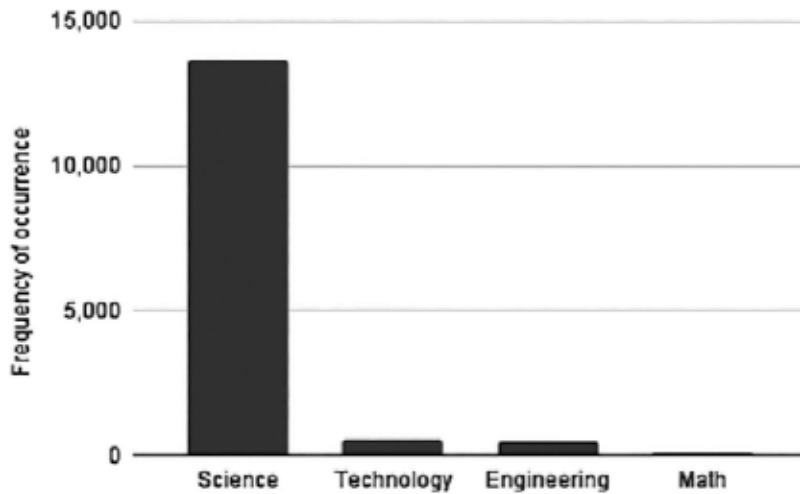


Figure 1. Frequency of occurrence of STEM terms in research synthesis.

sometimes it was present as the mechanism for delivery of other topics, such as big data or non-observable aspects of biology. But societal issues related to technology, such as data privacy, were missing.

STEM disciplines were most often employed to help audiences recognize evidence of social problems with goals such as “an increased understanding of environmental changes and natural hazards including rising sea levels and changing frequency and magnitude of heat waves, extreme precipitation events, and drought” (Todd et al., 2019, p. 5). Fewer examples existed of applying STEM to creating or understanding *solutions*. However, engineering, which was rarely used to understand social issues, was often associated with solutions, particularly around energy (e.g. nuclear energy) and medical advances (e.g. biotechnology).

While most projects used STEM knowledge to engage visitors in understanding social issues, a few projects instead utilized public interest in social issues as the gateway to understanding STEM. For example, the *Evolution Health Connection* exhibit at the New York Hall of Science successfully “leveraged the public’s fascination with health issues to broaden their understanding of the fundamental importance of evolution to their own health” (Weiss et al., 2016, p. 27). And an exhibit about nanotechnologies found that panels with content about social issues and applications of nanotechnologies were most often cited by visitors when discussing relevance (Kunz Kollmann et al., 2015, p. 4).

What is the impact of the STEM-based efforts to address social issues?

There is strong evidence that these projects are advancing public awareness and understanding of social issues and are motivating behavioral change as shown in Figure 2. Across the subset of literature that included STEM, impacts within the category of “Advancing Knowledge” were the most frequent, followed by “Action or Behavior”. The category of “Enjoyment” was often listed as an outcome even when it wasn’t identified explicitly as a goal. Based on those findings, we could be tempted to argue that informal STEM learning institutions have the capacity to impact knowledge and behaviors related to social issues while also providing a positive experience, potentially a very exciting conclusion.

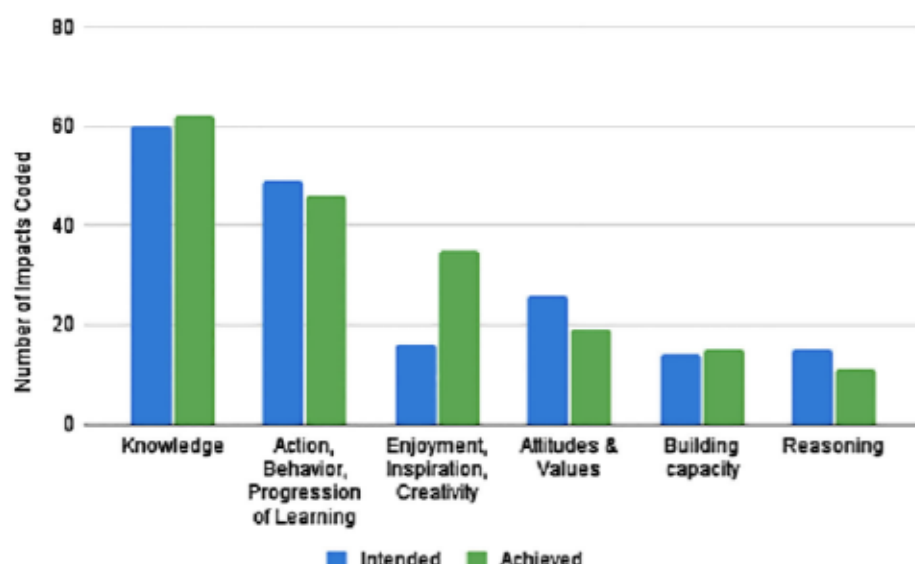


Figure 2. Coding of impacts intended and achieved in ISL projects.

However, further examination of the literature presents a more ambiguous picture and suggests a more guarded optimism about capacity. Knowledge gains were rarely measured but instead assessed through self-reported statements, such as “visitors reported they learned something new.” And while a number of studies reported that visitors were able to recognize and understand characteristics of social problems (i.e. increased flooding as result of climate change), visitors were less likely to understand the complexity and the more nuanced societal implications. For example, the summative evaluation of the exhibit *Race: Are We So Different?* found that while most visitors understood the main idea that race is a socially constructed concept, “The exhibition was less successful at impacting visitors’ understanding of the complexity of racism in America” (Randi Korn & Associates, 2007, p. xxi). Similarly, an exhibit aimed at influencing visitors’ ability to think critically about healthcare choices found that while visitors understood the main message about the value of scientific evidence, fewer expressed “the more nuanced understanding of how to assess the quality of the evidence” (Haupt & Povis, 2017, p. 9).

Additionally, the limited research that looked specifically at visitors’ reactions to seeing social issues addressed by an informal learning site was inconclusive, with some studies suggesting that visitors were ready for more engagement and other studies suggesting otherwise. For example, an evaluation of an exhibit about climate change and the oceans reported that some visitors found conservation messages as upbeat and inspiring, while others found the messages to be “preachy, political, intense, in-your-face” (Randi Korn & Associates, 2011, p. 25).

It was also difficult for us to parse the relationship between changes in knowledge and changes in behavior. Most projects wanted to accomplish more than awareness and understanding of issues; they wanted to change behaviors and spark actions. However, studies that *measured* behavior change were rare. As one report stipulated, “although intentions for environmentally responsible behavior increased, actual behavior changes

were not measured" (Pennisi et al., 2017, p. 44). There were a few instances of behavior changes in public programs that included prolonged and sustained interactions such as a club or community collaborative or professional development initiatives. And there were a handful of reports that suggested that while the intervention didn't provoke new behaviors, it reinforced current ones. We can't say whether the lack of observed behavior change is a result of the limitation of evaluation methodologies or actually reflects a lack of change. Skills related to thinking critically and analytically (*reasoning*) were commonly described as difficult to measure or achieve, although some projects reported success when the skill set was specific and the interventions research-based and carefully designed (e.g. Curtis, 2014; Kunz Kollmann et al., 2015).

Opportunities, barriers, and gaps

While this study did not attempt to draw conclusions about what the field could or should do, there were clear gaps between intentions stated in the literature and the practices we saw described within that literature, which we believe speak to capacity. There were also significant opportunities, as well as barriers, to achieving the aspirations of addressing social issues. We posit that overcoming these barriers and taking advantage of the opportunities would increase the capacity of the field to align practices with intentions.

Growth in literature

The number of publications focused on social issues increased more than four-fold between 2010 and 2019, compared with 2000 and 2009, and the growth was particularly notable in the empirical literature (see Figure 3). Peer-reviewed articles were included from journals as diverse as *Journal of Microbiology & Biology Education*, *Journal of Museum Education*, *Journal of Community Health*, *Political Communication*, *Journal of Museum Education*, *Museums & Social Issues*, and *Journal of Science Communication*. Theses and dissertations from 43 universities and more than 30 disciplines often addressed topics that were not reflected in the peer-reviewed literature. The reports posted within the InformalScience.org repository reflected less diversity in the institutions and projects, with large institutions or multi-institutional collaborations the predominant source of reports. The breadth and depth of this literature provides an opportunity for developing a deeper, theoretical understanding of the ways that informal learning experiences can address social problems.

Limited field-wide professional development (PD)

The studies that assessed professional development (PD) activities ($n = 14$), found that participants valued what they learned, appreciated the opportunities to learn with other professionals (Fleischer, 2013; Kelsey, 2012; Todd et al., 2019), and they were more skilled and confident as a result (Gareis & Smith, 2015; Sickler, 2016). However, examples of PD efforts were sporadic and generally connected to a specific project and funding source. Given the complex and often sensitive nature of social issues, it was surprising to see so few efforts focus on preparing the professionals who develop, present, or facilitate visitor experiences with social issues.

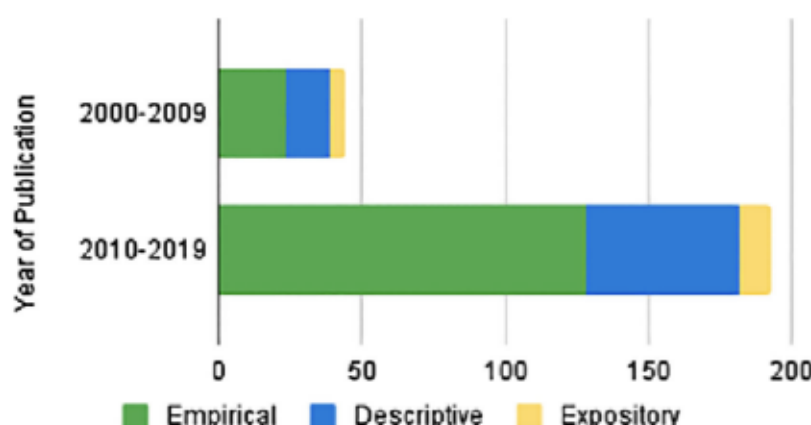


Figure 3. Growth of literature about social issues between 2000 and 2019.

Lack of cross-disciplinary or cross-sector collaborations

We were particularly interested in the nature of collaborations because research suggests that addressing social problems requires a multidisciplinary understanding of the causes of the problem and collaborative efforts across public sectors to solve problems (e.g. education, commerce, government, law, religious organizations, and NGOs). However, we saw very few cross-sector collaborations or efforts that brought in different disciplinary bodies of knowledge.

When expertise was drawn from outside the STEM fields, it was typically from fields related to understanding and communicating with *individuals* such as psychology, leisure studies, communication, and education. There were very few examples of bringing in expertise or perspectives more generally related to understanding *societies* and social structures, such as political science, sociology, gender studies, social work, or economics (Social sciences were often embedded in the research methodologies, which may have included a societal perspective). As a field that often engages in partnerships and collaborations with similar types of organizations, there is a clear opportunity to expand the composition of those collaborations.

Focus on individuals rather than society

Most of these articles expressed the desire to inspire or effect change at the societal level, using phrases such as “working together to effect social change” (Cabrera & Gomborg-Munoz, 2010, p. 205); “oriented towards social change by facilitating new ways of thinking about climate change” (Cameron, 2012, p. 331); and “ISLCs have the potential to be a highly effective vector for effecting broad societal change” (Geiger et al., 2017, p. 222). However, while intentions often focused on changing society, practices more often focused on changing individuals, particularly the actions within the sphere of their daily lives. Health projects identified impacts such as “change their eating habits” (Carney et al., 2009, p. 246) and “stimulate visitors to lead healthier lives” (Israel et al., 2007, p. 1). Climate change efforts encourage visitors to take actions such as composting, recycling, public transportation, or saving energy. The National Network for Ocean & Climate

Change Interpretation (NNOCCI) project described this as “the individual solution trap” (Bunten & Arvizu, 2013, p. 268), which ignores the complex, overlapping and often competing societal structures that need to be changed to effect social problems.

One of the more promising examples we found at the societal level was the exhibit *Race: Are We So Different?* which tried to “demonstrate to visitors that racism exists at the societal level, not only at the individual level” (Randi Kom & Associates, 2007, p. xii). The project was often cited for the ways it engaged visitors in discussions of race and racial equity at both the personal and societal level (e.g. Johnson-Cunningham, 2018; Morrissey et al., 2014; Porter & Garcia, 2018; Teslow, 2007). The exhibit continues and led to further research and recommendations for organizational and structural changes to address the systemic nature of racism at the societal level (Jones-Rizzi et al., 2021).

Aligning intentions with capacity: an emerging typology?

While there were many gaps in the topics addressed or the impacts achieved, by and large, the body of literature demonstrates a wide range of ways the field has engaged the public with social issues. We saw examples of exhibits, programs, facilitated dialogues, science on a sphere, citizen science initiatives, community-based research and many other traditional as well as innovative forms of public engagement. We saw examples of large multi-institutional collaborative efforts, but we also saw examples of projects hosted by individual institutions such as *The Changing Face of What is Normal: Mental Health* exhibit, designed by the Exploratorium (Winfrey & McDonald, 2016, p. 63), and a series of dialogues designed to reinvigorate civic dialogue about reproductive rights at the Matilda Joselyn Gage Center (Wagner et al., 2013). This range of institutions and efforts supports the premise that any institution or project has the capacity to play a role in addressing social issues.

Research on public understanding of social problems suggests that societies begin to address problems when presented with: 1. significant evidence and information about the problem (*Grounds*), 2. reasons for addressing the problem (*Warrants*) and, 3. recommended actions and changes (Best, 2013; 2016). Using those three categories, we see three roles that informal learning projects or institutions could undertake.

- *Role as Knowledge-broker:* The ISL field seems to be particularly successful at providing evidence of social problems and engaging the public in understanding and reflecting upon that evidence. “Knowledge is an important commodity in claimsmaking” (Best, 2016, p. 124) and the field has the opportunity to continue to play a strong role in helping the public recognize, understand, and consider evidence of social issues. There were also studies that explored communication and interpretation techniques suggesting a growing capacity in this role (e.g. Fraser & Rank, 2012; Katz-Kimchi & Atkinson, 2014; Luebke et al., 2012; Pope & Selna, 2013). Within this role, there is an opportunity and arguably a responsibility to address a broader range of issues and to acknowledge the structural forces and issues of equity that are involved. This requires a shift from understanding the environmental phenomena associated with the social problem (e.g. rising sea levels, loss of animal species), to understanding the larger cultural and societal structures that have allowed or created the problem.

- *Role as Advocate*: The research and interpretive experimentation with rhetorical tools and ways to frame messages (particularly around climate change), suggests that the field is building capacity to appeal to the public in ways that are effective and aligned with the cultural practices of informal learning. However, in reviewing the language and the rhetoric embedded in the empirical articles and reports, terms that are typically associated with social change, such as equity and justice, were much less likely to occur in association with STEM-based institutions, in comparison to the heavily used term “knowledge” (See Figure 4) This pattern may be a matter of semantics, but it is difficult (and troubling) to imagine motivating the public to address a social issue without addressing the social inequities associated with that topic.
- *Role as Change Agent*: The ISL field appears to be comfortable in advocating for actions that are within the sphere of individuals’ daily lives but not as comfortable with recommending actions that would get at the systemic causes of social issues. Whether individual institutions or the field at large commit to the role of change agent, there is value in calibrating intended impacts with a more transparent acknowledgement of the societal context of problems.

Limitations of this research

A review of the literature provides a broad landscape that can reveal patterns, anomalies, and gaps in current activities of the field. But there are significant limitations to what a review can accomplish. The most significant is that our research is not focused on practices, but on articles, reports, and theses that describe or assess those practices. What we saw is one step removed from actual practices and may have missed salient trends, interesting anomalies, or emerging practices. We also

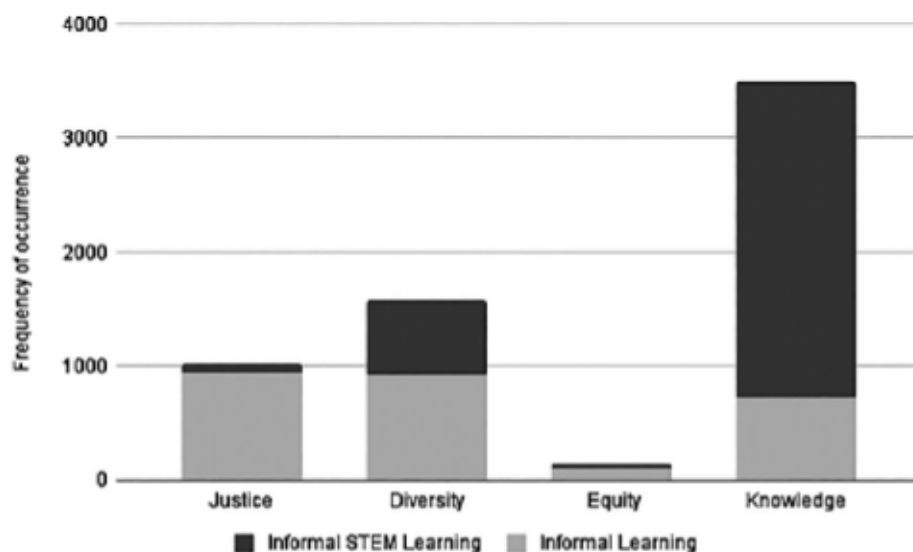


Figure 4. Frequency of terms associated with social issues used between environments.

recognize that sites of informal learning are part of a larger learning ecosystem that includes schools, libraries, parks, and other types of environments. We did not study these ecosystems.

We also acknowledge that funding sources, journal publication guidelines, institutional concerns, university protocols, and other factors influence what gets published, who publishes, and what is said. The majority of the projects represented in this literature were supported by external funds (typically the National Science Foundation, National Institutes of Health, Institute of Museums & Library Services, National Oceanic and Atmospheric Administration) which may be a conflating variable in considering what these reports imply about the priorities of the field.

Finally, many of the studies were intended to *describe* a particular audience, intervention, or experience rather than *measure* the impact of a particular intervention. For example, many audience studies looked at attitudes or knowledge about a particular social issue, and graduate theses (particularly master's theses) often described a particular trend or practice (e.g. dialogue programs or representation of current science) rather than measuring the impact of that practice. This limited our ability to recognize potentially important impacts that hadn't been empirically measured or reported.

Conclusion

Addressing societal issues is a clear priority for the field of informal learning. This research synthesis examined the ways in which that priority is realized by analyzing and synthesizing the discussions and results of projects reported in publications between 2000 and 2019. We looked at topics addressed, impacts intended or achieved, and patterns that suggest opportunities or barriers. We found that many social issues important to the public are being addressed such as climate change, health, and racial equity. But many of the more contested or personal topics such as reproductive rights, mental health, or economic disparities, are not. The types of impacts most often intended and achieved were related to knowledge or understanding, with other types of impacts more difficult to measure or determine.

We started this research with the belief that informal learning institutions have a unique capacity to address social issues because of their reputation as sites of learning and recreation for formal and informal groups. Our review suggests that the field is indeed playing a significant role in advancing public awareness and understanding of social issues but that capacity may be limited by a number of patterns in practice which we saw in the literature including a lack of cross-disciplinary perspectives or cross-sector collaborations; a focus on achieving and measuring change at the individual level rather than societal level; and the limited professional development opportunities related to addressing social issues or inequities.

Based on research about public engagement in social problems and the range of examples of projects we saw in this literature, we see three types of approaches to engaging with social issues. As "knowledge-brokers", projects (or institutions) can play a role in advancing public awareness and understanding of social issues. As "advocates for change" projects can provide reasons or motivations for addressing social problems. As "change agents", initiatives can effect changes at the structural level that address the complexity of social problems. Each of these roles comes with tremendous opportunities and

responsibilities to advance the health and well-being of our global and local communities and our natural environment.

We hope that this analysis of the literature acknowledges the tremendous efforts reflected in this literature and encourages further experimentation, funding, research, collaborations, and imagining.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

Notes on contributors

Kris Morrissey has 20+ years in museum practice and academia including 10 years as Director of the Museology Graduate Program at University of Washington where she taught courses on research, museum practice, and social change. She has supervised master's and doctoral research at University of Washington and Michigan State University. She is the Founding Editor of the journal *Museums & Social Issues* and is currently working as an independent researcher and as a Research Fellow at Knology.

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