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## **Environmental Education in Public Libraries**

### **Structured Abstract**

**Purpose** – To investigate effective public library environmental education interventions in order to inform the development of a framework for public libraries.

**Design/methodology/approach** – A qualitative research method was developed incorporating surveys and follow up interviews with librarians working in U.S public libraries, who were known to have been involved in environmental education initiatives.

**Findings** – The research determined which environmental education interventions were most likely to lead to action and behaviour change in public library users. The resulting discussion has allowed for the creation of a framework which establishes factors useful for successful implementation of environmental education programmes and activities. These elements include partnership, institutional commitment, inclusion and outreach, and practical activities linked to a larger vision.

**Research limitations/implications** – The research participants were limited to those libraries in the U.S. which were all affiliated with the ALA Resilient Communities programmes and had received grants

**Practical implications** - The paper concludes with a framework for implementing environmental education programmes in public libraries. Effective interventions are also shared which provide practical ideas and strategies.

**Social implications** - Providing structure and considerations for establishing an environmental programme enables libraries to build on experiences of other libraries. As climate change action becomes a more pressing issue, providing these interventions supports action.

**Originality/value** - The paper discusses the concepts of environmental education and the role which public libraries can play in this arena, concluding that sustainable development should be treated as a new tenet of librarianship, and environmental education as a new research field of library and information science.

**Keywords** - Public libraries, Sustainable development, Environmental education

**Paper type** - Research

# Introduction

To address climate change on a global level, The United Nations identified Climate Action as one of its 17 Sustainable Development Goals (United Nations, 2015), emphasising that a proactive approach is the responsibility of every sector of society, including the education sector. (United Nations, 2019). In this respect, understanding both the theoretical factors for climate change as well as practical actions can help inform individuals and lead to changes in behaviour. Gaining knowledge of the world economy, supply systems and unsustainable practices “can show people that .... they have a critical role to play in redefining their lifestyles to address the current sustainability issues that humanity is facing.” (Anderson, 2012, p. 3)

Education must ensure that people have access to practical instruction and ways to enact sustainable choices. Education can provide “transformative shifts in how we think and act and how we relate to present and future generations... This is where education has a crucial role to play in climate responses.” (Mochizuki & Bryan, 2015, p. 4). This idea of knowledge spurring action is affirmed by the increased ‘pro-environmental behaviours’ exhibited by people with greater knowledge (Fedorowicz-Kruszewska, 2020). This implies that information alone is not enough, in that education about environmental concerns needs to lead to action.

Environmental education not only seeks to inform, but to engender lasting behavioural change. This sort of education can focus on individual behaviour: skills (sorting recycling, reusing materials, cooking using local ingredients) resources (local recycling centres, vendors who offer low waste packing options) or actions (turning off electricity, avoiding water waste). From a public library perspective, the informational and educational interventions offered have the potential to reach all sectors of society in line with the United Nations recommendations. This can be delivered in three ways: providing access to knowledge; practical education; and promoting the sharing economy. The sharing economy is when goods are shared between consumers thereby reducing the number of items that need to be produced.

The free access to a vast quantity of unfiltered scientific research about the climate crisis is a starting point for having informed citizens (Falkenberg, 2019). Librarians are providing

interventions such as creating awareness about reducing resource use and promoting educational events that address environmental, social and economic contexts and have been for decades (Fedorowicz-Kruszewska, M., 2020; Antonelli, 2008). Educating members of society around climate change is critical and public libraries play a key role in such education.

The crucial role of libraries as ‘green educators’ and ‘green teachers’ has been recognised by the American Library Association [ALA] with the roll-out in 2020 of the ‘Resilient Communities: Libraries respond to Climate Change’ project (Fedorowicz-Kruszewska, 2020; American Library Association, 2020) which provided small grants for selected libraries in the U.S.

### *Aims and objectives*

This research aims to determine the most effective ways in which public libraries can promote environmental awareness through focusing on the environmental education interventions of these ‘Resilient Libraries’:

- To establish the specific interventions and activities of public libraries in environmental education
- To explore how library patrons have responded to environmental education interventions in public libraries
- To investigate the effectiveness of such interventions in terms of impact.
- To develop a framework for good practice for implementing environmental education interventions

In order to identify which interventions are most efficacious three primary research questions were developed:

- What are Resilient Community libraries doing to contribute to environmental education?
- How are Resilient Community library interventions efficacy being identified and evaluated?
- What interventions have been the most transformative for the participants in the interventions?

# Literature Review

Whilst the subjects of environmental education and libraries as green institutions are explored widely in academic sources, the focus of libraries' roles in environmental education is less thoroughly researched. To this end, this initial literature review evaluates relevant sources in three different areas: the importance of climate change education; libraries and environmentalism; libraries as environmental educators.

## *Climate change education*

Anderson (2012) and Mochizuki and Bryan (2015) discuss climate change education as needing to foster both adaptation and mitigation behaviours. Anderson details skills that should be included in climate change education such as recognising and reacting to the effects of climate change, understanding reasons for climate change, and exploring differing points of view around climate change topics. The methodology for teaching these concepts should be cross-curricular, practical and concrete, address local problems and serve local needs. This requires community outreach. The author explains that the efficacy of climate change education must be measured in changes in individuals' behaviours, lifestyle, and consumption.

Mochizuki and Bryan (2015) echo the belief that effective environmental education brings about changes in behaviour. Integration of environmental education in schools is posited as a cost-effective and efficient way to disseminate information and enact this behaviour change. The authors state that meaningful climate change education must be transdisciplinary, incorporating economics, politics, history, ecology, science, sociology and ethics; it also must incorporate the range of effects from climate change including food disruption, access to clean water and more frequent natural disasters. This paper also emphasises the need to step outside the walls of the classroom when enacting climate change education. Extending the idea of education, the authors advocate for education to be extended to all ages and demographics via public information campaigns alongside targeting students via school curricula.

While these works all argue for curriculum reform that focuses on action, they lack evidence-based research on the long-term effects of education on behaviour change. Åhlberg, Äänismaa and Dillon (2005) study specific environmental education interventions and their efficacy, addressing the need for action research. Their research concluded that after embedding 'sustainable living' concepts into a university curriculum over four years, students

adopted more behaviours consistent with environmental conservation, as well as demonstrating more awareness of how individual actions in environmentalism impact the wider community. The curriculum incorporated investigative reports, collaborative knowledge building, identifying local issues and group problem solving.

### ***Libraries and environmentalism***

Research concerning libraries' role in environmentalism identifies three aspects of environmentalism: structural (the library building), procedural (library systems) and services offered (i.e. to the public).

Rowley (2006) argues for the library's role in environmental issues, and discusses the imperative for libraries to engage in environmental management to be models of good practice, show social responsibility, and legitimise environmentalism. The need to have an explicit commitment to environmentalism as part of a mission and vision is discussed, and how this needs to be implemented via policies and targets that are managed and monitored, integrating environmental management into the fabric of the library and its procedures.

Fourie (2012) explores the notion of environmental management further alongside the importance of supporting 'green' information seeking behaviour. The need for overarching collaboration through committees, strategic planning, creating coalitions of relevant disciplines, compiling reports and promoting research is explored. The author describes how digitalisation of processes and providing more electronic resources is not sufficient for 'going green' but also active commitments from libraries need to provide more access to academic papers and support environmentalism in information seeking behaviours. Practical applications here would include promotion of resource use reduction, displays, and improving information literacy skills with a green focus.

Hauke and Werner (2013) examine environmentalism as a marketing tool for libraries. The authors state that with little capital, libraries' green activities can be used as an attractive way to promote services and position the institution. A distinction is drawn between 'greenwashing' (environmental marketing backed up by little substance) and positive communication of meaningful green activities. The authors detail low-cost interventions that can be implemented to feed into the marketing strategy, including: encouraging green methods of transport, ensuring strong leadership on green issues from management, partnering with outside agencies, altering workflow and routines to ensure that they are more

environmentally sound, procuring from local green providers, promoting green-themed events, and converting to Fairtrade food and drinks and zero-waste practices where possible in library cafes. The paper argues that communication of these initiatives can be a marketing tool to bolster a positive image of libraries.

Sahavirta (2016) expands upon the concept of what a green library is beyond just the structural or administrative and goes on to define green libraries as those that have a community role. The author calls this aspect of library provision 'green services' and identifies green services and the use of shared spaces as the next step for libraries. Green services include providing information and advocating for sustainability.

In Sonkkanen's (2013) paper, the impulse for libraries to adopt more ecologically friendly procedures and practices is expressed. Macro-factors such as government and community policies and buy-in are expressed as possible hindrances. The author explains that it is not enough to adopt practices. The need is stated for standards and evaluation tools to assess practice and measure effectiveness of green interventions. The author states that evaluation of practices provides evidence of effectiveness, and that this can be used by libraries to justify spending and costs, as well as to quantify progress towards goals.

Hauke (2015) addresses the points raised in Sonkkanen's (2013) work and begins to set out some of these standards to assess how green a library is, not only in terms of the structure of the building, but also in mission, including procedures, services, education and community involvement. The author posits that many libraries do not have the finances or resources to retrofit or create environmentally conscious new builds. Practices and services can be improved on more immediately and with less investment. The paper emphasises the need for 'Green Library' certification to encompass these aspects of library offerings.

Miller's (2010) work goes some way to doing this and states that libraries must be agents of community change for environmentalism. This can be accomplished by having libraries serve as role models in the community as well as providing quality education anchored in environmental literacies. The work goes on to discuss environmental considerations in the infrastructure of libraries, including choices of materials and cleaning products, and lighting and developing strategies to reduce consumption through practical considerations such as interlibrary loans, reduction of resource use and conversion to digital resources.

### *Libraries as environmental educators*

Literature concerning environmental interventions undertaken by libraries is sparse, although some scholarship in this field is beginning to emerge.

Beutelspacher and Meschede (2020) examine the efforts of 141 librarians at 54 German public libraries and their efforts to implement environmental services. Attitudes of librarians towards public libraries' responsibility to environmental issues were compiled, with 108 respondents strongly agreeing that libraries should 'pay attention to sustainable practices in workflow'. Fewer librarians felt that libraries should 'inform and raise awareness in the community' around environmental issues, with only 55 respondents strongly agreeing. The authors then evaluate the popularity of specific offers to promote environmental education: books and media in the collection (done by all 54 libraries), establishing a Library of Things (30 libraries), and providing physical locations within the library that support environmental practices such as charging stations, bike racks and recycling (28 libraries). This piece of research provided an audit of librarians' attitudes about environmentalism, as well as cataloguing several interventions from libraries, forming an important foundation on the subject.

Fedorowicz-Kruszewska's (2020) paper begins by collating several research papers setting out the various motivations of libraries in pursuing a greater environmental profile, along with a variety of the operational contexts for 'green' intervention (environmental management, marketing, infrastructure, collection, IT) including education. This study used data from 20 libraries that were all finalists in the IFLA 'Green Libraries Award' between 2016 and 2019, to evaluate activities related to three different facets of libraries: *people*, *processes* and *artefacts*. The areas are further broken down into people (employees), artefacts (green collection, green building, eco-items) and processes (informing, forms of work with the user, sustainable management, cooperation with the external environment). Interventions categorised under 'people/employees' focus on staff training and involvement in community and professional groups. 'Artefacts/green collection' included digital media and eco-specific literature, 'artefacts/green building' explored the physical structure and 'artefacts/eco-items' listed bags and water fountains. 'Processes' includes the offerings and public interventions offered by these libraries. 'Processes/informing' activities encompass sharing events, displays, exhibitions of eco-material, eco-newsletters, posters and photos on 'green' themes,

‘processes/forms of work with the user’ lists recycling and upcycling workshops, gardening and tree planting, film screenings and lectures on environmental subjects and DIY workshops. ‘Processes/sustainable management’ comprises reducing resource consumption, opting for scanning rather than printing, and waste management. ‘Processes/cooperating with the external environment’ details partnerships with local government, schools, participating in community events and coordination of environmental events. Though this work is a case study of only 20 libraries, the number and scope of the interventions collected makes this an important foundational study.

In summary, whilst environmental education is acknowledged as an important social factor in addressing environmental issues, there are no national or international guidelines or standards as to how public libraries might get involved in this. There is some evidence of scholarship around ‘green’ and environmentally friendly libraries, but very little about the educational role of libraries in this arena. The research presented in this paper, through focusing on the impact of environmental education interventions as experienced by ‘Resilient Communities’ grant winners will go some way to contributing to this emerging field.

### **3. Method**

The ‘Resilient Communities’ pilot project (American Library Association [ALA], 2020) awarded \$1000 grants to 25 public libraries and \$500 grants to 51 public libraries to be spent on programmes for community engagement around the climate crisis. The scope and field of study for this research was therefore those libraries that were awarded Resilient Communities grants. Data collection focused on the interventions that these public libraries provided, and the perceived ‘effectiveness’ of these activities.

The research utilised a ‘mixed method’ approach collecting both quantitative and qualitative data and engaged participants drawn from those libraries involved with the ALA ‘Resilient Communities’ project.

The first part of the data collection involved a survey sent out to the Head Librarian or project Lead Librarian at each of the named ‘Resilient Communities’ libraries. The survey was designed to determine what activities the library had offered as part of the project and initially asked librarians to choose from a selection of proposed interventions, informed

through research papers on environmental literacies and education by Beutelspacher and Meschede (2020) and Sonkkanen (2013). The initial survey results allowed for quantitative data to be obtained regarding the frequency and popularity of interventions.

The survey also included questions about the ‘effectiveness’ of interventions, whereby the responding librarian was asked to make an effectiveness judgement via a Likert scale. ‘Effectiveness’ was defined as ‘the likelihood that the intervention will lead to some lasting behaviour change of action’. This section of the survey was also used to surface qualitative evidence of effectiveness (opinions, verbal feedback), through participating librarians indicating how they evidenced their assessments, as knowing the source would highlight the kind of feedback being used as well as add legitimacy to the quantitative data, though it is acknowledged that librarians were often using subjective impressions to evaluate the effectiveness of interventions.

The self-reported effectiveness of each intervention was then analysed to create an aggregate score which was consequently used to create a hierarchy of the most effective interventions, as reported by the participating libraries.

All participants were asked, as part of the survey, whether they would be interested in further participation through a short semi-structured interview. The purpose of these interviews was to gain a deeper understanding of the libraries’ offering (both past and planned), the library context and the ways in which data and feedback had been collected.

## **Findings**

24 public libraries responded to the survey, all of which were recipients of the ALA’s Resilient Communities grant or had received a stipend as part of the project. Four librarians (here designated as Librarian 1-4) were interviewed to provide additional information, and survey comments from 2 librarians (Librarian 5,6) are also included. The interviews were conducted (online) during the summer of 2021.

The results of the survey revealed that every intervention recommended in the work by Beutelspacher and Meschede (2020) and Sonkkanen (2013) was offered. The number of libraries offering each intervention is shown in the table (Table 1), along with the mean of the effectiveness score provided by librarians. Librarians were asked to judge how likely each intervention was to lead to action as a measure of the effectiveness and made these

evaluations using formal methods (feedback forms, participant assessment) or informal methods (increased attendance numbers, perceived enthusiasm, comments from participants). The assessment of this effectiveness was done on a Likert scale from 1 (not likely to lead to behaviour change) to 5 (very likely to lead to behaviour change).

### **Insert table 1 here**

Additional activities shared by participants within the survey were aggregated and included on the table, though these did not have attached effectiveness scores; N/C or 'not calculated' appears in the effectiveness score of these interventions.

### ***Survey responses***

#### *Promoting media related to environmental education*

All libraries indicated that they promoted books and media related to environmental education, the most popular intervention. In contrast, the effectiveness score was calculated at 3.09, the second lowest of all interventions. The quality and quantity of resources affected were factors in the effectiveness of this intervention, as in this example from a librarian justifying a low effectiveness score:

“We had to make do with second-rate books sent from main library. There weren't enough books and resources that were of good quality and what was there was too specific.” (Librarian 2)

#### *Creating awareness of events and 'theme' days/weeks*

Theme weeks, days and events were promoted by 20 out of 24 libraries (83%). The effectiveness score of this intervention was 3.26. Cross-promotion of these events led to greater participation:

“We partnered with Citizens Greener Evanston. They had additional Earth Week programming and they promoted the presenters for 2 presentations – we had 30 people and 42 people attending, which was pretty good.” (Librarian 2)

#### *Changing collection policies to more digital media*

15 libraries (62.5%) enacted changes to collection policies to focus on digital media. The effectiveness score was the lowest of all interventions at 2.91. Librarian 4 noted that in their

case, this change was not due to environmental policy or motives, but rather a result of necessary changes due to COVID-19:

“The move to digital programming content has been brought about by pandemic. The moderate score was because it was more about access to information rather than concrete behaviour change” (Librarian 4)

#### *Providing access for more environmentally friendly transport*

16 libraries (66.7%) indicated that increased access for environmental transport methods had been put in place. One example was that of the bike repair station:

“The bike repair station is very popular and encourages patrons to use bikes... It has air, tools and equipment to fix tires.” (Librarian 3)

The overall effectiveness score for this intervention was 3.33.

#### *Providing collection points for unwanted media*

8 librarians (33.3%) indicated that they had implemented collection points and processes for unwanted books. Partnership with outside organisations was also discussed:

“That has a bit of an effect...there is a drop off bin for books for Better World Books so that’s helping with books being reused and recycled.” (Librarian 2)

The overall effectiveness score for this intervention was 3.85.

#### *Installing recycling collection points*

With an effectiveness score of 3.59, installing recycling and collection points was an intervention done by 14 out 24 libraries (58.3%). These recycling points included locations for paper, glass and plastic collection.

### *Promoting reduction of resource consumption*

17 librarians (70.8%) indicated that their library had promoted the reduction of resources such as energy/electricity, water and materials (paper). The effectiveness score of this intervention was 3.25, the third lowest effectiveness rating.

### *Expanding the range of items available for lending*

18 librarians (75%) indicated that their library had items other than books available for lending. This intervention was ranked the second most effective with a score of 3.94. Items available for lending included sewing machines, audio equipment for podcasting, seeds, tools, and fishing rods and tackle:

“We lend fishing poles and tackle boxes (to licenced anglers)... It is our most popular programme. Because we are on the lake, you can go straight out and use it.”

(Librarian 3)

### *Lending energy reduction equipment*

15 librarians (62.5%) revealed that their library makes energy reduction equipment available. The effectiveness score was 3.43. The immediate feedback about energy usage, from those libraries offering such equipment, was that it is seen as an effective way to change behaviour, as noted by one librarian who scored the effectiveness of the intervention at 4:

“We provide outlet energy monitors; using them, people understand what their energy usage is and act accordingly.” (Librarian 4)

### *Hosting repair cafes*

15 librarians (62.5%) indicated that they had instigated repair cafes for household objects and toys, including bicycles, furniture, ceramics and electrical items. The service varied according to the expertise of the volunteers.. The effectiveness score was 3.43. This intervention received the widest range of scores with effectiveness ratings from 1 to 5, although Coronavirus restrictions played a role in the cancellation of many programmes. Librarian 2 noted that they had scheduled repair cafes that had to be cancelled due to COVID-19. This was also echoed in the comments section of the survey:

“Without restrictions in place, we likely would have been able to do things like repair cafes, recycling drop-offs, and put our Library of Things into circulation.”  
(Librarian 5)

The role of repair cafes in educating and resulting action was seen as key:

“It’s kind of like ‘teach a person to fish...’ They are not just shown how to fix something but given knowledge about how to fix it. We have sewing machines at the library and there was a corresponding uptick in rentals after the café...There’s causation. It’s all about the messaging.” (Librarian 4)

#### *Hosting ‘do-it-yourself’ workshops*

17 librarians (70.8%) had hosted ‘do it yourself’ workshops. The effectiveness score was 3.75. The need to position workshops within the wider context of environmental action was cited as important, as well, as in this example:

“Something that is important is a common thread ... the tool library, make your own tote bag, a repair café... the common thread is a climate action... and a message: Stop being a producer.” (Librarian 2)

#### *Hosting upcycling workshops*

8 librarians (33.3%) surveyed indicated that they had held upcycling workshops, where used items were refashioned into new objects. Examples were given of workshops where old t-shirts were turned into tote bags, and plastic bottles into a small compost bin. The effectiveness score was 3.27.

#### *Holding workshops around sustainable food provision*

With an effectiveness score of 4.22, workshops about sustainable food practices were judged to be the most effective intervention. These interventions were also the most popular, with all 24 of the libraries providing these types of activities, ranging from gardening and composting to apiculture to sustainable fishing.

“We’ve been very excited at the response to gardening and food growing programmes. We had a zoom class about gardening that 90 people attended.”  
(Librarian 4)

### *Holding workshop about zero-waste practices*

7 respondents (29.1%) had held workshops providing information about zero waste practices. The effectiveness score was 3.69. Recycling information workshops were specifically very well attended, as in these examples:

“Recycling was our biggest event. We thought people everyone would know these things, but it was a half an hour of questions.” (Librarian 1)

“The recycling was one of the most popular. [The effectiveness score of 4] was based on participation and interaction. There were lots of questions and addressed a need for information.” (Librarian3)

### *Other interventions*

Respondents to the survey were invited to share any additional interventions that they had enacted. Where there was overlap, the suggestions were collated. The lower half of table 1 lists these interventions. Effectiveness scores of write-in activities were not possible to compute as they were not assigned a Likert scale in the survey. Three of these interventions were part of the Resilient Communities suite of requisite activities and, as such, were the most popular:

- Held film screenings and follow-up discussions
- Programmed events highlighting intersection of climate change, race and gender (climate justice)
- Information about responding to extreme events because of climate change (fires, floods, extreme weather)

## **Discussion**

This discussion synthesises the research findings into a framework which can be used to create environmental education programmes for public libraries.

### *Factors that contribute to effective interventions*

Throughout data collection, 4 additional factors that supported success were identified as being an integral part of the planning process as they can increase the success of an intervention: Partnership; Institutional commitment; Practical actions; Inclusion and outreach:

#### *Partnership*

All participants stated that partnership was a key factor in the success of their environmental programming and that it came in many forms, offering a variety of benefits to the library. Partnering can be done through any of the following: local advocacy groups; government agencies; schools and universities; campus organisations; special interest groups; private organisations; experts in environmental or social issues; climate action organisations; private companies; and the wider library community. Partnering can be done on a large or small scale, from a series of programmes to one-off lectures or workshops.

Partnering is one of the most essential elements to bring into environmental education programming. Examples of best practice show that the most fruitful partnerships are those where the library's mission is furthered and supported by the partnering agency. Involving outside agencies should be done thoughtfully and with purpose for the maximum effect. Approaching local agencies and businesses with an action plan and clear mission can lead to more focused buy-in and, as a result, more support with resources, communication and promotion, and activities. (Miller, 2010)

#### *Institutional commitment to environmentalism*

While 1 of the libraries had a culture of environmental education, with dedicated policies, committees, targets and staff, 3 of the libraries' programmes were driven by individual passion and enthusiasm. It is significant that in the library where there was institutional backing, an average of 12 interventions were completed. Where librarians were operating individually, an average of 7.2 interventions were offered. This demonstrates that programmes are likely to be more robust when institutionally supported. Librarians with institutional backing were confident about how their work fitted into the bigger picture (Librarian 4). They spoke of budget, designated staff, leadership, and clear targets, while those who were creating programming independently expressed a sense of taking an 'ad hoc' approach. (Librarians 1, 3). The literature also suggests that a lack of leadership and

management in environmental issues leads to reliance on individuals' efforts and interests. (Sonkkanen, 2013). Library management structures are required and need to be proactive to support a meaningful commitment to environmentalism. Miller (2010) suggests that a simple action plan that defines the institutional goals is a good first step, but the implementation of an action plan does not need have huge cost implications, nor be a radical change in operations or even mean a commitment in terms of time. Communication of sustainable initiatives, creating guidelines and an overall vision, designating personnel with environmental responsibilities for a 'Green Team', target setting, and staff training are all low-cost, high-impact ways to embed institutional environmental management (Hauke, 2015).

### *Practical actions connected to a larger vision*

Focusing on behaviour change, rather than attitude change or information, is more likely to have a lasting effect (Arbuthnott, 2009). Effective interventions are those that are practical and active rather than informational as they allow individuals to understand concrete ways in which they can change behaviour (Anderson, 2012). These interventions meet individuals where they are and demonstrate how to incorporate environmental actions into their lifestyle (Fourie, 2012)

Workshops and events that focused on actionable tasks helped participants to break abstract ideas into actions (Librarian 2) and were engaging (Librarian 4). The focus on specific, definite tasks in areas such as gardening, green transport or recycling prevents the participants from feeling overwhelmed into inaction (Arbuthnott, 2009). It is important for this individual action to be connected to a greater mission. This thread of conceptual understanding puts activities into a wider context. Having a disparate set of activities with no wider context can lead to the larger environmental message getting lost. Patrons should understand how the activities support sustainability so that interventions are not merely seen as 'fun craft sessions' (Librarian 2). For example: gardening workshops can be described in the context of reducing plastic waste and reducing reliance on fossil fuels for transport; sewing tote bags demonstrates how patrons can become producers rather than consumers, as well as reducing the need for plastic or paper bags.

### *Inclusion and outreach*

Outreach into the community takes many forms. The first is the most literal – moving the library activities outside of the walls of the library. Librarian 2 explained how shifting the DIY bug spray workshop into a more public place brought new attendees and reached a wider, more diverse group of people. Environmental education can, and should, reach beyond the walls of the library and traditional educational spaces. (Stevenson, Nicholls & Whitehouse, 2017) Programming that seeks to meet learners where they are can increase the number of patrons involved, particularly in communities that are underrepresented in libraries. This is especially important with regards to environmental education, as vulnerable populations (those living in poverty, women, minority groups) are most impacted by the impacts of the climate crisis (Mochizuki & Bryan, 2015).

Both partnering with community groups and going outside the walls of the library can help with increased inclusion. Additional factors to consider are the avenues of communication, the language interventions are offered in, more diverse programming, and scheduling. Meaningful content, interventions in Spanish and the media for disseminating information were flagged as important for Librarian 2; Librarian 4 ensured that workshops and events were held at a range of times to be as inclusive as possible and worked with local indigenous scholars to present a series of workshops about indigenous environmental custodianship

### *Evaluating effectiveness*

The research participants detailed many types of evidence for feedback. The methods used for these evaluations ranged from informal discussions to quantitative data collected by the library on feedback forms and by analysing specific intervention-linked data. Respondents used this information to make an evaluation of the effectiveness.

The criteria given for the evaluation was to judge how likely the intervention was to lead to behaviour change. In interviews, librarians acknowledged that the methods used for feedback were often not backed up by data and that, in the future, more considered and rigorous evaluation would be useful to understand the effectiveness of interventions. (Librarians 2, 3,4).

As it is challenging to create a meaningful picture of the effectiveness of an intervention, the method for collecting evidence should be established at the planning stage and assessed against stated criteria and objectives (Hauke, 2015). Therefore, with evaluation methods determined at the outset, the library is more likely to receive data that provide accurate and targeted feedback.

One obstacle with measuring behaviour change is that the librarian must rely on external and self-reported metrics, leaving out smaller changes in attitude or behaviour that arise imperceptibly, indirectly or later on (Sahavirta, 2016). This could be countered through follow up surveys measuring longer-term behaviour change with a priority placed on quantifying observable behaviour changes (Carmago & Shavelson, 2009). For example, a social media campaign asking patrons to share and show the results of workshops utilising pre-determined hashtags could provide further evidence of interventions turned into action as these hashtags could then be monitored and quantified. This would have the additional purpose of promoting the environmental education offerings at the library.

### ***A framework for environmental education***

Guidelines and structure can help libraries adopt a more cohesive environmental education plan to ensure that the maximum benefit is achieved (Sonkkanen, 2013). To this end, the main contribution of this research is the initial development of a framework for environmental education. Creating an environmental education programme is a complex task. This potential framework incorporates local and national, as well as professional, expectations, as libraries and librarians have to deliver content as determined by legislative and professional bodies. Guidelines about what environmental education in libraries should entail need to be codified by professional bodies to ensure that there is a set of 'green literacy' objectives across the sector (Sonkkanen, 2013; Fedorowicz-Kruszewska, 2020). The library environmental mission needs to include external requirements, but also serve as the umbrella for individual interventions. Clarifying this mission allows a cohesive approach in the library's offerings, institutional buy-in (and often additional resources as a result) and a prioritisation of environmental issues in all aspects of the management and running of the library. (Jickling, 2003). This mission forms the reference point for specific interventions, which in turn should support the mission. The interventions suggested in this framework are the three most effective as determined by the research, though any activities planned by the

library could be entered into the framework. Value-added factors are identified as part of the planning process to prompt users to consider if these aspects can be embedded in the activities. These concepts should not serve as a checklist for every offering, but instead encourage librarians to enrich planned activities.

Suggested evaluation and feedback methods are included in the framework, to be determined as part of the programming planning. The methods that are most appropriate to the context, the patrons, the subject matter and the information needs of the library should be selected. The arrow leading back into the interventions demonstrates the need to use the feedback to inform the library's programmers about which interventions were the most effective or successful, and in turn, which interventions best supported the library's mission.

**Insert figure 1 here**

## **Conclusion**

The aim of this paper was to inform the development of an initial framework for the implementation of environmental interventions by public libraries. The research conducted for the project enabled the identification of effective environmental education interventions. In addition, patterns emerged of factors that contributed to the success of a library's environmental educational offerings. This framework demonstrates the meta-structure libraries should consider when implementing effective interventions as well as the specific considerations that form the best practice for creating effective offerings to patrons.

The framework establishes not only the hierarchy and considerations to take into planning environmental education, but also identifies how events and interventions can be assessed and the results can feed back into planning. When individual interventions are part of a larger mission supported by management and local legislation and guidelines, programming is more cohesive and coherent. A variety of evaluation tools can be used to monitor success of these interventions. This framework should be considered as a starting point as additional research and information will likely lead to the format being expanded.

This paper provides the beginnings of the conversation about effective environmental education in libraries. From this work, additional topics for research became apparent, as there is still a lot of work to be done in this emerging field of study. Environmental education in libraries is becoming more robust not only as an academic interest, but also to librarians around the world. By providing librarians and library managers with clearer

information about the effectiveness of interventions public libraries will be enabled to prioritise environmental education.

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<b>Intervention</b>	<b>Number of libraries enacting intervention</b>	<b>Effectiveness score (to two decimal places)</b>
<b>*From Beutelspacher, L., &amp; Meschede, C. (2020)</b>		
<b>° From Sonkkanen, L. (2013)</b>		
Promoted books and other media related to environmental education*	24	3.09
Created awareness of days or events such as 'Earth Day' or held 'theme weeks' °	20	3.26
Changed collection policies to include a focus on more digital media °	15	2.91
Provided more access for patrons to use environmental modes of transport (bike spaces, electric car docks, etc *	16	3.33
Established collection points for unwanted books or media °	8	3.85
Installed recycling collection points (for batteries/paper/ electronic equipment)*	14	3.59
Promoted the reduction of consumption of resources (using less water/paper/electricity) *	17	3.25
Expanded the type of items available for lending (ie Library of Things, seed rental, tool sharing, etc) *	18	3.94
Provided rental of energy reduction equipment such as thermal imaging tools or energy consumption metres °	15	3.43
Held repair cafes *	15	3.43
Hosted 'do it yourself' workshops *	17	3.75
Hosted upcycling workshops *	8	3.27
Held workshops promoting sustainable food practices (gardening, composting, information about using local or seasonal food) *	24	4.22
Held workshops providing strategies and/or information about zero-waste practices *	7	3.69
Held community events around local environmental justice/ local impact in nature (birding, local improvements, etc)	2	N/C
Held film screenings and follow-up discussions	4	N/C
created DIY kits for patrons to use	2	N/C
Programmed events highlighting intersection of climate change, race and gender (climate justice)	3	N/C
Held parallel programming in languages other than English	2	N/C
Hosted children's story times with environmental focus	1	N/C

Shared information about responding to extreme events as a result of climate change (fires, floods, extreme weather)	2	N/C
Held climate change discussion panels/Zoom lectures	2	N/C
Held lectures from experts in climate change activism and action	1	N/C
Increased media with a specific environmental focus	1	N/C
Established a Library Green Team	1	N/C
Hosted a climate change simulation workshop	1	N/C

**Table 1: Interventions offered by libraries**

# Framework for environmental education planning

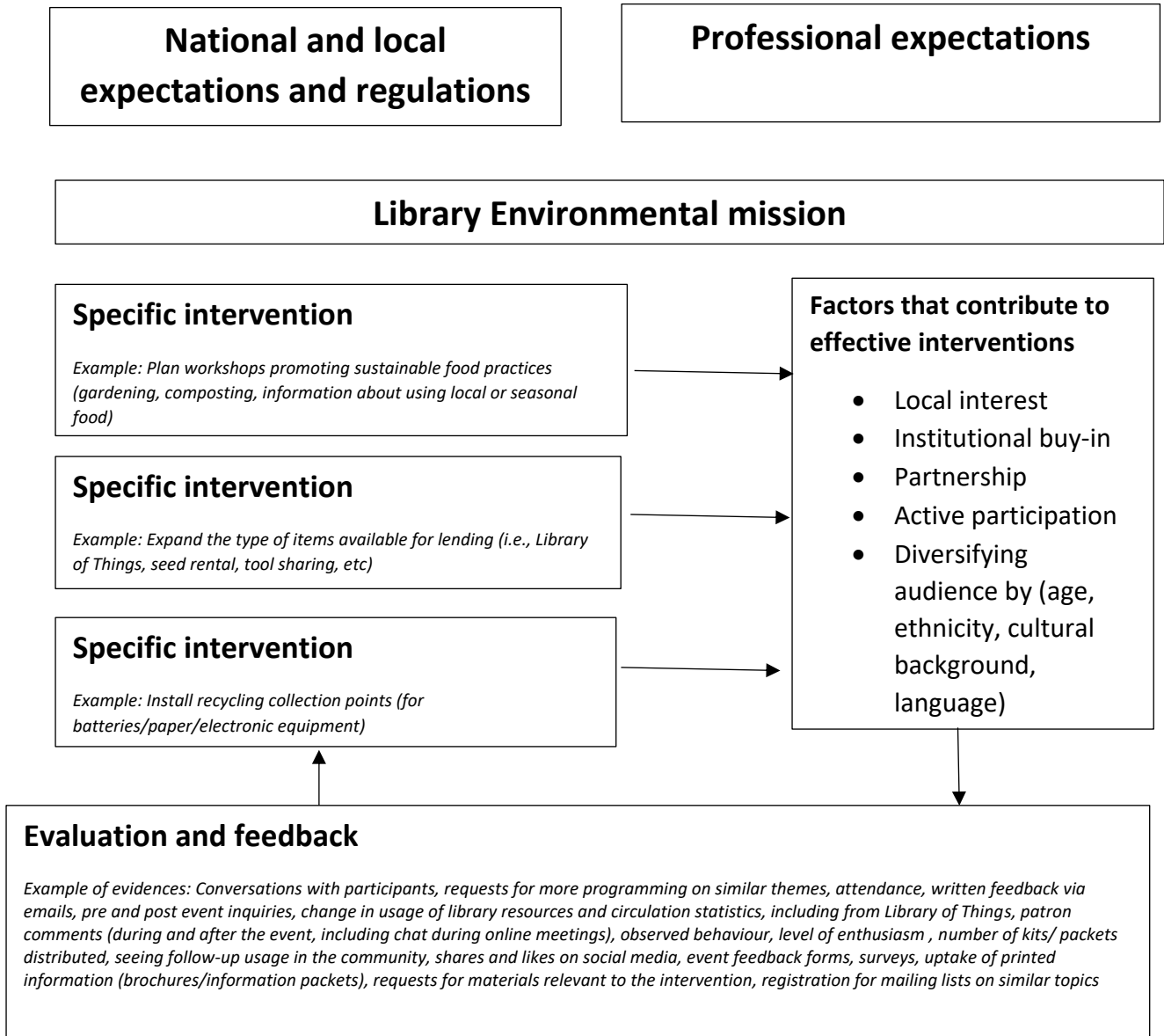


Figure 1: Framework for environmental education planning