How Informal Education Programs Can Learn From Higher Education Assessment: Evaluating the Morton Arboretum's N-ACT Program

Jeremy A. Joslin

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HOW INFORMAL EDUCATION PROGRAMS CAN LEARN FROM HIGHER EDUCATION ASSESSMENT: EVALUATING THE MORTON ARBORETUM’S N-ACT PROGRAM

Submitted in partial fulfillment of the requirements of Doctor of Education in the College of Professional Studies and Advancement at National Louis University

Jeremy A. Joslin

Higher Education Leadership

Approved:

Dr. Brian Hamluk
Chair, Capstone Committee

Dr. Bettyjo Boucheys, Capstone Committee

Dr. Andrew Hipp, Capstone Committee

Dr. Nate Cradit
Program Director/Committee Member

7/8/2020
Date Approved
Acknowledgements

I reluctantly admit that it took writing an acknowledgements section for my own study for it to dawn on me that one of the first things a reader sees in a dissertation is likely one of the last pieces written. It’s a funny thought to have as I try to make sure I can name all of the people I am indebted to and should thank for helping me get to this point. It feels like it should be a long list, and spoiler alert, the list isn’t even all people!

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Abstract

As a response to the debate about the worth of completing a degree, higher education has built a set of assessment practices intended to quantify the change in a student as they matriculate from a first year to a graduate controlling for the different backgrounds of students. Cultural institutions like museums, zoos, aquariums, and public gardens face similar questions about the value they bring to their communities, and traditionally have relied on attendance-based data as a matter of convenience that falls well short of demonstrating impact as an informal learning setting. This study suggests higher education’s assessment practices can be used in the informal setting of an arboretum to quantify the impact engaging with one of its informal education programs has with participants. Applying a mixed-methods design collecting both quantitative and qualitative data exploring if the length of time someone engages with a program results in mission-aligned outcomes for the institution hosting the education program, this study addresses some of the challenges cultural institutions have faced in collecting better impact data. Results from the study are promising in terms of mission-aligned outcomes for the specific program evaluated, and suggest that a mixed-methods design should be employed more widely by museums. There are limitations to how well this design meets practitioner needs, however, which impacts future areas of research in need of further exploration.
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Chapter 1: Institutional Profile - Introduction

Founded in 1922, The Morton Arboretum is built from a mission to protect and care for trees and the environment for future generations to enjoy (The Morton Arboretum, n.d.-a). The educational programs the Arboretum conducts to engage the public may have changed over time, but the mission those programs support remains the same. If anything, the mission to protect trees as a resource critical to the health of our surroundings and environment has only become more important over the nearly 100 year life of The Arboretum. Today more than ever the Arboretum remains a mission-driven science-focused institution dedicated to protecting and caring for trees, educating the public on why this is important, and giving people the skills to care for trees in their own lives through education and events programming that informs as much as it entertains. And while that education may be more informal than that of higher education in the U.S., adapting a higher education evaluation framework could be similarly effective for capturing education programming’s ability to effect change in participants and use that as evidence of mission impact. As a science-focused cultural institution engaging and educating different audiences, The Morton Arboretum is an ideal parallel to draw for continuous quality improvement through assessment in higher education. What is more, the field of informal education finds itself searching for exactly such evidence of impact; such a project set at The Morton Arboretum has the potential to help many other similar institutions improve their own processes and practices.
Before the case is made for using higher education processes to assess the informal education programs of cultural institutions, the internal context of The Morton Arboretum as a learning institution must first be established. Institutional parallels to higher education and more formal programming will be made clear through the exploration of The Arboretum’s goals to propel its audiences to take action through the deployment of knowledge to motivate change in participants that aligns with institutional mission. Along with the internal context, the external context surrounding The Arboretum as a cultural institution must be explored, investigating the attendance data these institutions have traditionally used as a measure of impact and how that data falls short of actually demonstrating the impact these institutions have. This will also provide perspective on how institutions like The Arboretum take higher education’s responsibility to serve students as a part of the public good to a much broader stage, with missions that can turn an entire populace into stakeholders in that institution, while still using higher education assessment practices to capture whether those audiences are in fact being served. The leadership and relevant staff of The Arboretum will also be profiled, as well as the institution’s core values as an encapsulation of a mission-focused institution.

As the Institutional Profile, Chapter One concludes with a research question for this project and summarizes how building higher education-based assessment practices into an informal education context has the potential to bring numerous benefits to the Arboretum as this study’s host institution. Because of the Morton Arboretum’s presence as a global institution, these implications for practice also extend to other cultural institutions.

For Chapter Two, a literature review is compiled to demonstrate the parallels and connections between higher education and informal education programming, as well as the review of how the practices cultural institutions have used to assess programs in the past fall well
short of capturing the multi-faceted impacts many institutions strive for. This literature review emphasizes the theme of education as transformative regardless of setting, and uses humanity’s innate need to connect to nature as a thematic framework for the study.

Chapter Three outlines an explanatory convergent design as a case study to demonstrate the power higher education assessment practices could bring to the efforts cultural institutions make to illustrate those impacts. The mixed methods approach of this project will model those higher education practices on a specific informal education program at The Morton Arboretum, capturing that program’s mission-aligned impact while also demonstrating the approach that could be taken up by other similar cultural institutions to capture the impact of their own programming.

Chapters 4 and 5 present the data collected through that mixed-methods design, and integrate that data into a series of conclusions regarding the Arboretum program that has been evaluated, and what implications for the Arboretum and other cultural institutions that evaluation may hold. Chapter 5 closes with a look back at how recommendations stemming from this study’s data tie back into themes explored throughout the study, and what establishing new evaluation practices for cultural institutions could mean for the field.

Institutional Profile Part I: Internal Context

Institutional History

The Morton Arboretum was founded by Joy Morton, the founder of the Morton Salt Company in Chicago, IL (The Morton Arboretum, n.d.-b). Joy was the eldest son of J. Sterling Morton, the Secretary of Agriculture to President Cleveland. J. Sterling Morton started the Arbor Day holiday in May of 1872, of which it is said that Nebraskans planted over a million trees that
first holiday (The Morton Arboretum, n.d.-c). The Morton family had a strong connection to trees and nature with a family motto of “Plant trees.” Joy Morton clearly took that motto to heart, and as a Chicago executive looking to build a country home in 1909 he stopped in Lisle, IL on the site that would eventually become The Arboretum. He named that country home “Thornhill,” and by 1921, the building had been completed and the work to transform the property into an arboretum, or outdoor museum of trees, had begun. The Arboretum was formally chartered in 1922, with a nine-member Board of Trustees charged with a mission to “collect and study trees, shrubs, and other plants from around the world, to display them across naturally beautiful landscapes for people to study and enjoy, and to learn how to grow them in ways that enhance our environment” (The Morton Arboretum, n.d.-a). The Thornhill estate still remains on the property, and houses the Education department. That Education department has existed since 1940, making Morton Arboretum one of the first public gardens in the world to move from solely caring for plants to educating the public on why this care should be done. These educational programs are the informal learning that will be the focus of the research question posed by this project.

The Arboretum’s Education department offers a spectrum of programs for all age groups, from introductory experiences exposing the public to the ideas behind why public gardens exist and the importance of conserving trees to hands-on experiences that give participants the opportunity to not only learn how to plant and care for trees but put those skills to work. All of these programs, regardless of intended audience, are designed to align with the institution’s wider mission by moving participants to take action on behalf of trees (The Morton Arboretum education strategy document, 2019). They do so by making participants more aware of trees, the important roles they play in the environment, the benefits they bring to the community, the
multitude of threats trees face every day, and the power of one individual’s actions to have positive impact on their surroundings.

Today, The Arboretum sees more than 1 million visitors annually (The Morton Arboretum, n.d.-e), and engages hundreds of thousands of those visitors in education programming through a combination of on-site programs, off-site outreach, and even digital programming to give people anywhere the chance to interact with Arboretum staff. Although the education programs that occur at the Arboretum are more informal than the for-credit classroom learning in higher education, several programs involve classroom learning of STEM concepts such as basic plant identification, restoration ecology concepts and techniques, and native seed and plant propagation (The Morton Arboretum, n.d.-f). The Arboretum is able to leverage its expansive on-grounds collection and advanced scientific expertise as a source of experiential learning, the opportunity to put that classroom learning to use in a field setting, which has been demonstrated to help in retaining the information learned (Knackmuhs, Farmer, & Reynolds, 2017).

The Arboretum is able to offer such science content largely through the presence of the Center for Tree Science (CTS), Morton’s initiative to bring together experts from botanical gardens, universities, government bodies, green vocations, and other fields to make a concentrated effort to preserve tree diversity, urban forests, and the benefits these spaces provide the public (The Morton Arboretum, n.d.-g). The CTS is a research body very similar in structure and theme to a research university, where CTS is generating research into the best techniques to study and care for plants and trees. That information is then passed along to other professionals through Morton’s education programs and other avenues of audience engagement. Although those audience engagements consist of the informal education that often occurs at cultural
institutions like museums and public gardens, the learning that happens in these program could be assessed in a fashion similar to the learning outcomes used in higher education. A deeper dive into the internal context of The Morton Arboretum as a learning institution demonstrates that it is an institution ready for more quantitative assessment of the impact its education programming can have.

**Institutional Finance**

The Arboretum’s education programming and audience engagements in support of mission are made possible by a responsible approach to finance that puts new meaning to the “stewardship” The Arboretum attempts to instill in visitors. The Arboretum’s mission essentially is to turn its audience into stewards empowered to take action of their own accord, which ironically it can only accomplish if it takes the same approach toward its own resources to ensure sustainability.

Fortunately this has been exactly the approach taken by The Arboretum, which “holds itself accountable to the public, including all its members and other constituents who support The Arboretum’s mission to plant and conserve trees and other plants for a greener, healthier, and more beautiful world” (The Morton Arboretum, n.d.-h). As a nonprofit organization, the Arboretum’s finances are very similar to higher education institutions in that they are a mix of earned revenue from programs, contributed revenue from donors and grant agencies, and dividend and interest income off an institutional endowment. This combination has allowed The Arboretum to have a positive impact with the public for nearly 100 years, and responsible management of these resources will assure that impact continues far into the future.
A recent capital campaign entitled “Growing Brilliantly” has helped ensure The Arboretum’s future. A five-year campaign concluding at the end of 2018, Growing Brilliantly was a multi-initiative effort to invest in the future of trees (The Morton Arboretum, n.d.-i). Thanks to the campaign raising over $63 million in contributed revenue, the Arboretum has been able to:

1. Build a new south farm complex to house Horticulture and Collections staff.
2. Develop “The Center for Tree Science,” a multi-disciplinary research facility
3. Develop multiple tree conservation programs.
4. Enhance the Children’s Garden, an essential piece of engaging younger audiences.
5. Create a new plant development program.
6. Continue focusing on growing annual support while simultaneous conducting the capital campaign.

Clearly, the Arboretum has taken the appropriate steps to ensure the institution’s fiscal health and well-being for the near future. That fiscal well-being is essential because it allows the Arboretum to continue investing back in the community through programs that help improve the environmental health of their surroundings. In essence, The Arboretum’s fiscal stewardship makes it possible to continuing creating more environmental stewardship, which supports the institutional mission to plant and protect trees.
Institutional Strategy

The “why” of a mission-based institution like Morton Arboretum is fairly cut and dry, and the conservation-focused mission at Morton makes writing a strategic plan in support of that “why” a pretty straightforward endeavor. The Arboretum’s strategic plan was updated over the course of this study, with the researcher serving in an interim Vice President role which provided additional insights into the process of writing the updated plan and opportunities to contribute directly to it. The updated plan brought new areas of focus to the institution’s priorities, but the overall mission behind the updated plan remained the same. This updated plan was approved by the Arboretum’s Board of Trustees in March of 2020, setting institutional direction for the 2022 centennial celebration and beyond. This “centennial plan” focuses on creating positive impact regarding specific conservation topics the Arboretum is uniquely suited to address including climate change, urban trees and people, and oak ecosystem conservation (N. Cavendar personal communication, 2019). As those specific strategic pursuits continue to be refined, reviewing progress on the objectives from the Arboretum’s existing plan reveals a period of successful growth and progress.

The previous iteration of the Arboretum’s strategic plan had four main goals, each with several categories of programs and initiatives created to bring about those goals, and all paint the picture of the Arboretum as a leading institution in the effort to care and protect trees for the future. Those goals were:

1. Strengthen the Arboretum’s leadership in tree science and conservation.
2. Inspire, encourage, and catalyze tree advocates.
a. Provide learning opportunities that propel people to take action to plant and protect trees.

b. Evolve and ensure relevance of programs and services for the public.

3. Position the Arboretum as a leading nonprofit organization in the Chicago region.

4. Develop and sustain the assets and resources needed to ensure institutional quality and long-term success.

With the institution nearing its centennial and a global leader among public gardens and arboreta, the process of updating Morton’s strategic plan captures the challenges of what happens when an institution most would already consider successful thinks about where it needs to head in the future. While the impact tree and plant life has on the environmental state of the climate ensures the Arboretum’s mission to plant and protect trees will have an immediate relevancy for the foreseeable future, the institution’s strategic plan establishes goals that will make the Arboretum a force for good far into the future. These new goals are organized under four primary pursuits:

   a. Urban trees and people: Advance expertise, reach critical communities, and facilitate/inspire the next generation of tree champions.
   b. Oak conservation: Advance tree science and horticulture, provide leadership and catalyze action for trees especially oaks, improve the regional oak ecosystem.

2. Climate change – Ensure resilient trees for the future at the Arboretum and in the Chicago region.

a. Environmental sustainability: Develop a pathway for transformative institutional environmental sustainability, catalyze broader action for sustainable practices.

b. Arboretum sustainability: Invest in continued excellence in visitor experience, build physical capacity for a growing workforce, grow the Arboretum’s endowment and financial resources.

4. Inclusion – Engage and reflect diverse audiences to serve the broader public good (Morton Arboretum Strategic Plan, 2020).

Goals in the previous plan like “inspire, engage, and catalyze” are present in the updated plan without being called out specifically in the various pursuits; this work has become an expectation of how the institution engages its audiences, making it unnecessary to call out on its own. This certainly encapsulates the work the Arboretum’s informal education programming does with audiences to convince them to take action on behalf of trees, and will be conducted under efforts to make progress on all four of the updated strategy’s pursuits moving forward. That means the work to build a set of evaluation practices remains relevant and even critical for the Arboretum. The new strategic pursuits focused on climate change action, helping people and urban forests thrive together, and conserving oak species due to the central role they play in local ecosystems are well-suited to quantitative metrics to gather data on. And the higher education assessment practices used to build this project could be instrumental in helping future staff capture progress toward those strategic pursuits.
Education Department Philosophy

In an effort to ensure all programs are creating impact in support of mission, Morton Arboretum’s Education department has used both recent strategic plans to cultivate a list of department-level key performance indicators (KPIs) that place all programs in alignment with the broader institutional mission. These indicators will set the foundation of quality assessment for all programs, assessing not just participant experience in the programs but whether or not their engagement was able to shift how participants think about The Arboretum, its mission, their own power to care for trees and effect change in their surrounds, and even how they perceive the world around them. These indicators are written to change as needed depending on the intended outcomes of the department’s individual programs, but the current list is as follows:

- Positive change in participants’ feelings of self-efficacy in their ability to take action for positive change in their environment through conservation.
- Positive changes in participants’ affinitive feeling toward The Arboretum, its mission, and the program(s) with which they engage.
- Increased participant affinity for trees and nature.
- Changes in participants’ feelings of self-efficacy in their ability to communicate environmental science content to broader audiences.
- Changes in participants’ interest level in further exploring STEM and STEM-related careers.
- Participants having taken action on behalf of trees in the form of:
  - Planting new trees.
  - Caring for existing trees through new skills/knowledge.
- Participating in the care of natural areas in the region.

In a way the creation of these KPIs mirror the process of creating a curriculum map for a degree or general education assessment in higher education. Observed as a whole, these indicators explain why an institution like The Arboretum even has an Education department: the department’s programs are created to help engage the public and move them toward the actions of planting and caring for trees that have been stated in the institutional mission since The Arboretum was founded. Each individual program will also have reach metrics and more focused KPIs to measure quality and success, but they all spring from those department-level indicators that lead to the broader institutional mission.

**Education and Engagement**

Education programs at The Arboretum fall into three broader audience categories: the youth and family audience, students and schools audiences, and the adult audience (The Morton Arboretum, n.d.-d). Programs for each of these audiences range from introductory experiences introducing newcomers to The Arboretum, its collection, and its mission, to courses that give participants the skills and knowledge to take independent action to plant and care for trees. The range of these programs essentially mirrors the journey a student takes through a higher education degree; starting with general knowledge and then moving on to more specialized disciplines.

Many of The Arboretum’s education programs give different age groups a chance to take that action on Arboretum grounds. Programs like the Youth Volunteer Program give middle and
high school-aged volunteers a chance to work in different roles on-grounds (The Morton Arboretum, n.d.-j). The Natural Areas Conservation Training (N-ACT) program connects people looking to learn how to care for woodlands, prairies, and wetlands in their area with the Arboretum’s expertise on doing precisely that (The Morton Arboretum, n.d.-k). “Little Trees,” the early-childhood nature-based education program established in the fall of 2018 gives children 3-5 years old the opportunity to learn and explore over the course of a 32-week curriculum set across The Arboretum’s 1700 acres in the hopes of setting a new generation on the path to STEM exploration and tree stewardship (The Morton Arboretum, n.d.-l). All of these programs, whether introductory or hands-on in the field, align with the Arboretum’s institutional mission to teach the public how to plant and care for trees, encouraging them to take action in their own lives to care for trees in an effort to ensure the benefits they offer continue for future generations.

With this alignment in place, the next step for each of these programs will be improved evaluation processes to assess whether they are in fact achieving these outcomes, something this study directly addresses for the N-ACT program as discussed in later chapters.

Most education programming at The Arboretum engages interested audiences in informal learning on the science and conservation behind plant and tree care. There is, however, an audience for more formalized, classroom learning on these topics at a higher education-level, which The Arboretum meets through its partnership with the Area Colleges of Chicago Association (ACCA). Through ACCA, The Arboretum offers college-level coursework in disciplines like Botany, Forest Ecology, and Science Communication, taken for credit by students at any of ACCA’s twelve institutions. This partnership has proven beneficial to all involved. The higher education institutions help keep students interested in the Environmental sciences on-track to complete a degree on-time by taking courses they do not have high enough
enrollments to run on their own. The Arboretum gets to connect to an important audience, the future researchers and scientists that would be right at home at the Center for Tree Science if they continued to study tree and plant biology.

The Arboretum’s Education department tries to have programming for every type of audience; however, one aspect of education where the Arboretum can prioritize improvement is in the demographic breakdown of its participant audiences. If the Arboretum’s mission is to engage the public on the importance of caring for trees for future generations, it makes sense that priority audiences would be younger as they literally have more future ahead of them on average. Programs should also be reaching new audiences on a regular basis, exposing new people to the Arboretum’s mission and the importance of trees. This is not always the case; the average age of education programming participants is over 55, with a member to non-member ratio of around 70/30 (The Morton Arboretum education strategy, 2019). This audience could also be more ethnically diverse, if only to come closer to the demographics of the Arboretum’s local surroundings. DuPage county Illinois, where the Arboretum is located, may not be as diverse as neighboring Cook County and the Chicagoland area, but it is fairly diverse with several groups represented in the population as seen in Figure 1.1 (Quickfacts, 2017).

![Figure 1.1: DuPage County IL Racial Breakdown (2017 Census)](image)

- White (66%)
- Hispanic/Latino (14.4%)
- Asian (12%)
- Black/African American (5.2%)
- Other (2.4%)
The Arboretum’s visitor breakdown seen in Figure 1.2 is not nearly as diverse as the surrounding area, something that needs to change if the institutional mission is being fully supported. This is a point that drove the presence of the “inclusion” pursuit in the Arboretum’s latest strategic plan.

![Figure 1.2: Morton Arboretum Audience Breakdown (2017)]

**Formal versus Informal Education**

Before explaining how higher education assessment practices can be applied to programming in a cultural institution like The Morton Arboretum, it is important to take a moment and clarify what this capstone project means by the idea of “formal” versus “informal” education. If a formalized degree curriculum is central to the idea of higher education a transformative experience, the informal education programs at cultural institutions offer the same experience, using the introduction of new knowledge to audiences to propel changes in perspective. While the formalized education of a degree program will include assessing knowledge and skills gained as part of a course-level objective, the end goal of completing a
degree is a student matriculating to a graduate who leaves a higher education institution a
different person they were when they began. Examining the programs mentioned in the previous
section make it clear that informal education programs are attempting to reach the same
transformative outcome; a change in participant’s perspective on whatever the focus of the
program is, albeit typically on a much shorter timeframe without testing for pure knowledge
retention. This point will be explored in greater detail in Chapter 2’s literature review.

Formal or informal, the intended outcome in both settings is the use of knowledge or
factual content to broaden an audience member’s perspective on that content, leaving the learner
changed in some way. In higher education, that content is based on degree curricula; for cultural
institutions, that content is based on the mission of that institution. In either case, being able to
capture a change in the audience is a measure of positive change toward the intended impact.
And just as higher education institutions have had to weigh in on the debate surrounding the
worth of a college degree, cultural institutions have been asked to ensure they can demonstrate
the positive impact they are able to have on their audience and surroundings. Assessment
practices in higher education can help institutions capture whether or not a degree is achieving its
intended outcomes, and these similarities to informal education programs suggest the same
practices can be used by cultural institutions in an effort to capture evidence of impact related to
mission.

**Impact Assessment and Quality Improvement**

Just as higher education institutions are concerned with external accreditation and quality
assurance, the informal learning programs like those at museums and public gardens are
becoming more focused on how to assess the quality of their programs, the impact they have
with their audiences, and how those programs align with institutional mission. Federal and private funding bodies have also begun to place more emphasis on programs that have demonstrative impact with their audience, “asking cultural institutions to provide convincing evidence that the goals and outcomes” of a program have been achieved (Adams, 2012, p. 26).

Tying quality assurance to funding has made capturing and improving programming quality even more of a priority for these cultural institutions, similar to higher education and capturing the benefits of completing a degree.

For The Arboretum’s Education department, the process of implementing and capturing the KPIs from their strategic plan is an ongoing one. And although the KPIs have been established internally as quality measures, they are frequently examined by external sources like the National Science Foundation (NSF) and the Institute of Museum and Library Services (IMLS) through grant application procedures. With such measures in place, The Arboretum’s education programming looks to help ensure its mission to plant and care for trees is carried out far into the future, both by the institution and the public it engages. Such an outcome would be perhaps the plainest measure of program quality possible.

Just as a deeper focus on higher education program outcomes has lead institutions to rethink how they are defining whether a graduate is truly prepared for the professional world, a deeper focus on quality assurance can be seen as a change for the better, despite the lack of current infrastructure to help institutions make this change. It will also lead to the implementation of continuous improvement processes, creating a cascade of ever-increasing positive impact aligned with mission for successful programs. That is why it is so critical cultural institutions implement these higher education practices to help capture impact. Capturing impact
is only the beginning of what collecting better data and using it to improve can mean for how institutions like The Arboretum carry out their mission.

**Institutional Support Resources**

Morton’s Education department’s recent efforts to capture impact towards the Arboretum’s broader mission and quantify the benefits its programs bring to the community have set the department on an interesting path moving forward. As one of the oldest public garden-based education departments in the country, at an institution whose mission and goals remain as relevant today as they were when the institution was founded in 1922, perhaps the time is right to evaluate the resources available to the department moving forward. A strengths/opportunities/aspirations/results (SOAR) analysis (Starvos & Cole, 2013) focused on the desired results the Education department looks to achieve versus the traditional SWOT framework’s use of simple strengths and weaknesses could provide valuable insights into how the department is set up to succeed in its goals to support the broader Arboretum mission.
Table 1.1: Morton Arboretum Education Department SOAR Analysis Grid

<table>
<thead>
<tr>
<th>Strategic inquiry</th>
<th>Strengths:</th>
<th>Opportunities:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Department has extensive intellectual resources available through The Arb’s Science &amp; Conservation staff.</td>
<td>• New technologies are making it possible to reach audiences without needing to remain in a physical footprint of the collection.</td>
</tr>
<tr>
<td></td>
<td>• Some programs are already shifting to more quantitative capture of the desired impacts with success.</td>
<td>• Demonstrating this impact could establish The Arb’s Education dept as a leader in the field on capturing the kind of metrics institutions are struggling with.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Appreciative intent</th>
<th>Aspirations:</th>
<th>Results:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• All programs aligned with the broader institutional mission and capturing the positive impact their engagements are leading to.</td>
<td>• A clear connection between the actions of the department and work being done by the public in support of institutional mission.</td>
</tr>
<tr>
<td></td>
<td>• Participants in all audiences taking more action on behalf of trees, actions that take many shapes.</td>
<td>• More contributed funding from external sources thanks to capturing data funders are looking for, leading to even more capacity to continue engage.</td>
</tr>
</tbody>
</table>

Stavros and Cole (2013) called the SOAR analysis a “potential-focused” (p. 22) framework, and it is clear in Table 1.1 that there is tremendous potential behind The Arboretum’s Education department. Armed with information on how the Education department fits into the broader institution and the aspirational direction for current and future programming as established by the new strategic plan, it is feasible not only can the department capture its impact, but it could model that process to an entire field.
Institutional Profile Part II: External Context

Moving Higher Education Practices into Informal Education

The Morton Arboretum has begun to take a more critical look at how to capture the impact their audience engagements have, including education programs. The establishing of KPI’s that align with the broader institutional mission give the Arboretum’s Education department the foundation of beginning to quantify whether or not their programs are in fact leading to participants taking action on behalf of trees. As recently as 2018, education programs have begun a shift to a mixed methods evaluation approach and pre/post-program assessment design in an attempt to separate the impact of participating in a program from an audience member’s existing propensity to take action aligned with the Arboretum’s mission. The first of these evaluation procedures implemented showed some promising results, but considering the Education department offers hundreds of individual programs annually there is a significant amount of work still to be done. These initial successes can model how capturing different data can lead to truly continuous improvement efforts, and an even more positive impact toward the institution’s mission.

For the Morton Arboretum, the process of implementing these practices and establishing a truly continual improvement process is an ongoing one. And although the establishment of department-level key performance indicators within the Education department can serve as internal quality measures, Morton is frequently examined by external funding sources like the National Science Foundation and the Institute of Museum and Library Services through grant application procedures. With such measures in place, the Arboretum’s Education department looks to help ensure its mission to plant and care for trees is carried out far into the future, by
both the institution and the public it engages. Such an outcome would be perhaps the plainest measure of program quality possible.

The internal context of The Morton Arboretum as an institution illustrates an informal education setting ready for the more formalized assessment practices of higher learning. What is more, these formalized assessments are well suited to capture the change in participants’ attitudes and actions that The Arboretum’s informal education programs are designed to produce. So why haven’t these practices already been assimilated from higher education to cultural institutions? A more in-depth look at the external context surrounding The Arboretum will reveal that this is in fact beginning to happen, but also that cultural institutions have to overcome decades of inertia when it comes to what data they use to measure success. Often times the simple reach and attendance figures most commonly cited fall short of truly capturing the positive impact these institutions can have, and as this realization spreads the formal assessment practices of higher education can serve as a framework for institutions of informal learning as well.

The Historical Utility of Attendance Data

To put the importance of assessing program impact in museum/public garden education programs into perspective, in North America alone around 183 million people visit these institutions annually, more than the combined annual attendance of Major League Baseball, the National Basketball League, the National Hockey League, and the National Football League (Association of Zoos and Aquariums, n.d.). These institutions represent tremendous opportunity for lifelong, out-of-the-classroom learning that helps the broader public understand STEM and
how science has a place in everyday life. At least, they do if they are able to use assessment and quality assurance practices to capture the impact their engagements with guests are having.

For most museums and public gardens, this type of quantifiable data has been defined as “immeasurable” for decades (Borun, 1977). The evaluation efforts institutions have undertaken typically focused on participant experience in terms of customer service, capturing the benefits of keeping guests entertained without exploring the question of whether or not those positive experiences had lasting impact once the engagement ended. Anecdotally there is always evidence these experiences have impact; museum staff or leadership usually have a story about a memorable day at their local zoo or garden putting them on the path to where they are now, but as a whole this type of experience has not always been captured.

This trend is starting to change however. To investigate whether zoos and aquariums were successfully promoting the benefits of conservation to their audiences, the Association of Zoos and Aquariums conducted a multi-year study of accredited institutions across the U.S. (Falk et al., 2007). In 2015, the Lincoln Park Zoo published a study examining the impact of demonstrations at their Regenstein Center for African Apes could have on guests attitudes about apes (Price et al., 2015). In that same year, the American Alliance of Museums convened a meeting of over one hundred museum education directors and program managers to discuss the challenges facing the future of museum education, including the need to focus on capturing the impact these departments are having (Hogarth, 2016). This need for change is also seen at a global level. Recently, to combat resistance to measuring impact and shifting the focus of how quality assessment is defined at public gardens, the Botanic Gardens Conference International (BGCI) released a technical review calling for more research into the economic and societal impacts public gardens can have (Smith & Harvey-Brown, 2018). Clearly, there is a movement
happening to assess more of the shifts in attitude and perception informal education programs can have on their audiences, and not just on whether or not that audience enjoyed themselves while they were engaged. This also serves as a more accurate assessment of a program’s quality, especially when those informal programs are designed to align with the overall mission of an institution. Such is the case of The Morton Arboretum, discussed in the internal context of having spent significant time aligning the outcomes of education programming with the institution’s broader mission.

The timing of a movement to capture and use more impact data is right, as more and more private and public funders are asking for quantifiable evidence of what impact an institution’s programs are having (Rojc, 2018). Just as in higher education one current debate revolves around what benefits completing a degree actually has for a graduate, the pressure in informal education is on how to capture whether or not a program is actually having any kind of positive impact with its audience. Museums and public gardens need to be able to demonstrate the quality of their programming by capturing quantifiable evidence that engaging with said programs leads to a shift in attitude, thoughts, or behaviors on behalf of the audience and that those changes lead to positive progress on an institutional mission that aides the broader public. Those that can will find themselves with continued funding, and those that cannot will find themselves left behind.

**Similar Garden/Arboretum Institutions around the U.S.**

Perhaps it is telling that all of the previously mentioned impact studies set at cultural institutions are set at zoos and aquariums. It seems that the early work on assessing impact has left tree and plant-focused institutions behind, making them of special importance in the potential
audience for this study. Briefly profiling three institutions similar in mission and programming to The Morton Arboretum suggests that these institutions are just as ready to put higher education assessment practices to work, even if they have not yet done so. It is fair to assume these institutions are certainly facing the same questions from external funders on demonstrating evidence, and would benefit significantly from these practices.

**Longwood Gardens.**

One of the “world’s great gardens” (Longwood Gardens, n.d.-a), Longwood strives to be leaders in horticultural excellence and educational programming, while bringing a wide array of artist events to the Philadelphia area for more than a century. Longwood inspires the public through excellence in garden design, horticulture, education, and the arts.

Longwood is another public garden concerned with how to capture the impact of their programming, with their recently updated strategic plan setting measuring and communicating the impact of their mission. However, that strategic plan runs through 2022, and currently the language around this initiative is tentative, with “develop a methodology for measuring Longwood Garden’s social impact” (Longwood Gardens, n.d.-b) setting this goal in the ideation phase rather than application.

**Bernheim Arboretum and Research Forest.**

Located in Kentucky, Bernheim is the “living legacy” of Isaac W. Bernheim, a German immigrant who came to the US in March of 1867 as an 18-year-old with four dollars in his pocket (Bernheim Arboretum and Research Forest, n.d.-b). He went on to achieve great success as a distiller and in 1929 Bernheim bought and endowed the land that would become the 15,000-acre Bernheim Forest. Today, Bernheim connects people with nature as a “nationally treasured
leader in ecological stewardship that inspires exploration of our deep connections with nature” (Bernheim Arboretum and Research Forest, n.d.-a).

**Chicago Botanic Garden.**

A mere 40 miles away from The Morton Arboretum, the Chicago Botanic Garden (CBG) “cultivates the power of plants to sustain and enrich life” (Chicago Botanic Garden, n.d.). CBG had its annual visitor count hit one million guests in 2017, and has classes and programs very similar to The Arboretum. As opposed to Morton’s 1700-acre contiguous footprint, CBG consists of 31 different gardens and natural areas situated on 385 acres around nine islands and six miles of Lake Michigan shoreline.

Much like these other institutions, The Morton Arboretum is forging ahead with the process of implementing quality assurance through the development of mission-aligned KPIs detailed in the internal context section. For the Arboretum, the process of implementing and capturing these KPIs is an ongoing one. Additionally, although the KPIs have been established internally as quality measures, they are frequently examined by external sources like the National Science Foundation (NSF) the Institute of Museum and Library Services (IMLS) through grant application procedures. With such measures in place, The Arboretum’s education programming looks to help ensure its mission to plant and care for trees is carried out far into the future, both by the institution and the public it engages. Such an outcome would be perhaps the plainest measure of program quality possible.

This focus on quality assurance and capturing demonstrative impact certainly represent a change in strategy for parts of the museum and public garden world. But just as a deeper focus on higher education program outcomes has lead institutions to rethink how they are defining
whether a graduate is truly prepared for the professional world, a deeper focus on quality assurance can be seen as a change for the better, despite the lack of current infrastructure to help institutions make this change.

External Quality Assurance

Morton Arboretum is a member of both the American Public Gardens Association (APGA), and the Botanic Gardens Conference International (BGCI). These are continentally and globally-focused organizations, respectively, which can both provide guidance for institutions like Morton as well as providing individual gardens a platform to demonstrate successful practices to other gardens and arboreta. Although they do not explicitly evaluate the quality of the programming offered by their members, these organizations exist to encourage best practices and provide the support that garden staff need to maximize their capacity to serve institutional missions.

The APGA has a mission to “serve public gardens and advance them as leaders, advocates, and innovators” (American Public Gardens Association, n.d.-a). While the APGA has an organization does not provide quality assurance oversight, they recently launched a data-gathering benchmarking initiative (American Public Gardens Association, n.d.-b) focused on compiling metrics such as staff capacity, compensation and salary data, and the species diversity of collections at their member institutions. This tool will allow all of the APGA’s over 600 member institutions (American Public Gardens Association, n.d.-c) compare the size and structure of similar gardens, as well as examine how larger institutions are structured. The benefits to having this kind of data available are obvious, but they also illustrate what has been the traditional struggle of what kind of information institutions are collecting. Staffing size,
salary data, are quantifiable metrics that can be useful, but their utility as measures of quality is questionable at best. The tendency becomes to measure activity instead of focusing more on capturing impact, leaving the field as a whole with less evidence of quality assurance than a different focus might yield.

Organizations like the APGA or BGCI may not play the same role for gardens as external accreditors like the Higher Learning Commission play with higher education institutions, but they are able to guide institutions toward better quality assurance practices. By setting the expectation that institutions should be capturing this quality data, organizations like the BGCI can go a long way toward establishing better quality assurance in the field, even if they have no role in enforcing those practices at individual institutions. For individual institutions to begin the process of changing how they assess quality on their own, they need evidence that the collaborative organizations trying to support them consider those changes worth making. The APGA and BGCI have certainly started the process to help lead more institutions into this new approach to quality assessment.

**Programmatic Accreditors**

It can be surprising to consider that museums and institutions that have labelled themselves “cultural institutions” have not had more prior focus on the impact they are having on said culture. Globally, public gardens alone see an estimated 500 million visitors a year (Mounce, Smith, & Brockington, 2017), representing tremendous potential to have and capture a large societal impact. The need for an institution like the BGCI to put out a technical report calling for more impact studies is a reminder that this is a field where program evaluations and quality assessments have focused on easily trackable metrics that only paint part of the picture of
what an institution is trying to accomplish. Tracking visitor counts, endowment performance, and guest satisfaction gives museums and gardens a starting point but does not capture what “cultural institutions” are actually trying to accomplish: educating their public through programming engagements that lead to changes in attitudes and behaviors moving forward.

Part of the challenge with assessing a guest’s experience in a museum or public garden program is that narrowing the measure of impact typically revolves around the evaluation’s ability to establish a baseline of where the participant was before they engaged, and where they end up once their engagement is over. One additional complication to this process is the idea that any shift in attitude or affinity on behalf of the participant could be external to the program experience (Kollmuss & Aygeman, 2002). Organizations like the APGA and BGCI can suggest best practices, and emphasize the importance of capturing these impacts, but the field itself is relatively bereft of studies doing exactly that. Informal education programs are essentially “teaching in situ,” (Taylor, Neill, & Banz, 2008), an ephemeral moment in time aimed at propelling people toward change, but surrounded by future variables outside anyone’s ability to control.

The Morton Arboretum’s Education department is attempting to address these difficulties by re-examining how they assess program performance, and establishing the previously mentioned set of department-level KPIs that capture the changes each of the department’s programs are designed to lead to (The Morton Arboretum education strategy, 2019). Even without external accreditors to enforce quality standards, The Morton Arboretum is looking to lead the public gardens field by example, clearly stating what the outcomes of each program are leading to and implementing new evaluation procedures for those programs to quantify their impact in doing so. If these practices can in fact capture evidence that programs are capable of
motivating change in how participants think about the content they are presented, it will be the measure of positive impact for which an entire field is searching.

Higher Education Assessment Practices Relevant to Informal Education

Suskie (2015) described five dimensions of quality a higher education institution should strive for, and in cultivating a commitment to excellence that goes beyond beginning and ending with the accreditation process, these dimensions become “enduring and pervasive” (page 25). Thus the dimensions of quality become cultural artifacts of the institution, a quality framework with five cultures, each of which need to be present to keep an institution on their journey to higher quality. Those cultures could be used in more settings than higher education with a simple expansion of how “institution” is defined to include those where informal learning also occurs, and still needs to be assessed. Suskie’s cultures could clearly frame assessments of other learning. Those cultures are:

- **A culture of relevance** – All programming, work, and goals flow from the broader institutional goals and are undertaken with integrity and responsible stewardship.
- **A culture of community** – The institution involves stakeholders and incorporates input into decision making.
- **A culture of focus and aspiration** – The institution’s mission and goals set a clear outcome to work toward and avoid distraction.
- **A culture of evidence** – Aligned with a culture of focus and aspiration, the institution collects information from determined indicators to capture success or failure on its ultimate goals.
• A culture of betterment – The data collected by the institution is put to use in a cycle of continuous improvement, creating meaningful change within the institution as well as without.

It is clear that although they were formulated in a higher education context, Suskie’s framework can be applied to other institutions focused on learning, including the informal education programs of cultural institutions. But to do so, the notions of “excellence” and doing the right thing must first be explored, because as Suskie herself states, “quality…is not just a matter of doing things excellently but doing the right things excellently” (p. 52). How the “right thing” is defined will change as the organizational context for the framework changes, but ultimately it means the institution conducts itself with integrity in the pursuit of quality.

In higher education, doing the right thing revolves around serving an institution’s students and delivering the best possible education, something well rounded and capable of preparing graduates for life in the working world. Suskie suggests that higher education institutions have five fundamental responsibilities:

1. Meet stakeholder needs, especially students.
2. Keep its promises.
3. Ensure its health and well-being, and deploy resources effectively, prudently, and efficiently.
4. Serve the public good.
5. Be accountable by demonstrating quality and effectiveness in fulfilling these responsibilities.
All of these responsibilities align with delivering a transformative educational experience to students that helps them achieve their longer-term career and life goals. For a more informal learning environment, like those of cultural institutions, the responsibilities would be similar but shift to focus on serving the public good more broadly as opposed to focusing primarily on students. That is due to the difference in why cultural institutions exist: instead of focusing on preparing individual students, cultural institutions typically focus on more public missions with broader audiences (Johnson, 2009). However, even with such a change any learning institution would still want to live up to the responsibilities Suskie puts forward; meeting stakeholder needs, keeping promises, responsible stewardship, and accountability are hallmarks of any successful organization. For a cultural institution like Morton Arboretum, serving the public good through its mission to plant and protect trees becomes the lens through which all quality is measured. “Mission-aligned” for cultural institutions means eliciting a change in an audience that delivers on a previously defined aspect of why the institution exists to bring improvements.

For Morton Arboretum, the right thing is anything that aligns with the institutional mission and motivates their audience to take action on behalf of trees. Those actions can take several shapes, but essentially the why of the institution is to ensure that trees endure to provide their benefits for future generations. Thanks to all the threats trees currently face, like habitat loss, pest infestation, and increased emissions, the Arboretum needs the current audience to take action to help make sure trees can continue to provide these benefits. Doing that excellently means programs that have demonstrative impact either introducing various audiences to what those benefits are or changing participants’ opinion on whether their own actions can have positive effect, and getting them to actually take action. From the perspective of the Arboretum as an
institutions, “excellence” is defined by not only motivating the public to take action, but capturing evidence of how each individual program was able to effect that motivation.

The KPIs established by the Arboretum’s Education department are an effort to define what each program contributes to the institutional mission in terms of an aligned intended outcome. By tying the definition of programmatic quality to the overall institutional mission, the Arboretum has created an assessment framework that can be used to measure program quality in a field that has traditionally shied away from such quantitative evidence (Adams, 2012). What is more, this helps ensure the institution’s mission remains relevant to the current audience, an essential piece of Suskie’s quality frameworks. An examination of how each of Suskie’s five cultures can be applied at Morton Arboretum illustrates how the institution is on a path to truly continuous quality improvement and increased impact.

The Culture of Relevance.

“Relevance” is perhaps the single most important culture an institution like The Morton Arboretum can cultivate and maintain. Cultural institutions like public gardens, zoos, and museums must constantly ensure their individual missions are timely, applicable, and most of all relevant to the audiences with which they wish to engage (Jackson, 2002). Part of the challenge to staying relevant to their audiences is that theoretically, every member of the public is a stakeholder in such institutions. Suskie broadened the definition of stakeholder to anyone “who is affected by what (the institution) does” (p. 51), and through that lens with a mission to plant and protect trees literally the entire plant becomes a stakeholder in the progress made by the institution toward that mission. The Arboretum’s conservation-focused mission ensures that it has relevance, but the breadth of stakeholders that could be impacted by that mission makes
remaining accountable for all of them an almost Sisyphean task. Thankfully, the Arboretum has a history of integrity and fiscal stewardship capable of preparing the institution for just that type of far-flung continuing relevancy.

Integrity.

The challenge of expanding the stakeholder group to a global level does not mean cultural institutions should not try to achieve this accountability. In fact, for conservation-focused institutions doing so would be the very definition of the right thing considering the current state of the environment as well as the debate on how sustainable our current resources may or may not be. With such high mission relevancy, reaching a wider audience becomes an institution-level performance indicator in and of itself. That kind of broad reach is the only kind of reach that would create program success capable of delivering impacts that result in a world where such a mission was no longer needed, which is their point to begin with. For The Arboretum that does not seem to be a currently near future, so why not attempt to broaden educational reach as wide as possible in the hopes of influencing as many global stakeholders as possible.

Before an institution can meet the needs of stakeholders, they must first get a sense of what those needs are. Audience research is an essential part of a cultural institution’s success and The Arboretum is no different. The Education department’s current strategic plan places heavy emphasis on “programing with the audience instead of for” (The Morton Arboretum education philosophy document, 2019) in an effort to capture this importance. An institution like The Arboretum can design programs with outcomes that align with the actions called for by the institution’s mission, but the audiences for those programs also come to each engagement hoping to have their own unique needs met. As Suskie stated, in order to meet the needs of key
stakeholders, the institution needs to “learn about their perspectives, interests, and priorities” (p. 54). If the institution can find a way to meet those stakeholder needs through resources in programs that support The Arboretum’s mission, that is where demonstrative impact will happen.

Such a conservation-focused mission has to be supported by programs that yield action on behalf of the public to be effective. For the Arboretum, the mission to plant and care for trees has to be taken up by members of its audience to have any measurable positive change. But not everyone comes to engage with an arboretum program ready to take action; some have little to no awareness of why the institution exists, why trees are important, or the impacts their own local actions can have on a larger scale. So not all programs can have “convincing people to take action” as the ultimate success measure. Some simply have to introduce the institution to the participant and result in them having learned something new. Programs with prolonged engagements have an opportunity to change how participants feel about the Arboretum, the importance of trees, and the power their own actions have. And programs for more affinitive or active audiences can give participants the training to actually care for trees outside arboretum grounds. The majority of Illinois’ 4.1 million acre tree canopy is on privately owned land (O’Connell, 2017), so adults, specifically landowners, are a key audience to engage with if convincing people to care for trees is one way to define success.

It is an interesting twist that although The Arboretum’s mission is tree-focused, the necessity for such a mission is primarily due to the benefits trees provides the people that surround them. Cultural institutions like The Arboretum might not be able to put students first in the manner of higher education, but their focus on missions that serve the public good essentially accomplish the same thing. And for The Arboretum, ensuring that the institution is stable moving
forward and capable of continuing to have positive change on the world around is a key measure of internal quality assurance.

**Stewardship.**

In the case of The Arboretum, “stewardship” has multiple meanings. Along with Suskie’s use of the phrase to encompass an organization’s ability to responsibly manage resources to ensure its viability in the future through fiscal stewardship, The Arboretum is focused on environmental stewardship and its ability to help the public take action that protects the environment. The Arboretum’s mission is to essentially turn its audience into stewards empowered to take action of their own accord, which ironically it can only accomplish if it takes the same approach toward its own resources to ensure sustainability.

Fortunately, this has been exactly the approach taken by The Arboretum, as described in the finance portion of the internal context section of the institutional study. The Arboretum “holds itself accountable to the public, including all its members and other constituents who support The Arboretum’s mission to plant and conserve trees and other plants for a greener, healthier, and more beautiful world” (The Morton Arboretum, n.d.-a). As a nonprofit organization, the Arboretum’s finances are a mix of earned revenue from programs, contributed revenue from donors and grant agencies, and dividend and interest income off an institutional endowment. This combination has allowed The Arboretum to continue having positive impact for nearly 100 years, a landmark date not too far away in 2022.

Clearly, the Arboretum has taken the appropriate steps to ensure the institution’s fiscal health and well-being for the foreseeable future. That fiscal well-being is essential because it allows the Arboretum to continue investing back in the community through programs that help
improve the environmental health of their surroundings. In essence, The Arboretum’s fiscal stewardship makes it possible to continuing creating more environmental stewardship, which supports the institutional mission to plant and protect trees.

**The Culture of Community.**

Organizational governance at non-profit foundations and cultural institutions is often very similar to the Board of Trustees structure in higher education. Morton Arboretum has both a Board of Trustees and a Board of Advisors to help set the institution’s strategic direction and governance, both made up of “corporate and civic leaders who also serve as ambassadors and advocates for the Arboretum in the community” (The Morton Arboretum, n.d.-m). In their efforts to use more audience input to shape programming moving forward, the Arboretum’s Education department also has its own advisory committee. The department recently revamped its committee, re-writing the group’s charter with a tri-point purpose (The Morton Arboretum Education Advisory Charter, 2018):

1. To communicate and build affinity toward The Morton Arboretum’s mission, and education and information initiatives among academic, civic, and corporate leaders.
2. To increase Arboretum visibility and influence among state and national education leadership.
3. To increase program impact and reach through the creation of new partnerships.

Specifically calling attention to the Arboretum’s institutional mission in the Education Advisory Committee’s charter was purposefully done. The Education department itself has not developed its own distinct mission because as part of the wider institution; the Education department exists to make progress toward that broader institutional mission. And with the
updated Arboretum strategic plan making “inclusion” one of its four central pursuits, it is clear the organization is determined to reach a diversity of audiences in an accessible, equitable manner, again highlighting a culture of community.

**The Culture of Focus & Aspiration.**

The “why” of a mission-based institution like Morton Arboretum is fairly cut and dry, and the conservation-focused mission of the Arboretum provides a foundation from which all strategic planning stems from. It would be easy for the Arboretum to lose focus if the scale of the threats facing the health of the planet were allowed to govern the pursuits of the strategic plan; the impacts of climate change and our changing ecosystems certainly have impacts on trees and plants the institution certainly has no small ownership of. But by keeping the new strategy’s focus to specific issues regarding trees like the connections between urban trees and their community and the need to preserve oaks as a keystone species in local ecosystems, the Arboretum has an opportunity to address broader issues like climate change on a scale that is still actionable.

With the institution nearing its centennial and a global leader among public gardens and arboreta, Morton’s current strategic plan captures the challenges of what happens when an institution most would already consider successful thinks about where it needs to head in the future. While the impact tree and plant life has on the environmental state of the climate ensures the Arboretum’s mission to plant and protect trees will have an immediate relevancy for the foreseeable future, the institution’s strategic plan establishes goals that will make the Arboretum a force for good far into the future. The presence of the sustainability and inclusion pursuits are
efforts to ensure the institution is capable of evolving and maintaining its relevance for years to come.

**The Culture of Evidence.**

The Arboretum’s new strategic plan is certainly forward-facing and an attempt to give the organization a way to continue having positive impact for years to come, but when it comes to program-level success there has to be demonstrative evidence collected and evaluated. The challenges facing cultural institutions such as The Morton Arboretum looking to use quantitative evidence of their impact and the success of their programs in achieving that impact have been discussed at length: cultural institutions traditionally focused on simple hard metrics like attendance; the impacts institutions seek to have are difficult to quantify due to the one-off nature of their engagements with the public; and incorporating this kind of evaluation into programming is often outside the skillset of institution staff and comes with additional financial and time costs. However, with external funders increasingly expecting quantifiable impact attached to their support, and even oversight bodies like the BGCI laying the groundwork for institutions being better at capturing the positive impact they have on their surroundings, building a culture of evidence is an essential piece of quality assurance for institutions like Morton Arboretum.

Fortunately, the Arboretum’s new strategic plan has overlap with the previous plan, meaning programs can pivot to include new initiative outcomes without completely abandoning outcomes they were previously focusing on achieving. Specifically, the Arboretum’s Education department has a handful of projects already undergoing evaluation cycles capable of capturing that impact. These evaluation cycles focus on whether engaging different programs leads to any change in things like participants’ self-assessed likelihood of planting trees on their own, their
level of awareness of the role trees and plants play in the health of their environment, and other behavior-linked measures. These outcomes will certainly remain as critical under the new strategic plan as they were in the previous one.

**The Culture of Betterment.**

With the rest of Suskie’s framework in place, the question becomes what does a “Culture of Betterment” look like at cultural institution like The Morton Arboretum? It is not impossible to implement a “culture of betterment” and continual improvement processes for programs even as the nature of the data collected changes, and there are a handful of current Arboretum programs getting close to that continuous cycle. Tracking the changes in one such program, the Youth Volunteer Program (YVP), tells an interesting story in how attendance data tells the institution some information, but to get to a measure of impact the questions asked of the program have to become more aligned with the key performance indicators that match the institution’s mission. The process that Education staff implemented to evaluate the YVP on this dimension could serve as a model not only to other Arboretum programs, but to programs across other cultural institutions as well.

**Evidence of Impact Collected.**

The Arboretum’s Youth Volunteer Program gives middle and high school students the opportunity to volunteer in three different roles across the grounds: Gardeners, working with horticulture staff in the Children’s Garden; Naturalists, working with staff to deliver programs to the public; and Counsellors in Training, working with Summer Science Camp staff (The Morton Arboretum, n.d.-j). This program is an ideal informal education setting in which to use higher education assessment practices to capture quantifiable program impact. Although participants are
not given formal tests on knowledge they have gained, the program itself has several KPIs that align with the institution’s broader mission and would capture evidence of changes in participants stemming from their engagement in the program if measured. That was not always the case however, as the program was initially evaluated simply on the participants’ enjoyment of their experience. Examining how that has changed over time is an opportunity to pilot the ideas this capstone project is based on.

The challenges of evaluating programs set at cultural institutions are myriad. There is typically no formalized assessment of learning; programs are designed to invoke change in participants’ perspective on relevant ideas but struggle to capture that change after the fact. As such, museums, zoo, and gardens have typically stuck to simple attendance figures and guest satisfaction as evaluation measures. The YVP was no different; initially the only data collected consisted of tracking program growth over time as evidence for continued support to external funders. And these numbers were in fact positive; from 2006 (then the “Macgyvers” program) to 2019, the program grew from a pilot of 40 participants to 143 participants in three different roles, all of which had high satisfaction scores (Figure 1.3).
Growth in metrics and positive participant satisfaction scores are possible indicators of a strong program, but do not capture whether engaging in that program actually leads to changes in behavior that align with The Arboretum’s mission to plant and protect trees. Furthermore, that data cannot separate program impact from existing affinity toward that mission. The question rose, “Is this program positively rated because it is good, or because we recruit teens already inclined to be conservation-focused, essentially preaching to the choir.” Focus groups with participants beginning in 2015 produced qualitative data that suggests in fact, the teen participants were coming to the program through their own need to have volunteer experience for college applications, not from any pre-existing connection to The Arboretum, its mission, or their existing belief in the importance of caring for trees.

The high satisfaction scores of previous years and the testimony of previous participants suggested that yes, the Youth Volunteer Program was having an impact. Next, The Arboretum had to change how the program was being evaluated to actually attempt to capture that impact.
Knowing that YVP was attracting participants through that audience’s need for volunteer experience of any kind, and that participants enjoyed the program when they were in it, The Arboretum then needed to evaluate the program in a way that captured what, if any, influence the program was having. Specifically, the influence on participants’ perspective on the importance of trees and the power their own actions have to impact their surroundings, two KPIs aligned with the broader institutional mission. To do so, the Education department shifted to a pre/post program questionnaire that both established a baseline for participant experience and then checked for any change at the end of the program. The questions asked revolved around the KPIs mentioned above, focusing on whether participants felt any differently on the importance of nature, the importance of conservation, and the power of their actions to shape their surroundings.

Launched for the 2018 session of YVP, responses from the first year of this new evaluation methodology were very promising. There was statistically significant change in participant response on a number of items, as seen in Table 1.2 (N. Rivera Personal Correspondence, 2018).

Table 1.2: 2018 Pre/Post YVP evaluation instrument scores (p<.05)

<table>
<thead>
<tr>
<th>Question</th>
<th>Pre-Survey</th>
<th>Post-Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>I like to be in nature</td>
<td>3.935 (N=93)</td>
<td>4.220 (N=91)</td>
</tr>
<tr>
<td>Being in a natural environment makes me feel peaceful</td>
<td>3.989 (N=92)</td>
<td>4.110 (N=91)</td>
</tr>
<tr>
<td>My actions can make the natural world different</td>
<td>3.688 (N=93)</td>
<td>3.897 (N=91)</td>
</tr>
<tr>
<td>People should help the environment</td>
<td>4.785 (N=93)</td>
<td>4.791 (N=91)</td>
</tr>
</tbody>
</table>
Moving forward, The Arboretum can use this approach and its data as evidence why the YVP should be supported through grants to build capacity and expand this impact to as wide an audience as possible. And as the program gears up to start again in the spring of 2019, continuing the pre/post evaluation process as well as implementing changes based on the participant feedback will model the kind of continuous improvement process all of The Arboretum’s education programming should achieve.

There are clearly multiple stories that can be told about the YVP based on the types of data collected, but even the changes in data tell a story of its own. This change tells the story of a program able to shift the questions it asked to evaluate itself to get a better sense of if the program was in fact accomplishing what it was designed for. That story can in turn help other programs re-focus how they are evaluating success in terms of impact, helping an entire roster of education programming truly capture quantified evidence of mission support moving forward.

Examining the internal and external context surrounding informal education programs at The Morton Arboretum reveal an institution ready to think differently about how it uses data, in a field where the old metrics need re-examining. This also suggests that the education happening in such a setting, although more informal, can be assessed using some of the thinking higher education institutions use to evaluate their students’ progress on learning outcomes. Because of the mission-specific content happening in education programs at cultural institutions, using these higher education practices could capture quantifiable evidence of progress toward said mission, if the right outcome measures have already been established by the institution.
Institutional Profile Part III: Considerations of People

The Leadership & Staff of the Arboretum

The Morton Arboretum has encouraged the planting and conservation of trees to its audience on a local and global level. In 2019, The Arboretum saw its visitor count exceed one million total guests for the fifth year in a row thanks to the return of the “Nature Connects” travelling exhibit and the extended popularity of the “Troll Hunt” exhibit that led to new highs in monthly visitor counts, including July 2018 as the highest attended month in the history of the institution (Johnson, 2019). As a cultural institution, The Arboretum seeks to inspire, encourage, and catalyze the public into becoming tree advocates carrying out the Arboretum’s mission on their own terms. They are, in essence, the organization as transformative cultural entity, guided by a mission that needs to transform the public in order to continue having positive impact on its surroundings.

Although the mission of The Arboretum has not changed over the course of 98 years, the people leading the institution obviously have. The current leadership structure, external partners, and audience strategy all suggest the time is right for the institution to take steps necessary to re-focus how its programs are evaluated, and demonstrate to an entire field of cultural institutions that the impact their institutions have with the public no longer need to be thought of as immeasurable.

The Morton Arboretum’s “vibrant staff” includes 185 full-time, 120 part-time, and over 100 seasonal employees who work in all areas of the institution. The staff is a diverse mix of employees from all backgrounds, which should not surprise considering the wide range of responsibilities that go into running a 1700-acre arboretum and public garden with over 1 million annual visitors. Beyond The Arboretum’s Education and Science/Conservation departments, the
collection itself has to be cared for by horticulture staff, large-scale events are put on by events staff, and 50,000 membership households of different commitment are stewarded by the membership and development staffs. Arboretum staff are a mix of scientists, researchers, educators, fundraisers, horticulturalists, and facilities managers, to say nothing of 1500 volunteers and the Human Resources and administrative staff it takes to put everyone together. But whether in collections, research, education, visitor services, or administration, what each employee has in common is a commitment to the mission of The Arboretum to plant and protect trees and plants for a greener, more beautiful world (The Morton Arboretum, n.d.-n). Senior staff and the roles they play in guiding the institution are detailed below. The Education department, the focus of this capstone, is described as well, along with the audience and sub-groups this team attempts to reach through its informal education programming. The significance of this capstone, in terms of the internal and external context of the project, is also discussed.

**Arboretum Leadership**

**Gerald T. Donnelly, PhD, President and CEO.**

Trained as a botanist and forest ecologist, Dr. Donnelly earned his Ph.D. from Michigan State University. Since taking the role of President and CEO of The Morton Arboretum, Dr. Donnelly has led the institution through a period of substantial growth. He oversaw the creation of a dedicated Children’s Garden and renovation of the Arboretum’s 1700-acre grounds in 2006, essentially doubling The Arboretum’s then visitor count. In 2018 The Arboretum completed its second capital campaign, which brought over 63 million dollars toward initiatives like the creation of the South Farm conservation campus, founding the Center for Tree Science, even the creation of new, more resilient plant species (The Morton Arboretum, n.d.-o). All of these initiatives increased public awareness of The Arboretum’s mission and engaged the public in
their efforts to plant and protect trees. Under Donnelly’s leadership, Morton Arboretum has been accredited as both an arboretum and a museum by the American Alliance of Museums.

Donnelly also has leadership roles in multiple consortiums of public gardens both in the U.S. and globally; he served as president of the American Public Gardens Association (APGA) from 1997 through 1999, and currently sits on the board of the Global Trees Campaign with the Botanic Gardens Conservation International (BGCI) and the International Association of Botanic Gardens. In 2013, he was the recipient of the APGA’s “Honorary Lifetime Member” award, the institutions most prestigious honor as recognition of Donnelly’s ongoing leadership in furthering the mission of public gardens, service to the association, and uncommon devotion to the field of public horticulture (The Morton Arboretum, n.d.-p).

The Morton Arboretum Leadership Team.

Dr. Donnelly is advised on leading the institution by The Arboretum’s Leadership Team (LT), comprised of the Vice Presidents of individual departments.

- Kris Bachtell, MS: VP of Collections and Facilities
  - Bachtell has been with The Arboretum for 38 years in various roles, contributing to the institution’s atypically high average length of employment of 7 years (C. Emmerick personal communication, 2018). Responsible for planning, maintaining, and creating all physical aspects of the collections and buildings on The Arboretum’s 1700 acres, Bachtell is fond of reminding people “the curriculum drives the collection” when it comes to informal education programming.
• Nicole Cavender, PhD: VP of Science and Conservation
  o Dr. Cavender has her doctorate in Horticulture and Crop Science from The Ohio State University, and leads The Arboretum’s scientific research through the Center for Tree Science. Her team works to improve the health of the urban and community forest of the Chicago region, protect threatened tree species around the globe, facilitate technology transfer to the green industry, and provide professional leadership to other institutions worldwide (The Morton Arboretum, n.d.-q).

• James Fawley, MBA: VP of Finance and CFO
  o As a nonprofit, The Morton Arboretum holds itself accountable to the public, including all its members and other stakeholders who support its mission to plant and conserve trees and other plants for a greener, healthier, and more beautiful world (The Morton Arboretum, n.d.-r). As VP of Finance and CFO, Fawley oversees The Arboretum’s nearly $40 operating budget, the responsible fiscal management of which ensures the institution’s health for future generations to visit and benefit from.

• Kathleen Spiess, CFRE: VP of Development
  o In 2019, Spiess and her department completed The Arboretum’s second ever capital campaign “Growing Brilliantly,” a five-year campaign which raised over $63 million. Prior to being named VP Spiess was Senior Director of Major Gifts, and now leads The Arboretum’s efforts to build philanthropic support for mission-related work in tree-science, conservation, and education (The Morton Arboretum, n.d.-s).
• Alicia LaVire, VP of Marketing and Communications
  o LaVire was previously the Senior Director of Marketing and Brand Management at Shedd Aquarium in Chicago and has extensive experience in nonprofit marketing, brand management, and communications. She has a BA in communications with an emphasis in advertising and public relations from Grand Valley State University (The Morton Arboretum, n.d.-t).

• Preston Bautista, PhD: VP of Learning and Engagement
  o Over the course of this project, a vacancy in the VP of Education and Information position lead to the creation of the VP of Learning and Engagement role, filled by Dr. Bautista. Dr. Bautista joined the Arboretum in March of 2020 from the Indianapolis Museum of Art at Newfields, where he served as Deputy Director of Cultural Affairs and Public Engagement since 2012. Dr. Bautista holds a PhD in Art History from City University of New York and has two Master’s in Art History, one from City University of New York and one from San Francisco State University.

Institutional Values

In late 2018, VP’s Spiess and LaVire lead an effort to determine and express the core values held by The Arboretum as an institution, which were then revealed in early 2019. These employee core values are intended to become an expression of the ingrained culture at a mission-based institution such as The Arboretum (The Morton Arboretum, n.d.-u). They are:

• Take ownership.
o Be a responsible steward. Care for the collections, visitors, supporters, and colleagues. Be mindful that work done today impacts the people and trees of tomorrow. Make a positive impact on the environment.

- Work together.
  o Respect one another. Appreciate diverse skills, experiences, and backgrounds. Actively contribute to shared outcomes. Do what is best for The Arboretum.

- Keep learning.
  o Pursue knowledge and betterment. Challenge yourself to grow. Experiment and evaluate to find improved ways of doing things. Find ways to increase effectiveness. Ask questions and exchange perspectives.

- Make The Arboretum exceptional.
  o Take time to ensure a job well done. Give thought to the best possible approaches, plans, and outcomes. Make every aspect of The Arboretum the best it can be. Contribute to a great visitor experience. Emphasize quality.

Announced in 2019, these values will be looked for in the everyday practices of current staff, and guide hiring practices at the institution moving forward. Hiring at a mission-based institution like The Morton Arboretum attracts a unique pool of applicants to the myriad of roles that go into keeping the institution running smoothly; roles vary from horticulture and gardening staff, to building maintenance, to guest services and store management.

**Education Staff**

The fifty-member Education department is one of the larger groups within The Arboretum, developing and facilitating programs that engage more than 350,000 of the institution’s one million-plus annual visitors. Those engagements occur in one-off programming
like field trips and drop-in programming at The Children’s Garden, longer engagement programs like Summer Science Camp or the Natural Areas Conservation Training program, or even digitally through newer projects like the “PLANTED” Finding your roots in STEM careers podcast.

The Education staff is essentially the setting for this capstone project, with the Director of Education, Jeremy Joslin, serving as the PI on the study using higher education assessment practices to evaluate the impact of informal learning programs at The Arboretum toward mission. Between leading The Arboretum’s Education department and being a member of the education team at Lincoln Park Zoo in Chicago, Joslin spent over eight years as a Dean both at Loyola University Chicago and at Morton College, a small community college in Cicero, IL where he focused on online learning and general education assessment initiatives. This back and forth mix of formal and informal education settings gives Joslin a background uniquely suited to conduct this study.

**Audience Breakdowns**

The education programs The Arboretum uses to engage the public are typically split into three audiences: early childhood, which consists of pre-kindergarten aged children and their families or caregivers; student programming for children in kindergarten through high school and even early college; and adult programs for life-long learners (The Morton Arboretum, n.d.-d). The strategic focus the department has put on using audience data to shape future programs has made the target audiences essentially another member of the department, shaping program content and delivery according to the needs they state. The challenge for Education staff is to continue creating and offering engaging programming that offer various levels of engagement for
all of these audiences, meeting audience need while also propelling them to take action on behalf of trees.

Beyond the simple definitions by age of who is in the audience for each of these divisions, the education staff has built a roster of “audience personas” to add a layer of personal touch to audiences that can feel broad and nebulous at times. These personas are based on the use of existing audience data that The Arboretum has gathered, brainstorming to create a handful of “archetypes that describe the target user” (Leibtag, 2012, p. 12) of different programs. Although the creation of these personas leans more toward data-driven fiction than research into specific audience members, these personas help staff keep audience needs as articulated by focus group research and data front and center while creating new programs. They also help separate priority sub-groups of these audiences, highlighting which audiences engaging with give The Arboretum the largest likelihood of accomplishing its intended outcomes.

**Study Research Question**

Nature-based cultural institutions like public gardens and arboreta are a part of the informal learning environment that makes museums a vital supplement to more formalized classroom learning, but they often lag behind the evaluation efforts of similar informal science institutions like zoos and aquariums (Smith & Harvey Brown, 2018). Much like HEIs found themselves under scrutiny in terms of capturing the positive impact earning a degree actually provides graduates, cultural institutions face increased pressure to capture evidence of the positive impact they are able to have on their community (Adams, 2012). It is imperative that the public garden/arboretum arm of the museum field implement more evaluation practices to quantify that impact and can look to HEIs for practices created to do exactly that. The assessment practices used to show impact in the more formalized learning environments of
Higher education are an ideal model to work from in building similar practices to assess the impact of the informal learning programs of museums and other cultural institutions. By doing so, public gardens and arboreta can take a quantum leap forward in their evaluation efforts, giving an entire field a more effective way of thinking about the impact their programs have and how to improve in the future.

Within the setting of The Morton Arboretum, examining the higher education-inspired assessment of the Youth Volunteer Program suggests that these practices can in fact be useful in capturing the impact of informal education programs. This capstone will extend that thinking, selecting an additional informal education program to assess in terms of what Arboretum mission-aligned impact said program is capable of having, impact being defined as the changes the program is propelling in participants as reflected in the KPIs and the actions participants take after the program. The program that draws the clearest parallels to formalized education is the Natural Areas Conservation Training (N-ACT) program, an in-depth training program for those interested in learning conservation practices they can put to use in natural areas (The Morton Arboretum, n.d.-b). “Natural areas” can be defined as private or publicly held land, most of which is green space that is home to multiple trees, plant, or grass species that benefit from people intervening to ensure that area maintains a natural state. The N-ACT program has existed in various forms throughout its ten-year existence and consists of 15 different courses covering topics like “Fundamentals of Restoration,” “Plant Identification,” “Restoration Ecology,” and applied field topics. To complete a certificate in natural areas restoration participants must have 30 hours of volunteer time at the Arboretum and one observed natural areas workday, but completing the entire certificate curriculum is not required and participants can sign up for whichever courses they are interested in. Previous restoration or conservation experience is not
required to start or enroll in most of the courses. Courses in the N-ACT curriculum are designed
to add up to providing a participant the education and training they need to work in several
different kinds of local natural areas, but they can also be useful on an individual course level by
helping people learn more about any number of smaller individual topics.

The N-ACT program follows all of the hallmarks of a certificate program found at an
HEI; providing students with a specific skillset that meets their need, flexible scheduling and the
ability to take courses in-person or online, a curriculum that works as the sum of a whole but
consists of courses that can be taken individually, and benefiting from the topical nature of an
relevant focal point (Finkel, 2018). N-ACT may be set in an informal education environment, but
it has more than enough in common with more formal programming to be evaluated by higher
education practices. This project will use a mixed method approach modeled off a typical higher
education assessment cycle combining different artifacts, surveying participants for quantitative
data on different points aligned with the Arboretum’s mission to encourage people to plant and
protect trees, as well as conducting on-site focus group interviews at the Arboretum to collect
qualitative data capable of creating further insight into survey responses. This approach will
build a comprehensive summative evaluation of the N-ACT program similar to degree program
evaluation at an HEI, creating and demonstrating a process for capturing informal education
programmatic impacts that can be modeled to other cultural institutions searching for the same
thing.

The emphasis higher education has placed on outcomes assessment and its importance in
accreditation mirrors the change in thinking on capturing impact happening at cultural
institutions. The creation of a new strategic plan for The Arboretum’s Education department with
key performance indicators for all programs, aligning them with the institutional mission, has
given all the institution’s informal education programming a chance to capture evidence of impact, in quantitative and qualitative terms. The ability to demonstrate successful achievement of these key performance indicators will let The Morton Arboretum claim it is in fact changing the perspective of the audience on the importance of its mission, the importance of trees, and the power of people’s actions to change the world around them for the better.

The research question asked by this study will be: does the length of time an individual spends engaging in the N-ACT program, defined by the number of courses taken, impact how that individual thinks, feels, and acts toward nature? That multi-faceted spectrum of engagement impact will translate to both the key performance indicators for the Arboretum’s informal programming, and individual measures investigated in the quantitative and qualitative portions of the study resulting in a series of sub-questions that correspond to the specific questions asked. The sub-questions are:

1. Does longer participation in the N-ACT program lead to an increase in feelings of affinity toward trees and nature?
2. Does longer participation in the N-ACT program lead to an increase in the belief that someone’s actions can positively impact their surroundings?
3. Does longer participation in the N-ACT program lead to an increase in self-reported conservation behaviors by the participant?

These sub-questions, and how the study instrumentation maps to each question, are examined in Chapter 3. It is hypothesized that individuals participating in three or more N-ACT courses as a “high” engagement group will self-report higher feelings of affective, cognitive, and physical connection than those who have participated in two or fewer courses, the “low” engagement group. A null hypothesis result would find no difference in self-reported connection
to nature between participants sorted by length of engagement. Rejecting the null hypothesis would allow the Morton Arboretum to demonstrate the positive impact of N-ACT as an informal education program, in a manner that demonstrates the utility of higher education practices to other cultural institutions.

**Study Significance**

A complete institutional profile of The Morton Arboretum paints the picture of a global leader in tree-science and conservation, engaging audiences through innovative programming on a regional and national level with a unique opportunity to re-examine how its informal education programming is assessed and help an entire field of cultural institutions improve how it captures impact. Parallels between the formal learning of higher education and the informal programming of cultural institutions make it possible for higher education assessment practices to be successfully transplanted to the informal context.

Internally, The Arboretum as a sole institution needs to be able to capture its impact to demonstrate the progress it has made on its broader mission. Externally, there are funders like the National Science Foundation (NSF, n.d.) and the Institute of Museum and Library Sciences (IMLS, n.d.) changing their practices; no longer content to simply review attendance figures, these reviewers expect quantifiable measures of impact to justify support. And professional organizations of public gardens external to Morton, like the Botanic Gardens Congress International (BGCI), have seen the need for this kind of evidence growing, and begun spotlighting that need to gardens and arboretums around the globe (Smith & Harvey-Brown, 2018). To summarize, there is need on an individual institution level and across the entire field of informal education to study whether the assessment practices of higher education can be implemented at cultural institutions.
This gap between the metrics institutions like Morton Arboretum have used to assess their informal education programs’ success or failure and the intended outcomes of those programs that aligned with institutional mission is not a sudden discovery; it persisted and grew over time as museums, zoos, and gardens relied on attendance metrics and visitor satisfaction surveys instead of thinking critically about what measures were most important to achieving a specific mission. Part of Chapter 2 will use the literature review to explore the background of how these practices persisted over time and how institutions are now starting to address the shortcomings of pure attendance as a metric. External funders like the NSF and IMLS are asking cultural institutions to think differently about their impact, while organizations like the BGCI are encouraging institutions to bring this to their day-to-day operation of programs, but examples of this filtering down to the institutional level are rare. The Lincoln Park Zoo in Chicago is one recent example (Price et. al, 2015). The Association of Zoos and Aquariums published a study that attempted to set some foundational practices (Falk et. al, 2007), but is refuted by others in the field as not being academic enough to guide best practices. Marino et al. (2010) is a direct response to that study, commenting on its methodology and calling for research on cultural institution impact to be based less on self-reported data like the Falk study, and with study samples more random than audience members who had engaged with the institutions.

From a certain perspective, Marino et al. bring up fair points about the research typically done on the impact of cultural institutions. The lack of a precise control group, the inability to account for the influence of variables outside a cultural institution’s control, and the self-reporting nature of the data collected from audiences are all serious methodological concerns for any formalized study. Concerns about how to collect accurate visitor data are part of the reason why attendance metrics became the default data used by cultural institutions for so long; it was
the cleanest data available. Studies on the impact of cultural institutions simply do not look like traditional academic research, which is why so many institutions have not been able to capture their impact beyond the size of their audience. This study attempts to address this issue to some extent; applying higher education-inspired practices to evaluate programs is a way to add rigor to how these informal programs have their impacts assessed.

This hesitancy on the part of cultural institutions to be more formal about how informal education programs are evaluated has left a wide knowledge gap for the field that this capstone can address. This question of impact is an ideal setting for action research, where the expertise is on the side of the practitioner; with a direct link between what an institution like The Morton Arboretum values, and what it knows (McNiff, 2013, p. 73). This capstone will be another example study, one done with the intent of demonstrating to the broader audience of cultural institutions how existing practices from higher education can help them do this work on their own. It will also be done at an institution considered a leader in the field, with existing communication channels to other institutions and access to a presentation stage at a national as well as global level. These advantages will give the project a real opportunity to play an educational and instructional role with a broad audience of cultural institutions.
Chapter 2: Literature Review

Education has the power to transform learners, whether set in a context of the formalized classroom learning of higher education or the more informal and experiential learning found at cultural institutions like zoos, aquariums, and public gardens. Just as higher education has found itself needing to capture and quantify the benefits of completing a degree, cultural institutions find themselves facing increased pressure to gather evidence demonstrating their ability to positively impact the public. Federal and private funding bodies have also begun to place more emphasis on programs that have demonstrative impact with their audience, “asking cultural institutions to provide convincing evidence that the goals and outcomes” (Adams, 2012, p. 26) of a program have been achieved. This pressure has led to a gradual shift away from historic attendance metrics to more comprehensive assessment measures, a change some institutions have implemented quicker than others. Specifically, public gardens and arboretums, even as science centers focused on botanical and ecological knowledge, find themselves lagging behind the evaluation efforts of zoo and aquarium institutions frequently cited in museum research. Just as in higher education, there have been barriers to why these practices have not shifted faster. The parallels between higher education and cultural institutions can help address this trend, by using higher education assessment practices applied to more informal learning to capture evidence of impact. Cultural institutions as places of experiential learning, adult audiences in free-choice learning environments, and the power of learning to promote conservation practices all suggest that the same assessment practices used in higher education can find purchase in more informal environments, and can help change how an entire field of institutions improves at capturing evidence of their power to impact.
This chapter reviews literature focused on formal and informal education, exploring connections between the two. The nature of education’s transformative powers give credence to the parallels between higher education and informal education programs, as does the idea of an “education ecology” consisting of experiences in and out of the classroom that help people learn and change. The challenges of capturing this change for cultural institutions is also reviewed, from the use of attendance as a measure of success to outcomes that again tie informal education to classroom learning like increasing knowledge retention and museums’ impact on attitudes toward STEM. These measures still fall short of capturing the impact aligned with mission that so many institutions seek, so the move from attitude change to taking action is also reviewed. For a nature-based institution like the Morton Arboretum, the relationship between people and nature is foundational to the institution’s mission and goals, and Wilson’s (1984) Biophilia Hypothesis is reviewed to provide a framework for involving museum guests with nature to encourage them to take action. It also lays the theoretical framework for this study, which closes out the chapter. Museum guests enter into their engagement with informal education at different stages of activation however, and a brief review of museum visitor studies from the North American perspective as well as an international one are also included. Some of those audiences are more likely to act than others, making it possible to separate and focus on who is a critical audience for a cultural institution to achieve their mission.

**Education as Transformative**

Higher education in the U.S. is intended to be a great equalizer; giving people of all backgrounds the opportunity to broaden their perspective on the world around them and learn new ideas. The same kind of change is present in Mezirow’s Transformative Learning Theory (Mezirow, 1978, 1995, 2000). For Mezirow, transformative learning is the “process by which we
transform our frames of reference to make them more inclusive, ..., capable of change and reflective so that they may generate beliefs and options that will prove more true or justified to guide action” (Mezirow, 2000, p 6-7). Mezirow’s theory identified ten steps of perspective transformation from which someone changed how they interpret their surroundings:

1. A disorienting dilemma.
2. A self-examination with feelings of guilt or possibly shame.
3. A critical assessment of epistemic, sociocultural, or psychic assumptions.
4. Recognition that one’s discontent and the process of transformation are shared; others have negotiated a similar change.
5. Exploration of options for new roles, relationships, and actions.
6. Planning a course of action.
7. Acquisition of knowledge and skills for implementing one’s plan.
10. A reintegration into one’s life on the basis of conditions dictated by one’s perspective.

The power of education to transform are found in the work of Boyd and Freire as well. Theories from all three researchers attempt to scaffold how learning changes an individual’s perspective on the world around them over time, with key differences. Boyd focused more on the internal journey of the individual, discovering new talents over a lifelong process of deepening one’s own understanding of self (Boyd, 1991). Freire’s work teaching people with limited literacy was thought to be such a threat to people in power he was exiled from Brazil in 1959 (Bentley, n.d.). This lead to Freire’s theory of education as emancipation; the more educated the individual is, the greater their power to transform their surroundings. As an outcome the idea of
education giving someone the power to change their surroundings sounds tailor-made for common general education outcomes from higher education programs. Such an outcome is also precisely the type of transformation cultural institutions are striving for in their education programming.

Whether a personal change like Mezirow, an internal journey like Boyd, or a lever for societal change like Freire, the goals of education programming at cultural institutions mirror this process of catalyzing change. Exhibits and collections are curated to propel people to different actions, “enacting social change and alter(ing) audience outlooks” (Cohen & Heinecke, 2018). It makes sense for institutions to be intentional about how their exhibits are curated but there are education theories that posit audiences can be positively impacted even without the direct intention of the institution. Dewey (1938) suggested an individual’s learning is connected to their everyday experiences, and knowledge develops through interaction with their environment. Cultural institutions like the Morton Arboretum, although created to address a specific mission and encourage audiences to take action toward that mission, all exist outside of formal classroom learning as a part of someone’s everyday experiences; thus still having the potential to impact the audience through informal educational engagement. Formal or informal, education has the power to be transformative as discussed next.

**Formal versus Informal Education**

Exploring the power of education to be transformative does not limit that potential to formal classrooms; indeed, there is an argument to be made that traditional classroom learning is rarely capable of providing the “disorienting dilemma” that triggers such change (Mezirow, 1995, p. 50). Instead, it is the informal education that happens outside the classroom on sports
fields, at home, or in museums and cultural institutions that can result in transformation over time. Russell, Knutson, and Crowley called it an “Education Ecology” (2013), an all-encompassing relationship with the environment where informal learning at cultural institutions becomes an integral piece of the individual’s learning support system. Attending an exhibit or program at a museum might not be compulsory in the same manner formal education is for most of the public, but the free-choice learning someone engages with can supplement their formal education. Those informal education experiences have the power to make classroom content more engaging. Ye et al. (1998) found most American students might not be excited about required science coursework, but this can be counteracted by a cultural institutions’ ability to connect science to students’ real-world experiences in settings not accessible in a typical classroom setting, resulting in an increase in STEM motivation (Holmes, 2011). A cultural institution’s informal learning has the ability to make content from the classroom come to life in every day settings.

The label “cultural institution” can be used to define any type of informal education settings with interactive exhibits and engagements encouraging exploration. Zoos, aquariums, gardens and arboreta, exploratoriums, science and art museums, museums focusing on natural history, aerospace, or any other topics, all fall under this definition. Over time these institutions have gradually increased their emphasis on education functions to produce exhibits and programs for audiences of all ages designed to deliver a transformative educational experience (Tran, 2007; Stocklmayer et al., 2010). Accordingly, studies on museum programs have also grown since the 1960s, offering insight into the ever-growing definitions and classifications of what informal education experiences these institutions engage the public through (Filippoupoliti & Koliopoulos, 2014). This timeline presents another parallel between higher education and
informal learning at cultural institutions, as the same period of the 1960’s began to see rising civil unrest reflected in more debate on the value of a collegiate degree (Garfield & Corcoran, 1986). In both cases, practitioners were realizing the learning experiences provided in their setting, formal or informal, needed to be assessed differently, a need that continues to this day.

Relevant to the context of this study is the frequent presence of informal cultural institutions on higher education campuses. Higher education has long found value in the presence of museums and even gardens or arboreta as informal contextual settings for the formalized learning found in degree programs. As far back as the 18th century, institutions like Harvard, Dartmouth, and Bowdoin College included chartered museums based on Oxford’s Ashmolean museum (Rorschach, 2004). Whether intended as a teaching resource or a way to better engage the community and attract new donors, on-campus cultural institutions drive home the close relationship between formalized higher education and informal non-classroom learning. It may be a given that students in specific academic majors may be more inclined to visit these informal institutions (Sherburn & Devlin, 2004), but the frequent presence of these settings in higher education is another point that suggests the same assessment practices used in formal degree programs can gather evidence of impact in a more informal setting as well.

Having a dedicated museum or garden on-campus certainly makes it easier to supplement formal education in an informal learning environment, but a college or university does not have to have its own chartered cultural institution to experience the benefits of higher education partnering with museums. College/university and museum partnerships are frequently “two-way relationships that embrace the values of reciprocity and engagements and create opportunity for meaningful multi-directional knowledge flow that informs both partners” (Silverman & Bartley, 2013). These partnerships can: expand the capacity of the institutions and individuals involved,
develop diverse and meaningful program assessments, and contribute to a community’s educational ecology (Clarke-Vivier & Bard, 2016). The idea of formal and informal education opportunities melding into one holistic educational ecology may initially focus on the individuals in that ecology, but the institutions that contribute to that ecology also benefit, an idea foundational to this research project.

Clearly, the distinctions that separate formal and informal education do not necessarily put the two at odds with each other. It is more likely that one supplements the other, with informal learning settings like cultural institutions providing students with the motivation and opportunities to more fully explore topics they are passionate about (Bartels, 2001). These are positives associations to build, especially since according to a 2009 National Research Council (NRC) study, elementary and middle school students spend more than five times as many waking hours outside a classroom versus in, giving them significantly more time for informal learning experiences. The same NRC study also points out that nearly two thirds of public middle and high school students visited a science museum during the school year, and almost half visited during one outside of the school year. Informal education programs have to supplement the learning of formal education, simply because there are so many more opportunities for them to engage their audiences. The fact that cultural institutions can supplement formalized classroom learning does not excuse museums and gardens from needing to better capture the positive impact those audience engagements have though, both in learning outcomes and support of institutional mission. More critical thinking on aligning program success metrics with broader institutional mission is still needed, as demonstrated by the exploration of how simple attendance metrics fall well short of capturing impact in the following section.
Capturing Impact at Cultural Institutions

Attendance as a Measure

Cultural institutions have historically relied on simple attendance metrics as a measure of success because that was the most straightforward number to capture (Adams, 2012). The number of annual visitors an institution can count became a substitute for “impact,” or the ability to change a visitor’s perspective, because it was the easier number to track. Digging deeper, there is also a disconnect between the impact outcomes institutions intend to have, like enacting social change or changing the audience’s perspective on specific issues as mentioned above, and what audience research has typically told those institutions their audience is looking for. There has been an underlying assumption that visitors to science-focused institutions are there with a primary purpose to learn the concepts of said science (Allen, 2004; Atkins, Velez, Goudy, & Dunbar, 2009; Falk & Storksdieck, 2005). In addition to a gap between attendance metrics and success on strategic outcomes, there is also a gap between known audience need and the institution’s desired outcomes. This is not new information; for decades museums have believed that many of the “reasons given for visiting the institution were unrelated to the institution’s educational goals” (Linn, 1983). This belief is supported by research cited in the section on audience needs and motivations later in this chapter. This gap is worthy of study, however, because it suggests that if cultural institutions intend to use more measures than attendance to capture program success aligned with mission, what the audiences desire from those programs also has to be accounted for as well as the institution’s own key performance indicators. Cultural institutions also have to continue exploring the motivations their audiences have for visiting, as reviewed in the section on museum audience studies later in this chapter.
Much like in higher education, “today, both public and nonprofit organizations are being asked to articulate, justify, and defend what they are doing…beyond consuming valuable resources” (Jones, 2014 p. 1). The need is clear for institutions to shift from pure attendance metrics to capturing the positive impact zoos, aquariums, and gardens are having when it comes to their missions and engaging the public. As early as 1995, United Way of America began putting more emphasis on outcomes of programs in reporting guidelines for organizations receiving funding (Cutler, 2009). Funding agencies like the National Science Foundation (National Science Foundation, n.d.) and the Institute of Museum and Library Sciences (Institute of Museum and Library Sciences, n.d.) have also placed more emphasis on institutions capturing evidence of broader impact in their grant process. Cultural institutions still relying solely on attendance metrics as measures of success have found themselves struggling to justify continued external funding.

**Knowledge Retention**

Apart from attendance metrics, the ability of informal education to positively impact retention of knowledge being tested in a formal setting is perhaps the most common measure of cultural institution impact. The benefit of increased content retention is frequently cited as a positive result for experiential education experiences in higher education (Farmer, Knapp, & Benton, 2007; Baker & Robinson, 2016), and the same can be said for field trip experiences and other engagements at cultural institutions.

What is more, the benefits these experiences can have for students may be amplified for underserved groups. In a 6-year study using student-level data the positive effect of museum field trip experiences on standardized testing was found to be largest for Hispanic students and
those who had qualified for free or reduced-price lunch (Whitesell, 2016). One interpretation of such findings is that field trips to cultural institutions can help close achievement gaps between students by providing underserved groups with the types of educational outside the classroom experiences that their less at-risk counterparts receive (National Education Association, 2008).

If audiences are in fact primarily visiting for the purpose of learning concepts, testing retention of those concepts is a fair question. However, if the institution’s mission is based in part on changing the audience’s ideas on a topic related to that science content, simply testing knowledge retention still falls somewhat short of capturing the institution’s intended outcomes. The logical leap from engaging with a cultural institution and retaining or expressing interest in science content depends upon a missing link of that engagement changing the participant’s interest toward said content. “The main route from informal science participation…to increased cognitive learning is assumed (emphasis added) to travel through a path of excitement, interest, and motivation” (Suter, 2014), but that assumption makes capturing an institution’s ability to spark that kind of interest essential. Attendance and knowledge retention may be the beginnings of that impact but do not tell the entire story.

**Attitude Change**

Much like attendance, knowledge retention is frequently used as a dependent variable to be tested in studies on the impact of cultural institutions due to the relative ease of capturing future classroom test scores versus changes in a participant’s attitude or perspective on content. Capturing an institution’s ability to change an audience member’s perspective on issues related to mission is more challenging, but it is also a better reflection of the goals most cultural institutions are trying to accomplish despite not being commonly reflected in the literature. This
is slowly starting to change though. Sachatello-Sawyer et al. (2002) suggested “the extent to which museum programs are successful can indeed be measured by their ability to affect, inform, empower and change people and, in doing so, help them improve themselves” (p. 19). The NRC (2009) suggested a similar idea, pointing out that participants of informal learning experiences “may develop awareness, interest, motivation, social competencies, and practices. They may develop incremental knowledge, habits of mind, and identities that set them on a trajectory to learn more.” The challenge for these institutions is finding the proper methodology to capture that change, something to which higher education practices have become particularly attuned in their application to achievement of degree programming outcomes. Museums and other cultural institutions could benefit from the application of those higher education practices to the informal education setting.

“Museum learning researchers, museum professionals, and the public alike historically asked the wrong questions” (Falk & Dierking, 2000) in their search for how to evaluate programs and demonstrate impact. Nearly 20 years later, for the public garden spectrum of the museum community that is still very much the case. As much pride as can be taken in the truly impressive annual attendance statistics of these institutions, attendance numbers alone cannot capture the positive impact these institutions are having with those audiences. Furthermore, the leadership of these institutions know this, hence reports like the BCGI’s 2018 report calling for its gardens to improve at capturing the economic, ecological, and even societal impacts of their programs (Smith & Harvey-Brown, 2018). What has to be captured is the cultural institution’s ability to change audience perspective and convince people to take action.
From Attitude to Taking Action

In addition to the audience’s capacity for self-improvement as Sachatello-Sawyer et al. mention, cultural institutions should also look to emerging social sciences for examples of how learning experiences can change people’s perspective and propel them to take action. Conservation psychology may be a relatively new field of study, but it has the “dual aim of understanding why people behave in ways that help or hurt the natural environment and promoting behavior that protects it” (Clayton & Brook, 2005). Ecopsychology studies the relationship between humans and the natural world through ecological and psychological lenses to develop and understand ways of expanding individual connections to the natural world, helping people develop sustainable lifestyles and conserving their surroundings (Gifford, 2007). These fields have emerged as scientists make the case humanity has shifted to the “Anthropocene” epoch, the next geological epoch defined by humanity’s impact on the Earth (Carrington, 2016). Humanity’s measurable negative impact on our environment make conservation-focused missions so topical and important today; it also makes it critical that we improve our understanding of why people take action to protect the environment, as well as why they do not. Taking a psychological perspective to these questions makes sense. Documenting what triggers someone to take action aligned with an institutional outcome will help those institutions design programming capable of moving audiences to those trigger points, and result in larger impacts.

Wilson’s (1984) Biophilia Hypothesis proposes the idea that humanity as a whole is genetically predisposed to enjoy and benefit from the process of engaging with nature because of all the benefits nature has provided humanity with over millennia of development. This innate connection to the natural world becomes the “basis for a human ethic of care and conservation of
nature” (Kellert and Wilson, 1993). The biophilia hypothesis forms much of the basis of the studies conservation psychologists and ecopsychologists conduct into someone’s motivation to take up conservation behaviors. Building on the idea of biophilia, additional literature explores the idea that someone’s motivations are also the result of their own values as determined by a lifetime of meaning-making through social interactions. Stern et. al’s (1999) Value-Belief-Norm (VBN) model suggests conservation behaviors are more likely to occur when those behaviors have been normalized through social interactions over time, allowing those behaviors to build up value to the individual.

The acceptance that each individual has their own unique trigger point that would lead to them taking action also highlights the issue that individuals engage with cultural institutions from their unique perspectives that is a combination of their environment and experiences leading up to that point. Cultural institutions encouraging visitors to take action that aligns with part of their mission has to be stacked on top of a unique set of circumstances each time, which again makes measuring a program’s impact especially challenging. Recent museum-related studies on impact recognize that the desired outcomes arise from a “complex set of situational factors; perceived control, attitudes, a sense of responsibility, skills, and an intention to act” (Ardoin, Schuh, & Khalil, 2016). No visitor arrives at a cultural institution as a blank slate; “they arrive with prior knowledge, experience, interest, and motivations for their visit” (Falk et al., 2007). Some visitors are essentially primed to act already, which although it leads to the intended outcome goals of an institution, does make it challenging for the institutions to say what impact their programs have in getting visitors to that point.

In 2019, the Center for Behavior and the Environment published a report arguing that although increased awareness is often a key phase in gaining public acceptance of policy changes
that support conservation action, “information alone is a weak route to behavior change” (Green & Williamson, 2019). Where the behaviors institutions intend to change will happen can be an additional barrier, as well as the audience member’s existing internal motivations and drivers. Education can still lead to a change in perspective that is necessary to shape behavior but that behavior is ultimately the truest expression of a science institution’s mission, especially one concerned with conservation action. All of these factors and influences illustrate just how complicated it can become to assess a cultural institution’s ability to lead to change.

Despite the challenges of separating out someone’s existing likelihood of taking action aligned with institutional outcomes from the impact of their engagement with a specific program, the question of impact still has special relevance to public garden institutions thanks to the topical nature of conservation outcomes. Children as young as preschool have been shown to be capable of not just acquiring conservation practices through nature-based learning experiences, but also understanding how those practices relate to the world around them (Field, 1981). This type of formative experience is at the heart of any institution’s mission that revolves around broadening conservation efforts and protecting the environment. What is more, recent studies suggest that children learning these behaviors can also influence parent perspective on their importance, leading to behavior change in the adults as well (Lawson et al., 2019).

Impact can also be assessed at a broader level, exploring the ability of an institution to impact a community or region in addition to individual visitors. In fact, assessing impact at this level is becoming more and more of the focus for funders; the Institute for Museum and Library Science’s “Museums for America” program lists “serving communities” as a critical goal for grantees to have as an intended outcome while applying (Institute for Museum and Library Sciences, 2011). There is a growing body of evidence that cultural institutions do have
educational impact on their surrounding community (Falk & Needham, 2011; NRC, 2009), but in most cases that evidence again reflects the assessment of knowledge retained or learned by the audience, and not changes in attitudes or behavior.

**Cultural Institution Audiences**

Impact may be assessed at a community level as well as individual, but narrowing a focus back down to the individual level to explore some of the motivation for people visiting those institutions can be enlightening. There are approximately 850 million visits annually to cultural institutions in the U.S., more than the yearly attendance at all NFL, NBA, MLB, and NHL games combined (IMLS, 2008). It is difficult to imagine the scope of potential impact these institutions are having with such a visitor count, but that also makes it more important than ever to properly assess what impacts these institutions are having with their audiences. As the field wrestles with that question, it should also be asked “who is visiting these museums?”

**Falk’s Visitor Categories**

Related to the 2007 AZA study on whether zoos and aquariums were able to change successfully visitor perception on conservation concepts, Falk also proposed clustering the relationship between cultural institutions and their audiences, arriving at what he saw as common categories between audience types (Falk, 2006). For Falk, someone deciding to visit a cultural institution boils down to that person or group having an identity-based need they see the institution as able to address. That motivation allows Falk to categorize museum visitors as: explorers, experience seekers, spiritual pilgrims, professionals or hobbyists, and facilitators. Each type of visitor approaches their engagement with an institution seeking a specific type of experience and seeks out specific outcomes from that engagement.
• Explorers – driven by curiosity, seeking to learn more about whatever they might encounter at the institution and open to newness.

• Experience seekers – primarily deriving satisfaction from the experience of visiting a culturally significant or important site and having the story to tell.

• Spiritual pilgrims – essentially “recharging;” seeking a contemplative or restorative experience, especially relevant to outdoor or nature-based institutions.

• Professionals/hobbyists – feel a close tie to an institution due to high relevance to their profession, hobby, or personal passion.

• Facilitators – primarily focused on enabling the visiting experience for others in their social circle.

Obviously, categories of museum visitors capture a sliver of the public already at least somewhat affinitive toward an institution, since they are the ones already visiting regardless of what their motivation to visit or engage happens to be. Non-visitors will be considered later in this review. For those that do visit, it is critical to consider why they become visitors in the first place. Institutions must be able to align their own intended outcomes with those of their audience to achieve maximum impact, but Falk’s categories are not the only categorization framework that institutions can use to investigate their audience.

**International Museum Visitor Studies**

It is worth noting that thus far the cited studies take place in North American institutions as a unique context for who is visiting museums and why. Examining visitor studies from Europe illustrate similar trends for museum visitors despite a setting that has its own unique set of circumstances. Specifically, the preponderance of publicly funded institutions and free admission
policies mean these studies frequently occur without the barrier of cost stopping members of the public from becoming museum guests as is common in the U.S.. In Europe of the early 2000’s the continued public funding of museums was subject to fierce political debate. As such, museums in countries like the U.K., France, Italy, Germany, and others found themselves unable to continue offering the free entry visitors had been enjoying for decades. The following two studies examine the impact these changes had on the visitor-ship of two institutions and explore other motivations for museum visitors. These studies again illustrate the importance of cultural institutions improving how they capture the positive impact their audience engagements have with individuals, and who those audiences are made up of. These are critical matters for mission-based cultural institutions with the intent to have positive impact on their surrounding communities. As these studies demonstrate, the ability to reach that community as an audience can be greatly impacted by external factors.

   Lampi and Orth (2009) investigated audience motivation to visit European cultural institutions in relation to entrance fees and the impact changing them can have. They examined visitor demographics before and after the loss of free admission and listed six audiences least likely to pay to visit museums: men, young adults, immigrants, residents of local suburbs, people with low levels of education completed, and people in the lowest income brackets (p, 100). Conducting interviews when most museums were losing their free admission, Lampi and Orth were able to ask participants in focused interviews if their intentions to visit museums would change after entrance fees were put in place. Although most participants did not report an intention to change their visiting habits, demographic data over the same time did in fact capture changes in visitor make-up, with Lampi and Orth able to categorize the visitor groups mentioned above.
Powell and Kokkranikal (2015) investigated visitor intent much more broadly, simply grouping visitor motivation in two categories: intrinsic or extrinsic. Their study explored the motivations of visitors to the Imperial War Museum in London, and highlighted two simple points: first, that those motives can have internal and external factors. Second, they noted that the line between education and leisure activity is often blurred. That motivation to visit a cultural institution can come from internal need or external influence is not a great surprise, even with Powell and Kokkranikal’s conclusion that external motivators are more powerful than a potential visitor’s internal need to visit. More surprising is the potential visitor’s separation of education and leisure activities as reasons to visit or not visit. This is an interesting distinction to make, as it can serve as a reminder of how important it is for cultural institutions to take the thinking of prospective visitors into account. Museums often do not see much of a difference between educational activities and engaging ones; to most staff at a science center there is little difference between learning and leisure. The audience does not see things the same way however, and it is important for cultural institutions to remember this. The gap between institution and audience perspective is one area where cultural institutions and higher education have less overlap; there is little doubt about the motivation a student has and their primary outcome of completing a degree. Cultural institutions have to engage visitors in informal education programs in much less obvious ways.

**Non-visitors**

Powell and Kokkranikal’s discussion on education versus leisure time illustrates a curious and seemingly arbitrary dichotomy on how people both likely and unlikely to visit a museum define their priorities for how they spend their time. Considering the statistics on annual visitation at these institutions versus the total attendance of the four major American sport
It is amazing there are those who do not visit museums at all. Even more surprising, examining visitors versus non-visitors suggests the reasons someone gives for not visiting a museum seems to reveal significant overlap with reasons others give for visiting. The definition of a “leisure experience” is described as “something worthwhile, an opportunity to learn, and have a challenge of new experiences” (Hood, 1983), all criteria that could easily be described as reasons to visit cultural institutions as opposed to not. Non-visitors may not be as impactful as visitors to cultural institutions in terms of moving people to take action toward an institutional mission, but the fact that the reasons someone might give for not visiting a museum are often the same as someone else’s reasons for visiting the same museum suggest that there may not be far to go to turn those non-visitors to visitors.

“Emerging Adulthood” as a Critical Audience

Comparing motivations of visitors versus non-visitors suggests the line between the two is thinner than expected, and the language used to describe each group’s motivations frequently overlap. As interesting as it may be to explore why someone does or does not visit science centers and cultural institutions, there is one final parallel between higher education and cultural institutions that can be presented in relation to visitors; the “emerging adulthood” age range as one of critical importance. A relatively recent development, emerging adulthood theory suggests that the industrial progress of the late-20th century has changed the nature of the transition from adolescence to adulthood in some societies, leading to a prolonged delay before individuals have reached true adulthood (Arnett, 2000). The idea of emerging adulthood makes room between the dependence of childhood relationships and adult peer-to-peer relationships that require fully formed self-authorship, giving those in this stage a chance for more identity work (Rounds, 2006). Ages for this stage range from the late-teens through the late-twenties, common ages for
traditional college students but also a time where identities can be shaped and influenced as someone broadens their exposure to the wider world. Often called “the age of possibility,” cultural institutions engaging with emerging adults could create or strengthen lifelong connections to science content. Such connections could possibly even influencing how these adults will one day educate their own children (Gutwill, 2018). That makes engaging with college students an issue of critical importance for most cultural institutions.

Current “emerging adult” age groups fall into the millennial generation, an important one for museums to engage with as they seek to maintain their cultural relevance. Born between 1981 and 1996, this generation is 75 million strong and now makes up the largest portion of the U.S. population (Dimock, 2018). Like any other generation, millennials have their own set of beliefs, perspectives, and expectations regarding the world around them. As some industries are starting to find based on the preponderance of “millennials are killing (insert industry here)” articles and think pieces, millennials are more than capable of shaping practices to their expectations. Any genre of museums or cultural institutions able to authentically engage this audience will be setting the path toward sustaining mission support for the foreseeable future. These institutions would do well to do so with program evaluation practices in place that can fully capture the impact of these engagements, a point this study is intended to address.

Nature-based Museums and Outcomes

That public gardens are a sub-set of science-focused cultural institutions that have fallen behind on their evaluation of impact measures is surprising in part because people are hard-wired to crave connection to nature and benefit significantly from it. Direct contact with nature has positive benefits for several types of audiences: increased cognitive development and physical
health in early childhood (Bell, Wilson, & Liu, 2008); improved mental health and lower stress in adults (Kardan et al., 2015); and even lower crime rates and higher property values where the tree canopy is healthiest (Lohr et al., 2004). These are all findings in peer-reviewed environmental studies; garden institutions need to be capturing these benefits in their program outcomes as well if they exist, and developing continuous improvement cycles to incorporate them if they are not already there.

The mission of The Morton Arboretum to plant and protect trees maintains its relevance year after year due to the myriad of benefits trees, shrubs, plants, and other ingredients to healthy, green spaces bring to their surroundings (The Morton Arboretum, n.d.-a). Those same benefits are under threat with trees facing loss of habitat due to urban expansion, pest population growth, and climate change making any institution’s ability to change an audience’s behavior in favor of mission alignment more critical than ever. With the right higher education assessment practices brought to bear, public gardens and other nature-based institutions will be able to demonstrate a measurable link between the science behind capturing those benefits and demonstrating the positive impact their programs are delivering.

The Morton Arboretum’s goal to change how audiences think, feel, and act toward nature is approximated in existing instrumentation that explores an individual’s relationship with nature. Schultz (2000) assessed how individuals empathize with nature, which certainly takes a level of connection to nature Arboretum programs may be able to influence. Mayer and Frantz’ (2004) Connection to Nature Scale (CNS) is a measure of affect toward nature as a community and whether the individual completing the measure feels they are a part of that community. Nisbet, Zelenski, and Murphy’s (2009) Nature Relatedness (NR) encompasses multiple facets of an individual’s connection to nature and has been used to build similar instrumentation for
Higher Ed Practices Informal Ed Programming

Arboretum audience research in the past. The Nature Relatedness scale examines an individual’s cognitive, affective, and physical relationships to nature; these different facets are important to include in this study due to the Arboretum’s multi-faceted mission. If the Arboretum aims not just to study trees and plants, but to convince others to as well by changing how they think, feel, and act toward nature an existing instrument that focuses on someone’s cognitive, affective, and physical relationship with nature is a great place to start. A modified version of the full Nature Relatedness instrument was implemented for this study, as described in the next chapter.

The theoretical framework connecting the Arboretum’s goals to the Nature Relatedness instrument is found in Wilson’s (1984) biophilia hypothesis. Wilson argued that because humans evolved in nature, people developed an innate yearning to connect with and learn about all life but especially trees and plants that supported humanity’s health and development over the millennia. These are the same benefits the Arboretum researches and includes in educational program content today; the idea that trees improve a neighborhood’s health (Lovasi et al., 2013), make people feel younger (Kardan et al., 2015), make residents feel safer (Kuo, Bacaicoa, & Sullivan, 1998), while also providing multiple positive impacts to physical health (Turner-Skoff & Cavender, 2019) all provide real-world illustrations of biophilia in action.

The benefits being in nature provide can be used to explain the effectiveness of outdoor learning programs (Farmer, Knapp, & Benton, 2007; Baker & Robinson, 2016) and immersive field trips (Whitesell, 2016) that were highlighted in this chapter. As social sciences have advanced, psychological theories have delved deeper into connections between human behavior and environmental sustainability, blossoming into offshoots of Psychology concerned with investigating what motivates people to take conservation action (Van Riper & Kyle, 2014). The research questions for this study, focusing on how length of engagement with an informal
education program as a dosage amount can impact self-reported feelings of connection to nature, springs directly from Wilson’s (1984) Biophilia Hypothesis and Stern et. al’s (1999) VBN model that ties behavior to personal norms that are learned from social interaction. Through this lens, even as individuals engage with museum programming at different levels of behavior activation as established by their previous experiences, engaging in said program can still further shape behavior by changing the participant’s social norms. If a Morton Arboretum program can connect positive environmental impact to behavior for participants, it should result in a strong self-reported connection to nature as captured by the Nature Relatedness instrument questions that also serves as a measure of that program’s capacity to have a positive mission-aligned impact. In Chapter 3 the mixed-methods design to capture such an impact is described.
Chapter 3: Methodology

This study sought to answer whether higher education assessment practices can be applied to informal education programming to capture the impact engaging with said program has with audience participants. Specifically, the Morton Arboretum’s Natural Areas Conservation Training (N-ACT) program underwent a mixed methods evaluation based on higher education practices consisting of a quantitative survey and qualitative focus groups of participants to capture whether or not the length of time spent in the program influences participants’ self-reported feelings of connectedness to nature. Participants were sorted into two categories; those with low engagement (two courses or fewer) versus those with high engagement (three courses or more). Demographic differences between participants were also used as conditional variables in an attempt to build profiles of the audience members most likely to be positively influenced by their engagement with informal education programs with the qualitative focus group discussions providing additional depth and insight into the thinking of participants. Furthermore, the process of conducting the study will serve as a way to examine what a case study documenting the use of higher education’s mixed method assessment practices can provide a cultural institution’s informal education programming evaluation efforts and what parts of that process can help other museums and gardens improve their own practices.

Research Question and Instrumentation Mapping

For mission-based cultural institutions, impact measures need to move beyond simple attendance and into capturing how their informal education programs are able to evoke changes in how participants think, feel, and most importantly, act toward that mission. For the Morton Arboretum, those mission-aligned actions entail catalyzing audience members to plant and
protect trees through the process of changing previously held beliefs on the importance and benefits of trees. The research question for this study, whether the length of engagement in the N-ACT program impacts how strongly participants feel connected to nature, can be broken down into sub-questions related to how participants think, feel, and act toward nature by virtue of the key performance indicators the Arboretum has developed for its informal education programs. The indicators of whether participants complete their engagement with a program and feel more affinitive toward trees and nature, have increased belief in their own self-efficacy to have an impact on the world around them, and whether or not they actually carry out the behavior of planting or protecting trees each serve as a sub-question giving more depth to the broader question and fully illustrating the connection participants feel and the various shapes it can take.

**Research question:** Does the length of engagement in N-ACT (2 courses or fewer versus 3 or more courses) impact participants’ feelings of connection to nature?

1. **Sub-question 1:** Does longer participation in the N-ACT program lead to an increase in reported feelings of affinity toward trees and nature.

2. **Sub-question 2:** Does longer participation in the N-ACT program lead to an increase in the belief that someone’s actions can positively impact their surroundings.

3. **Sub-question 3:** Does longer participation in the N-ACT program lead to an increase in reported conservation behaviors by the participant.

The explanatory convergent case study design selected for this study features a phased design with separate rounds of collecting quantitative and qualitative data which are then integrated into a series of richer findings than either data type would provide on its own. That design is explored in the following section. The existing survey instrument selected for the
quantitative Phase I of this study also captures a participant’s “cognitive, affective, and physical relationship with nature” (Nesbit, 2013); namely how people think, feel, and act toward natural environments. The multi-faceted nature of the instrument and its alignment to Morton Arboretum’s goals to shape participant behavior through programming engagement makes mapping individual questions on a modified Nature Relatedness scale to the sub-questions listed above straightforward (Table 3.1). The focus group discussion points seen in Appendix F can also be mapped to the sub-questions along alignment to key performance indicators (Table 3.2).

Table 3.1: Mapping Nature Relatedness questions to research sub-questions

<table>
<thead>
<tr>
<th>Survey item</th>
<th>SQ 1</th>
<th>SQ 2</th>
<th>SQ 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enjoy being outdoors regardless of weather</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Some species are just meant to die out</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Humans have a right to use natural resources</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Ideal vacation spot is remote wilderness</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I always think about how my actions affect the envir</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>I enjoy digging in the earth</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>My connection to nature is a part of my spirituality</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am very aware of envir issues</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>I notice wildlife wherever I am</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I don’t often go in nature</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Nothing I do will change problems in other places</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I am not separate from nature but a part of it</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>The thought of being deep in the woods is frightening</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>My feelings about nature do not affect how I live my life</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Animals, birds, and plants should have fewer rights than ppl</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Even in the city I notice nature around me</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
My relationship to nature is an important part of me | X |
Conservation is unnecessary b/c nature is strong | X | X |
Non-human species are indicators for humanity’s future | X |
I think a lot about the suffering of animals | X | X |
I feel very connected to all living things and the earth | X |
My NACT courses increased my understanding of ecosystem | X | X |
My NACT courses strengthened believe actions have impact | X | X |

Table 3.2: Mapping Focus Group Discussion points to sub-questions

<table>
<thead>
<tr>
<th>Discussion point</th>
<th>SQ 1</th>
<th>SQ 2</th>
<th>SQ 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>How did you hear about N-ACT?</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>What courses did you take?</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>What was the most useful thing you learned</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Where did you use it</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Did anyone take an online course</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>How far did you travel to take courses</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Where did you do your conservation work</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Are you still working there</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Do you ever talk to others about conservation</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>How engaged are you with social media</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Do you ever post online about conservation issues</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>What other nature topics are you curious about</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Where do you look for information on these topics</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Did NACT change your perspective on any issues</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>What could have made your experience better</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Is there anything else you’d like to say about your experience</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
As discussed in Chapter 2, this study design used an existing survey instrument, the Nature Relatedness scale, which explores an individual’s cognitive, affective, and physical relationship with nature. Additional items were created for the study, including demographic questions to use to categorize participants for the quantitative analysis of Phase I, and questions on the participants’ experience in the N-ACT program that align with the program’s intended audience, giving the Arboretum insight into the program’s effectiveness at reaching said outcomes. The outcome questions were written to use a Likert-scale identical to the questions original to the Nature Relatedness scale.

**Explanatory Convergent Case Study**

The common factors shared between formal and informal education make it clear that higher education assessment practices have utility in capturing the impact of cultural institution programming as well (Smithsonian Institute, 2004; Davies & Heath, 2013). It is also clear that the public garden and arboretum institutions within the field of cultural institutions have fallen behind other science-focused institutions like zoos and aquariums in terms of how they assess the impact they have with their audiences (Smith & Harvey-Brown, 2018). The parallels between formal and informal education and the need for public gardens to go through a process to better capture the impact of their audience engagements similar to higher education form the basis of this project. Using assessment practices modeled on higher education program-level assessments to capture the impact of a specific informal education program at The Morton Arboretum will serve to both increase the institution’s evaluation capacity but also model the process of increasing to other gardens and arboreta, an audience currently seeking for ways to capture impact. Examining an informal education program with a process modeled on higher education assessment practices will provide Morton Arboretum with valuable quantitative and qualitative
data on whether said program achieved its intended impact with its audience, while at the same time serving as a case study to other gardens and arboreta for how these practices could be implemented at their own institution.

Worthen, Sanders, and Fitzpatrick (1997) suggest for some practitioners a thoughtful integration of quantitative and qualitative measures is a preferable methodology for assessing real-life scenarios. For an institution like the Morton Arboretum, both quantitative and qualitative data need to be collected because neither method “is sufficient, by themselves, to capture the trends and details” (Ivankova, Creswell, & Stick, 2006) of the audience engagement and its context within the broader cultural institution. This project applied an explanatory convergent mixed-method design split into two phases to collect quantitative and qualitative data which were then integrated in a set of conclusions aligned with the learning outcomes the Arboretum looks to accomplish with its informal education programming. The same sample pool of participants was used for both phases, with program participants self-selecting into Phase II after Phase I. With no decision to be made based on survey data to select Phase II participants this design is convergent as opposed to sequential. A mixed-methods design of this fashion will allow each phase to collect data capable of addressing the research questions, but also build off each other into an integrated conclusion that is richer and more in-depth than its separate parts (Creswell & Plano Clark, 2011). The structure of the study as it relates to Phase I, Phase II, and their integration is summarized in Table 3.3 below.
Table 3.3: Explanatory Convergent Research Design

<table>
<thead>
<tr>
<th>Phase</th>
<th>Action</th>
<th>Procedures</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Quantitative survey</td>
<td>- Informed consent collection&lt;br&gt;- Modified “Nature Relatedness” scale delivery with demographic data additions&lt;br&gt;- Soliciting focus group participants</td>
<td>- MANOVA on length in program’s influence on self-reported connection to nature with demographic covariates</td>
</tr>
<tr>
<td>II</td>
<td>Qualitative participant focus groups</td>
<td>- Additional consent collection&lt;br&gt;- Group discussions on influence N-ACT coursework has had on time spent outside, actions taken via developed discussion protocols</td>
<td>- Testimonial detail from participants to shed light on quantitative responses&lt;br&gt;- Emergent themes from discussion shed light on quantitative findings</td>
</tr>
<tr>
<td>Integration</td>
<td>Integration of quantitative and qualitative results</td>
<td>- Interpret statistical and testimonial results</td>
<td>- Improved evaluation procedures for TMA Education programming&lt;br&gt;- Profile of audience members most likely to be positively influenced by program engagement</td>
</tr>
</tbody>
</table>
Phase I surveyed participants for quantitative data on different points aligned with the Arboretum’s mission to encourage people to plant and protect trees. Phase II consisted of conducting focus group discussions at the Arboretum to collect qualitative data capable of creating further insight into survey responses. This approach will serve as a comprehensive summative evaluation of the N-ACT program similar to a program-level evaluation at a higher education institution, capturing the mission-aligned impact the informal education program had with participants. The purpose of the explanatory convergent mixed method design is to “use qualitative methods to explain the findings from the study’s initial quantitative results” (Hardin & Wright, 2017). Integrating both types of data into a portrait of the N-ACT program will “allow for a more robust analysis, taking advantage of the strengths of each” (Creswell, 2005). At the same time, the phased approach will also serve as a case study demonstrating a process for capturing informal education programmatic impacts that can be modeled to other cultural institutions searching for the same thing.

Phase I: Quantitative Study

Participants

There was a potential pool of nearly 1200 N-ACT participants to contact to participate in Phase I’s quantitative survey (The Morton Arboretum dashboard, 2019). There is no upper age limit on participating in the program, with an age range starting at 23 years old all the way through the mid-70’s. N-ACT participation by gender is a fairly even split, with 43% of the participants male, 57% female (The Morton Arboretum internal metrics, 2019). The Arboretum has used N-ACT to build partnerships with other conservation-focused organizations in the region, including organizations in southern Wisconsin, western Indiana, and across the
Chicagoland region. Due to those partnerships, 412 of 2018’s enrollments were in courses completed total online, and 122 of those participants were able to complete coursework at no cost thanks to grant-funded scholarships (The Morton Arboretum, n.d.). The program’s regional reach likely limited the availability of some to participate in focus groups but an electronic distribution of the survey made it possible to at least contact all possible participants. Course evaluations for the online classes have a response rate that averages 8.6%, and given the audience profile that makes up N-ACT’s enrollments it can be argued this is a fair expectation to set for overall response rates to both the survey and the focus group interviews conducted for this project (The Morton Arboretum dashboard, 2019).

Materials

The survey used for this project will assess how N-ACT participants feel in relation to several concepts central to the mission of Morton Arboretum. The Arboretum’s key performance indicators for education programs like N-ACT include:

- Increasing participant’s feelings on the importance of being in nature.
- Increasing participant’s awareness of the benefits of trees.
- Increasing participant’s feelings on the power of an individual’s actions to impact their surroundings.

Fortunately, there are existing scales designed to assess someone’s feelings of connectedness to nature that can be used for this project. One of which, the “Nature Relatedness measure” has formed the foundation of other program evaluation efforts conducted by the Arboretum; the survey instrument is presented in Appendix A. The Nature Relatedness measure is a 21-item survey on how much individuals identify with nature, how concerned they are with
how people are impacting the environment, and how comfortable they feel in nature and their desire to be involved with nature (Nisbet, Zelenski, & Murphy, 2009). The three-pronged approach to assessing connection to nature allows this one measure to ask a participant questions relevant to multiple mission-aligned impacts as mentioned above, making it an ideal instrument to survey N-ACT participants.

The Nature Relatedness scale assesses an individual’s “cognitive, affective, and physical relationship with nature” (Nisbet, 2013). It has been shown to have high reliability, alpha = .87, and test-retest stability after six months, alpha = .88 (Nisbet, Zelenski, & Murphy, 2009), meaning self-reported responses maintain a high level of reliability over time. The Nature Relatedness measure has been found reliable even after being translated to other languages (Cakir, Karaarslan, Sahin, & Ertepinar, 2015) and is an ideal instrument to address the concerns nature-based museums have about how to assess the impact of their programs.

The presence of an existing measure is helpful for a study intended to illustrate to other cultural institutions that improving evaluation efforts does not necessary mean creating a unique survey instrument from scratch. However, the existing Nature Relatedness measure does not include demographic data also important to the evaluation of the N-ACT program like gender, age, zip code/residence data, or questions on the participant’s other prior engagements with the institution. This data is critical to collect in that it helps paint a portrait of the audiences the program engages with; thus, there will be additional questions on the participants’ demographic information collected in this study. There will also be additional questions on the participants’ perception of how the N-ACT program met the needs they enrolled hoping to address intended to better evaluation the capacity of N-ACT to meet audience need. These questions may take away from the high validity and reliability scores of the existing Nature Relatedness measure, but are
essential to the practical evaluation of a museum program. Modifying the pre-existing Nature Relatedness scale is necessary to build an instrument capable of collecting more general information for the evaluation of the N-ACT program. The Nature Relatedness scale is intended as a measure of someone’s general feelings of connectedness to nature (Nisbet, Zelenski, & Murphy, 2009), a goal which overlaps nicely with the key performance indicators established by the Arboretum for its programs, but still needs to be tailored to the needs of this study and the institution that hosts it, which includes the addition of demographic questions not originally appearing on the scale. The survey instrument consisting of the Nature Relatedness measure and the additional questions are included in Appendix B.

Validity and Reliability

The Nature Relatedness scale has been translated into non-English versions without losing the high validity and reliability of the initial instrument’s ability to capture an individual’s emotional and cognitive connection to nature (Cakir et al., 2015). A short-form version of the scale has also been developed, creating the “NR-6,” a six-question instrument measuring someone’s feelings of connection to nature that is highly correlated ($r = 0.90$, $p<0.00$) with the original 21-item Nature Relatedness instrument (Nisbet & Zelenski, 2013). It is clear the construct of nature relatedness is sturdy enough to survive modifications to the original instrument, but examining whether the modifications planned for this study through the inclusion of participant demographic data is the exception or not is worth taking note of.

Face validity. The use of an existing instrument to address the unique needs of a cultural institution’s efforts to capture impact of informal programming understandably calls the validity of the study into question. However, parallels in the language used to describe both the
Arboretum’s key performance issues for programs and the measures on the Nature Relatedness scale (Table 3.4) suggest that the existing instrument does in fact measure what the Arboretum intends to measure.

Table 3.4: Common language between Arboretum KPI’s and the Nature Relatedness Scale

<table>
<thead>
<tr>
<th>Arboretum KPI</th>
<th>Nature Relatedness instrument question</th>
</tr>
</thead>
<tbody>
<tr>
<td>“increase feelings of connection to trees”</td>
<td>“My connection to nature and the environment.”</td>
</tr>
<tr>
<td>“Participants taking action on behalf of nature”</td>
<td>“I always think about how my actions affect the environment.”</td>
</tr>
<tr>
<td>“Increased feelings of the importance of conservation”</td>
<td>“Conservation is unnecessary because nature is strong” (Expected to be oppositely scored on the 1-5 Likert scale)</td>
</tr>
<tr>
<td>“Increased feelings of self-efficacy on the power of participant actions to impact their surroundings”</td>
<td>“Nothing I do will change problems in other places on the planet” (Expected to be oppositely scored on the 1-5 Likert scale)</td>
</tr>
</tbody>
</table>

**Content validity.** Since the modified version of the Nature Relatedness instrument used for this study and included in Appendix B includes all the instrument’s original questions, the modified study will still cover “a representative sample of the behavior domain to be measured;” (Anastasi & Urbina, 1997) for individuals’ affective, cognitive, and physical relationship with their natural surroundings.

**Procedure**

**Institutional Research Review**

The use of human subjects required this study receive review approval prior before proceeding. This is an important detail to note, as most programs hosted by science-focused
institutions concerned with populations of tree and plant species are often unfamiliar with the need to ensure research is not exposing participants to unnecessary harm (Smith & Harvey-Brown, 2018). The following section outlines the procedures of Phase I, as well as the materials developed for Institutional Review Board (IRB) submission. They include:

1. IRB submission project narrative for entire study (Appendix C).
2. Survey measure informed consent form (Appendix D).
3. Phase I assignment to conditions.
4. Survey duration.
5. Phase I debrief/dismissal (Appendix E).

**Informed consent**

The adult audience for the N-ACT program is presented with minimal risk in the task of voluntarily completing a digital survey. The electronic delivery of the survey was accompanied by a written summary of why participants are being contacted, the dual purpose of this project (both as capstone and professional evaluation to benefit the Arboretum), the outcomes intended to be evaluated, the voluntary nature of the survey, and a link to the survey itself. The survey instrument opened with an acknowledgement of a participant’s informed consent, completion of which will be required to advance to the survey questions. This was be collected by the researcher and is presented in Appendix D. Participants were also be provided with instructions on how to complete the digital survey, which was a matter of clicking through the questions and selecting a response to each. Finally, participants were also told of the option to attach their name and contact information if they were willing to participate in Phase II’s focus group discussions, although responses were still kept anonymous to ensure confidentiality.
Assignment to conditions

Conducting a summative evaluation of the N-ACT program was an opportunity to assess whether or not the program has achieved success on the key performance indicators implemented by the Arboretum as summarized above. The quantitative data gained from the survey conducted used participant demographics such as gender, age, and ethnicity to examine what participants’ intentions were when first enrolling in the program, and whether or not they report having achieved those goals. Because N-ACT can be taken as individual courses or a complete certificate, one additional independent variable categorizing participants was whether someone was enrolled in the entire certificate program or just a handful of courses. The regional nature of the program will also make it necessary to examine participant response according to home zip code, as well as distance to the Arboretum and whether or not someone took online courses vs in-person which may not tie into mission-aligned impact but is another data point for evaluating the program what is important to model as part of the case study. The differences in any of these conditional variables that could illustrate a significant difference in the ability of N-ACT to have mission-aligned impact can then be used to guide focus group discussions to gain more insight into where they came from, and will be supplemented by qualitative data as described in later sections of this chapter.

Duration

Completing the survey questionnaire was designed to be a minimal time commitment of less than 10 minutes. Once distributed, the online surveys remained open until recruiting for the Phase II focus groups had ended. This was due to the need of the study to serve dual purposes as both an academic project but also a practitioner-conducted real-time evaluation of the N-ACT
program. Despite the similarities to a higher education certificate program, the N-ACT program has rolling course offerings throughout the year and requires on-going evaluation efforts. However, the data collection for this project was limited to a participation timeframe that began with the delivery of the introductory email described in Appendix C. N-ACT participants that registered or engaged with the program for the first time after the introductory email was sent were not added to the survey or focus group participant pools.

Debriefing/Dismissal

Upon completion of the survey window, a second notice was sent to all eligible participants informing them of the survey tied to this study being closed, and reminding them of the opportunity to participate in the Phase II focus groups. However, as N-ACT participants were continuously invited to enroll in additional Arboretum programs, care was taken to clarify the purpose of debriefing/dismissing only from the current evaluation of N-ACT, not from future education programs or their accompanying evaluation. This notice is included in Appendix E.

Data Collection

The purpose of a phased mixed method approach is to combine quantitative analysis with qualitative richness, and comparing responses on the Nature Relatedness measure across demographic and enrollment-type conditions in a multi-variate analysis allows for the experimental aspects of that methodology (Creswell & Plano Clark, 2011). For N-ACT participants, the length of their program participation will serve as the independent variable and scores on the Nature Relatedness measures as dependents. Additional co-variates including participant age, gender, education level, and intent in joining the N-ACT program were used in MANOVA tests on the 23 survey items in order to reveal the impact engaging with a program
had on participant’s connectedness to nature. This data was then supplemented by the qualitative insights as described in the following section.

The Nature Relatedness scale asks respondents to report on their agreement with statements regarding their connection to nature on a 1 to 5 Likert scale, “1” being extreme disagreement, “3” being neutral, and “5” being high agreement. The MANOVA analyses were conducted using the R Project for Statistical Computing, a free software environment for statistical and graph analysis (R-project.org, n.d.). The instrument as modified also included a number of open-ended questions as well to better serve as a program evaluation tool, responses for which were used to generate additional qualitative data to compare to Phase I’s quantitative findings.

Data Security

The modified Nature Relatedness instrument used for this study was built using the Arboretum’s Qualtrics license, and saved into a .CSV file to be entered into the R statistic platform. In 2018 Qualtrics received ISO 27001 certification, a framework of requirements and procedures for maintaining data security in a cloud setting (Qualtrics, n.d.). Once downloaded for analysis, participant data will be saved on a password-protected USB drive with the project researcher having the only access and used on a private, password-protected PC. Identifying data will only be used to build the Phase II participant pool, and will be kept separate from survey measure responses.

Phase II: Qualitative Study

The qualitative piece of this study is intended to help understand and explain the social context of the quantitative findings in Phase I (Hardin & Wright, 2017). Conducting focus group
discussions added a layer of qualitative insight on top of the statistical analysis of the survey data, crafting a more comprehensive summative evaluation of N-ACT as an informal education program. Apart, neither method in this mixed approach can tell the full story of what is happening for the spectrum of participants in a program like N-ACT. Together, the quantitative survey data can be integrated with qualitative testimony from the focus group interviews to present a more rounded and complete summary of what impact the N-ACT program has had with participants, while also demonstrating to other cultural institutions the necessity of both approaches when attempting to capture impact.

**Participants**

Participation for Arboretum audience members in a focus group discussion that is in addition to an evaluation survey is typically less robust than the Phase I survey participation, averaging 5% of the survey participants. An anticipated pool of 8 Phase II participants would meet this criteria and be considered a large enough group to conduct a meaningful focus group with.

**Materials**

The inclusion of qualitative questions on the modified Nature Relatedness scale serves as the basis for Phase II’s qualitative examination of similar themes, with the opportunity to go more in-depth with participants used to explore the long-term impacts completing N-ACT courses had on their behavior. Aligned with the program’s key performance indicators of increasing a participant’s awareness of the benefits of trees and encouraging participants to take direct action to plant or protect trees, the discussion guide focused on asking participants about their experience in the program, what they did with the information they learned in the program,
and if that action continued once their engagement had ended. While the Phase I survey captured participants’ feelings toward nature, the focus group data was a chance to provide participants the opportunity to reflect on the impact taking courses has had by placing them in an environment where they can be presented with the larger intended outcomes of N-ACT as context and then directly asked what if any impact their participation in the program had on their behaviors. Like any focus group discussion, there were prompts established for participants to react to, some of which came directly from the open-ended questions that were part of Phase I’s survey, but there was also room given to let participants explore other ideas as they arose. The initial discussion prompts are collected in Appendix F.

**Procedure**

*Institutional Research Review*

The project narrative written for institutional review included both Phase I and II of this study. Taken as a whole the submission materials describe the entirety of recruitment and procedures for Phase I and II of this study. In addition to the Phase I materials described above, the IRB submission also included:

- Focus group informed consent signature form (Appendix G).
- Focus group practices information letter (Appendix H).
- Focus group questions/discussion guide (Appendix F).
- Debrief/dismissal form (Appendix I).
Informed Consent

After agreeing to participate in a focus group or individual interview, participants were provided with a secondary informed consent form as attached in Appendix G. These forms included notice that the focus groups were to be recorded for purposes of clarity when reviewing the information, but that participants have the right to ask not to be recorded or stop participating at any time during the discussion. Completed forms were be collected by the researcher, securely kept separate from the digital survey data and any physical notes from the qualitative discussions.

Arboretum Focus Group Protocol

As the Morton Arboretum has increased the attention paid to audience feedback, it has developed and implemented a structured protocol for conducting more regular focus group discussions. These procedures also served as guidelines for the Phase II focus groups conducted in this study, and consist of:

- Exposure to a bigger picture: Summarizing the mission of the Morton Arboretum as a whole and how the specific program in question fits into what the institution is trying to accomplish.
- The program itself: Sharing the assumptions Arboretum staff have made in the process of developing and delivering the program to test them against the actual audience beliefs.
- Testing key performance indicators: The specific program was created with measureable changes to audience perception and behavior in mind as success measures. What reports do audience members make on whether or not these outcomes are actually happening
outside their program engagement. The majority of these points are represented in the list of content ideas in Appendix F.

- Open-ended questions: What other questions or comments do audience members want to make known to the Arboretum, and what other issues can the group discuss in the time allotted.

**COVID-19**

Phase I’s survey opened in mid-February of 2020, with focus groups initially scheduled for mid to late-March of the same year. Unfortunately, this timeline coincided with the COVID-19 outbreak which resulted in several states instituting shelter-in-place orders, including Illinois where the Arboretum is located. As such, a follow-up to the initial IRB narrative was submitted to allow for the focus groups moving online via the Arboretum’s Zoom teleconference service. All materials and discussion prompts remained the same. Chapter 4 as the presentation of data will review the circumstances of the focus groups and the findings that stem from that data in greater detail, but it is worth highlighting in this chapter as the methods section that even after the original design was approved circumstances dictated they change. However, the spirit of the design remained intact, and the data collected for Phase II brings interesting ideas to light.

**Duration**

Focus group discussions were limited to a one-hour duration, with the first of two sessions running slightly over. This was due to the participants having questions regarding the Arboretum’s plan for responding to the COVID-19 outbreak, and was not formally part of the data being collected.

**Debriefing/Dismissal**
Upon completion of Phase II focus groups, all participants will receive a second update on the status of the project that also served as a dismissal from further participation in this specific project. This notice is included as Appendix I. However, the on-going nature of N-ACT means it is possible participants will be invited to enroll in additional Arboretum programs, and care was taken to clarify the purpose of debriefing/dismissing only from the current evaluation of N-ACT, not from future education programs or their accompanying evaluation. This notice is included as Appendix J. This notice also served as a final update from this study upon the completion of integration and data analysis.

**Qualitative Data Collection and Coding**

Upon completion of this focus group sessions, transcriptions of all participant testimonials was reviewed for qualitative themes emerging as a part of the study’s data analysis. Recorded focus group sessions were transcribed into written records via Zoom’s automated transcription tool for cloud-stored data. After transcription was complete all meeting materials were removed from cloud storage. To maintain data security both the recordings and the printed summaries joined the quantitative data and collected informed consent forms in a secure location.

After examining the transcripts for broader themes, an additional layer of selective coding occurred as connections between initial categories emerged (Creswell, 2013). Specifically, the researcher for this study coded for stories the participants told about how their engagement with N-ACT shaped their behavior once that engagement had ended in an attempt to gather evidence of the program’s long-term impact. Combined with the quantitative results, this
narrative research will help shape the profile of an audience member likely to be positively influenced in a way that aligns with institutional mission.

Validation Strategies

The need for cultural institutions like gardens and arboreta to improve their ability to capture program impact cannot overshadow the need for evaluation efforts to remain capable of generating valid and reliable findings. The Nature Relatedness scale’s high measures of validity and test/retest reliability demonstrate how it can be a positive to use an existing measure versus a customized instrument, and the qualitative measures of Phase II also follow strategies to help keep the trustworthiness of this study high.

Trustworthiness. Lincoln and Guba (1985) suggested the concept of trustworthiness as a standard for qualitative research, appropriate for this study in the same sense that this project is conducted in a practitioner setting with the author as a stakeholder for the program being evaluated. This project represents an attempt to bring formalized research practices to practitioner evaluation efforts, and must ring true to that work. To address questions regarding the nature of qualitative studies and their capacity to ensure rigor, trustworthiness has four essential criteria: credibility, transferability, confirmability, and dependability. Each is commented on below.

Credibility. Having spent over two years in the role of Director of Education at the Arboretum, the researcher on this study has been immersed in a prolonged engagement with the culture and context of the institution, its audiences, and the engagements between the two through programming. Trust has been built between program participants and the researcher, and the researcher can make decisions as to what is salient to the study in the course of conducting
the focus group discussions (Creswell, 2013). This role within the institution is also reflected in the author’s positionality statement later in this chapter.

**Transferability.** Despite the uniqueness of the social setting for this study, the Arboretum’s mission to catalyze an audience to take action is something several types of museums and gardens will be able to identify with, grounding this study in the common work of said institutions. Bassey (1981) proposed practitioners would be able to relate to studies with settings similar to their own, and the context here of a cultural institution attempting to capture impact in part by conducting qualitative study is a relatable context to most museum professionals.

**Dependability.** To address the challenges of repeating the findings from a qualitative study, the procedures implemented in the focus group interviews of Phase II are described in as much detail as possible. The creation and implementation of a focus group protocol by Arboretum staff has helped solidify procedures even as they are used to collect feedback from very different audiences, and their description here would allow future researchers to repeat the work of the study if not the results. Due to the nature of an individual’s engagement with their learning ecology over time a total repeat of the findings presented here in Chapter 4 and discussed in Chapter 5 by future practitioners would be unlikely in any case, but the methodology had been created and described so that readers will be able to determine “proper research practices have been followed” (Shenton, 2004).

**Confirmability.** Similar to dependability, the researcher has made efforts to select and implement a research design capable of fully capturing the complexities of the N-ACT program’s specific reality, limiting the influence of researcher bias through the mixed methods
approach. The logic behind this choice, the description of its implementation in Chapter 3, and
the presentation of findings in Chapter 4 should allow readers to determine how close any data
collected is to the truth of the N-ACT program as a setting.

Replicating the findings of any specific qualitative study is challenging, but repeating the
process of this study will be within the realm of possibility. In fact, as extolled in the following
positionality statement, this study’s intent is not only to result in data that can be used as part of a
continuous improvement cycle for programs at the Arboretum, but to shape the evaluation
practices of other cultural institutions as well meaning the study itself is likely to be replicated
for future cycles of the program.

**Positionality and Researcher Reflexivity**

Coding the qualitative data collected and integrating those themes into the quantitative
data collected in this study requires a level of familiarity with the context of the N-ACT program
and the Arboretum itself as an institution; fortunately that familiarity is present through the
researcher’s role as the Arboretum’s Director of Education. As such, the researcher on this study
also oversees the department that houses the N-ACT program, and ensures that all of the
department’s program outcomes align with the Arboretum’s broader mission to encourage the
protection and planting of trees. Combine a professional role as Director with an academic
background in program evaluation filtered through a preference for pragmatism as an interpretive
framework and this study is purposefully designed to be focused on:

- How the data produced can be useful to the institution.
- What the institution can demonstrate to other cultural institutions to help improve
evaluation practices across the entire field of public gardens and arboreta.
From an action research perspective, employment status at the cultural institution hosting this study puts the researcher squarely in the “insider” category, and to some extent makes this project a self-study as well as the more formal “explanatory convergent case study” as labeled by its selected design. While this insider status does provide a lens through which results from the study have to be interpreted as further explored in the following section, acknowledging its presence as context for the study does not lessen the credibility of the study itself. As a practitioner, conducting this study represented an opportunity to improve the evaluation practices of the Arboretum by incorporating the more rigorous designs of higher education assessment. These changes in practice would also further the knowledge base of not just the Morton Arboretum but cultural institutions in general by addressing some of the questions raised in Chapter 2 around museums’ use of non-attendance measures as ways to capture impact. To some extent these changes are only possible due to this insider status; just as the participants engaging with informal education programs are a product of their unique learning ecology, the researcher on this project is a product of their own experiences as well. That those experiences included student and staff roles as context for this study give the study more depth when the author’s dual roles are accounted for in how the data collected in the mixed-methods design are interpreted.

Throughout this project, a study applying higher education assessment practices to informal education programming was conceived as a way to combine the best of both researcher and practitioner practices. Just as research without relatable findings is unlikely to be used by practitioners, programs built without a solid foundation of research and data-driven decision making are unlikely to successfully achieve any intended outcome. This study is an attempt to use the explanatory convergent mixed method design as a bridge between the researcher and practitioner perspectives, a combination of theory and practice that both sides of the process can
see value in. That thinking also helped keep researcher bias from exerting excessive or overt influence on the project, despite the study serving both as an academic capstone and professional initiative.

**Limitations and Delimitations**

Despite a MANOVA analysis’ ability to keep co-variates from asserting too much influence on any significant effects due to other variables, museum visitors come into their experience at varying points of readiness to act on what they learn from an engagement (Falk, 2009). The current audiences for Arboretum education programs have a degree of affinity toward nature already built in, and the nature of the N-ACT program helping people learn conservation skills require an existing level of affinity that could skew the scores toward high agreement on Nature Relatedness items across any conditions participants can be assigned to. A more meaningful study would use the same education programs to test impact for groups without prior affiliation to The Morton Arboretum (or other similarly science-focused cultural institutions) in a pre/post program engagement design, a design that has had success capturing impact for other Arboretum programs as mentioned in previous chapters and that could be the topic of future studies.

Concerns about the regularity of audience trends reflect one reason gardens and arboreta find measuring impact so challenging; audiences typically arrive somewhat aligned with mission already, and institutions struggle to accurately capture the additional impact their programs can have. The temporary and short-term nature of some informal education program engagements often makes including a pre-engagement measure a near impossibility. The inability to include a pre-engagement measure of the items mentioned here is a drawback to the project, but the
instrumentation used, as well as the qualitative data from focus group discussions, will still allow the explanatory sequencing design to capture what engaging in N-ACT programs has meant for different recent audiences. And those findings will then be incorporated into the continuous improvement cycle for the program, making the process worth the time spent on it despite its limitations.

Another audience-based limitation is the author’s dual roles as both researcher and Arboretum staff person conducting the survey and focus group sessions. Although the survey data is anonymous, the author’s name and position as Director are still included in all communication about the study for the sake of transparency, and could influence survey responses to some extent. These dual roles could also elicit more positive responses from focus group participants who find themselves discussing their experience in the N-ACT program with the head of the department that houses said program. Focus groups are by their nature less anonymous than online surveys and this could influence the extent to which participants are willing to honestly share their feedback, a limitation taken into account in interpreting this data in Chapter 5. When responses from the modified survey instrument’s open-ended questions are presented in the next chapter, the recognition of one of the emerging themes being audience complaints about their experience suggest participants not being honest with the researcher as a staff member of the Arboretum is not a major concern. However, the author’s insider status and its impact on this study’s collected data is also explored in greater detail in Chapter 5’s critiques of the study and suggestions for future research.

The decision to modify an existing instrument is a deliberate one made by the researcher, both due to the Nature Relatedness scale’s non-inclusion of demographic data, but also the need to demonstrate to other institutions that evaluation efforts do not necessitate the create of custom
instruments. However, the use of qualitative data from focus groups also depends upon participants being willing to share open and honest feedback about their engagement with the N-ACT program, something that may be influenced by the nature of Arboretum staff conducting the discussions. Unfortunately, the Arboretum frequently does not have the additional budget to conduct audience research through third party firms, hence the establishing of a focus group protocol to collect feedback from audience members directly. Audience participants are typically comfortable sharing comments that are negative as well as positive, and the regional aspect of N-ACT could even suggest participants from further away are even more ready to share honest feedback, having less existing connection to the institution. The value collecting qualitative feedback brings to this study makes it worth the risk that participants slightly soften what they share.

Conclusions

The N-ACT program has experienced substantial attendance-based success over its ten-plus years, having given thousands of people the skills to conduct conservation work on their own land, on public land, or as a volunteer with other organizations through its existence. Even if attendance as a measure of success falls short of telling the entire story, the numbers behind the N-ACT program, like the number of people served, the number of sites with people doing conservation work, and the pure acreage those sites represent are something the Morton Arboretum can be proud of. However, a higher education-influenced evaluation process as described in this chapter allows the Arboretum to assess the program’s success when it comes to other mission-aligned outcomes and key performance indicators, including:
• Participants actually conducting conservation work once their knowledge had grown as an aspect of planting or protecting trees, the most critical mission-aligned impact for the Arboretum.

• Participating in the program leading to other learning, either for participants continuing to take courses or sharing their experiences with others and getting them involved as well.

• Changing participants’ behavior for the long-term, where they continue to volunteer and conduct restoration work in natural areas after their engagement with the N-ACT program concludes.

These are all mission-focused questions this project can address, as well as highlighting which pieces of the N-ACT program are the most successful. These lessons can then help other programs at Morton Arboretum seek out similar success, as well as document an evaluation process that can be used more broadly in an informal education environment for other institutions. As of this writing, the Arboretum is approaching its centennial year, and having evidence of the positive mission-aligned impact a program like N-ACT can have with its audience could be critical to being able to begin its second century ensuring its mission will endure far into the future.
Chapter 4: Presentation of Data

The mixed-methods approach of an explanatory convergent design was selected for this study to capture the participant experience within the Morton Arboretum’s N-ACT program as robustly and richly as possible. This phased approach purposely mimics a higher education program evaluation collecting both quantitative data and qualitative artifacts in an attempt to capture the impact completing coursework in an informal education program has with participants. Informal education used by the Morton Arboretum to engage audiences has a series of intended outcomes aligned with changing how participants think, feel, and act toward trees and nature; capturing the ability of these informal education programs to change participant perspective also serves as proof of the impact the Arboretum is having with its audiences. This mixed methods design applies quantitative and qualitative data in an attempt to capture the impact the Arboretum was capable of having as comprehensively as possible. Just as that design was described in Chapter 3, the findings from both phases of the study will be presented in this chapter, separated into the quantitative findings of Phase I and qualitative findings of Phase II.

Data presented in this chapter from Phase I includes a breakdown of the subject pool, collected demographics of the survey participants, and an analysis of variance based on those demographic groups for questions that comprised the modified version of an existing survey instrument. That modified instrument was made up of the Likert-scale questions that were original to the existing Nature Relatedness instrument as well as added demographic items for participants and Likert-scale questions related to Arboretum learning outcomes. Phase I data presented in this chapter is used to examine the acceptance or rejection of the null hypothesis associated with the research questions of this study: Does the length of engagement in N-ACT (2 or fewer courses versus 3 or more courses) impact participants’ feelings of connection to nature?
1. **Sub-question 1:** Does longer participation in the N-ACT program lead to an increase in reported feelings of affinity toward trees and nature?

2. **Sub-question 2:** Does longer participation in the N-ACT program lead to an increase in the belief that someone’s actions can positively impact their surroundings?

3. **Sub-question 3:** Does longer participation in the N-ACT program lead to an increase in reported conservation behaviors by the participant?

Data from Phase II includes the percentage of survey participants who were willing to be contacted regarding the focus groups, profiles of those that participated in the focus groups, and a summary of themes that emerged from the qualitative data collected with a discussion of how those themes aligned with and expanded upon the survey data. After the quantitative and qualitative analysis sections, Chapter 4 concludes with a brief summary of how these findings were integrated as the final stage of the mixed-methods study. In Chapter 5, the researcher will continue to integrate findings from both phases into a series of conclusions, recommendations for practice, and suggestions for future research.

**Phase I: Quantitative Data**

**Participant pool.** The N-ACT program had 1169 participants in 2018 and 2019, with “participant” being defined as an individual who has gotten to the point of completing a registration for a course that is part of the total program. Removing participants who had not given email contact information, had listed an email that already appeared in the participant list (typically due to someone registering multiple participants but only listing their own information), or had an unusable email listed due to error resulted in a pool of 920 participants receiving the digital invitation to complete the modified Nature Relatedness survey of Phase I.
Over the three weeks the survey was live online from late-February to mid-March 2020, the invitation email to complete the survey was opened by 620 of the eligible participants (67% of the total pool). 273 of those that opened the email clicked through to see the consent page of the survey (30% of the initial pool). 177 participants completed the consent form and all of the survey (just over 19% of the pool). The average time for participants to complete the survey was 7 minutes.

Demographic profile. Survey respondents were 67% female and 33% male, with 1 respondent reporting as non-binary and 1 preferring not to identify. Respondents were overwhelmingly Caucasian, with only 12% of respondents self-reporting as something other than “white.” The average age of respondents was 59 years old, and zip codes local to the Arboretum’s home of DuPage County, Illinois were prominent in the demographic results as expected, but there were also responses from Wisconsin, Indiana, Michigan, and as far away as Germany. The breakdown of survey participant zip code data by county is presented in Figure 4.1.
Higher education degree attainment was well-represented in respondents, with 47% of participants reporting having a graduate or professional degree, and 38% reporting a four-year degree as the highest level of education they had completed. These results are summarized in Figure 4.2.

Figure 4.2: Highest degree completed responses
63% of respondents were members of the Arboretum, versus 37% who were not. 56% of respondents had taken at least one N-ACT course online. Overall, respondent demographics are similar to the Arboretum’s visitor profile and suggest the survey pool was representative of an audience that is typical for its informal education programs. Relevant to the research questions of this study, 52% of respondents had taken 2 or fewer N-ACT courses placing them in the “low” engagement category, versus 48% having taken 3 or more for the “high” engagement category. A near-even split is a fair representation of enrollment trends for the N-ACT program as a whole, with the program’s “a la carte” approach to scheduling lets participants take individual courses as they appeal to their interests, try to complete the entire program’s curriculum, or anything in between. However, simply categorizing participants into “low” and “high” engagement categories means respondents in the “high” category reported anywhere between 3 and 14 courses taken, due to the number of programs in the N-ACT program. Putting more detail into how “high” engagement participants are categorized is a point that will be returned to in terms of interpreting responses from the focus groups, as well as suggestions for future research directions in Chapter 5.

Program engagement and survey items. As explained in Table 3.4, wording from multiple questions on the Nature Relatedness instrument related directly to key performance indicators for Arboretum programming. For each question on the modified instrument used in Phase I, an analysis of variance was carried out with the independent demographic variables. These demographic characteristics were used to account for variance in survey item responses by groups within the subject pool. Co-variables were:

- “Engagement” in the N-ACT program, defined as low (2 courses or fewer) versus high (3 courses or more) as self-reported by participants.
• The participant’s status as a member of the Arboretum or non-member.
• The participant’s age.
• The participant’s gender.
• The participant’s education level.
• The participant’s original intent for enrolling: completing a single course, completing multiple courses, completing the entire N-ACT certificate.

Of the original Nature Relatedness items, engagement level lead to a significant difference between groups on whether participants’ feelings about nature affected how they live their lives (F (4.131), p < .05) and whether participants felt connected to all other living things on earth (F(5.942), p < .02). These results reject the null hypothesis for this study’s research sub-question regarding engagement in the N-ACT program having positive impact on participants’ feelings toward nature. Results from question 14 are presented in Table 4.1, results from question 21 are presented in Table 4.2.
Table 4.1: ANOVA results for responses on “My feelings about nature do not affect how I live my life”

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum Sq</th>
<th>Mean Sq</th>
<th>F-value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>1</td>
<td>2.59</td>
<td>2.5889</td>
<td>4.131</td>
<td>0.0437*</td>
</tr>
<tr>
<td>Member</td>
<td>1</td>
<td>0.01</td>
<td>0.0062</td>
<td>0.010</td>
<td>0.9209</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>0.09</td>
<td>0.0944</td>
<td>0.151</td>
<td>0.6984</td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>2.04</td>
<td>2.0423</td>
<td>3.259</td>
<td>0.0728</td>
</tr>
<tr>
<td>Education</td>
<td>1</td>
<td>1.85</td>
<td>1.8504</td>
<td>2.953</td>
<td>0.0876</td>
</tr>
<tr>
<td>Intent</td>
<td>1</td>
<td>0.26</td>
<td>0.2641</td>
<td>0.421</td>
<td>0.5171</td>
</tr>
<tr>
<td>Residuals</td>
<td>170</td>
<td>106.5</td>
<td>0.6267</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*=p<.05

Table 4.2: ANOVA results for responses on “I feel very connected to all living things on the earth”

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum Sq</th>
<th>Mean Sq</th>
<th>F-value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>1</td>
<td>2.81</td>
<td>2.8095</td>
<td>5.942</td>
<td>0.0158*</td>
</tr>
<tr>
<td>Member</td>
<td>1</td>
<td>2.44</td>
<td>2.4427</td>
<td>5.166</td>
<td>0.0243*</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>0.49</td>
<td>0.4929</td>
<td>1.042</td>
<td>0.3087</td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>2.02</td>
<td>2.0176</td>
<td>4.267</td>
<td>0.0404*</td>
</tr>
<tr>
<td>Education</td>
<td>1</td>
<td>0.71</td>
<td>0.7102</td>
<td>1.502</td>
<td>0.2221</td>
</tr>
<tr>
<td>Intent</td>
<td>1</td>
<td>1.23</td>
<td>1.2272</td>
<td>2.595</td>
<td>0.1090</td>
</tr>
<tr>
<td>Residuals</td>
<td>170</td>
<td>80.38</td>
<td>0.4728</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*=p<.05

There were significant findings in terms of differences between demographic groups on survey responses throughout the study’s modified Nature Relatedness instrument. The most frequently
significant demographic variables were participant age and gender; one or both of these variables accounted for significant variance on eleven of the twenty one original items, including Question 21 on feeling connected to all nature as summarized above. Tables 4.3 through 4.12 below summarize demographic differences on responses due to age, gender, or both in order of how the questions appeared on the survey.

Table 4.3: ANOVA results for responses on “Humans have the right to use natural resources any way we want.”

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum Sq</th>
<th>Mean Sq</th>
<th>F-value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>1</td>
<td>0.32</td>
<td>0.3214</td>
<td>1.241</td>
<td>0.26693</td>
</tr>
<tr>
<td>Member</td>
<td>1</td>
<td>0.00</td>
<td>0.0003</td>
<td>0.001</td>
<td>0.97271</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>2.06</td>
<td>2.0609</td>
<td>7.955</td>
<td>0.00537**</td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>2.00</td>
<td>1.9985</td>
<td>7.714</td>
<td>0.00609**</td>
</tr>
<tr>
<td>Education</td>
<td>1</td>
<td>0.42</td>
<td>0.4216</td>
<td>1.627</td>
<td>0.20384</td>
</tr>
<tr>
<td>Intent</td>
<td>1</td>
<td>0.42</td>
<td>0.4191</td>
<td>1.618</td>
<td>0.20517</td>
</tr>
<tr>
<td>Residuals</td>
<td>170</td>
<td>44.04</td>
<td>0.2591</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**=p<.01
Table 4.4: ANOVA results for responses on “My ideal vacation spot would be a remote, wilderness area.”

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum Sq</th>
<th>Mean Sq</th>
<th>F-value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>1</td>
<td>0.74</td>
<td>0.743</td>
<td>0.784</td>
<td>0.37731</td>
</tr>
<tr>
<td>Member</td>
<td>1</td>
<td>0.03</td>
<td>0.025</td>
<td>0.027</td>
<td>0.87018</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>7.13</td>
<td>7.128</td>
<td>7.519</td>
<td>0.00676**</td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>0.10</td>
<td>0.102</td>
<td>0.108</td>
<td>0.74328</td>
</tr>
<tr>
<td>Education</td>
<td>1</td>
<td>2.85</td>
<td>2.853</td>
<td>3.009</td>
<td>0.08459</td>
</tr>
<tr>
<td>Intent</td>
<td>1</td>
<td>0.39</td>
<td>0.385</td>
<td>0.406</td>
<td>0.52478</td>
</tr>
<tr>
<td>Residuals</td>
<td>170</td>
<td>161.17</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**=p<.01

Table 4.5: ANOVA results for responses on “My connection to nature and the environment is a part of my spirituality.”

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum Sq</th>
<th>Mean Sq</th>
<th>F-value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>1</td>
<td>0.87</td>
<td>0.866</td>
<td>1.110</td>
<td>0.29369</td>
</tr>
<tr>
<td>Member</td>
<td>1</td>
<td>0.02</td>
<td>0.018</td>
<td>0.023</td>
<td>0.88011</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>0.68</td>
<td>0.681</td>
<td>0.872</td>
<td>0.35170</td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>5.57</td>
<td>5.572</td>
<td>7.136</td>
<td>0.00829**</td>
</tr>
<tr>
<td>Education</td>
<td>1</td>
<td>5.38</td>
<td>5.380</td>
<td>6.891</td>
<td>0.00945**</td>
</tr>
<tr>
<td>Intent</td>
<td>1</td>
<td>0.41</td>
<td>0.414</td>
<td>0.531</td>
<td>0.46735</td>
</tr>
<tr>
<td>Residuals</td>
<td>170</td>
<td>132.73</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**=p<.01
Table 4.6: ANOVA results for responses on “I am very aware of environmental issues.”

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum Sq</th>
<th>Mean Sq</th>
<th>F-value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>1</td>
<td>0.50</td>
<td>0.499</td>
<td>1.462</td>
<td>0.228352</td>
</tr>
<tr>
<td>Member</td>
<td>1</td>
<td>0.10</td>
<td>0.098</td>
<td>0.286</td>
<td>0.593457</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>4.71</td>
<td>4.712</td>
<td>13.805</td>
<td>0.000275***</td>
</tr>
<tr>
<td>Gender</td>
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<td>0.03</td>
<td>0.025</td>
<td>0.074</td>
<td>0.785442</td>
</tr>
<tr>
<td>Education</td>
<td>1</td>
<td>0.01</td>
<td>0.007</td>
<td>0.021</td>
<td>0.885534</td>
</tr>
<tr>
<td>Intent</td>
<td>1</td>
<td>2.02</td>
<td>2.021</td>
<td>5.919</td>
<td>0.016012*</td>
</tr>
<tr>
<td>Residuals</td>
<td>170</td>
<td>58.03</td>
<td>0.341</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***=p<.001, *=p<.05

Table 4.7: ANOVA results for responses on “I take notice of wildlife wherever I am.”

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
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<th>Mean Sq</th>
<th>F-value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>1</td>
<td>0.25</td>
<td>0.2506</td>
<td>1.296</td>
<td>0.2565</td>
</tr>
<tr>
<td>Member</td>
<td>1</td>
<td>0.10</td>
<td>0.1017</td>
<td>0.526</td>
<td>0.4693</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>0.96</td>
<td>0.9585</td>
<td>4.958</td>
<td>0.0273*</td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>0.25</td>
<td>0.2543</td>
<td>1.316</td>
<td>0.2530</td>
</tr>
<tr>
<td>Education</td>
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<td>0.43</td>
<td>0.4308</td>
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<td>0.1373</td>
</tr>
<tr>
<td>Intent</td>
<td>1</td>
<td>0.61</td>
<td>0.6071</td>
<td>3.140</td>
<td>0.0782</td>
</tr>
<tr>
<td>Residuals</td>
<td>170</td>
<td>32.87</td>
<td>0.1933</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*=p<.05
Table 4.8: ANOVA results for responses on “Nothing I do will change problems in other places on the planet.”

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
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<th>Mean Sq</th>
<th>F-value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>1</td>
<td>1.91</td>
<td>1.910</td>
<td>2.512</td>
<td>0.11484</td>
</tr>
<tr>
<td>Member</td>
<td>1</td>
<td>0.47</td>
<td>0.470</td>
<td>0.618</td>
<td>0.43271</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>0.78</td>
<td>0.776</td>
<td>1.021</td>
<td>0.31381</td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>6.43</td>
<td>6.428</td>
<td>8.454</td>
<td>0.00413**</td>
</tr>
<tr>
<td>Education</td>
<td>1</td>
<td>0.14</td>
<td>0.140</td>
<td>0.184</td>
<td>0.66859</td>
</tr>
<tr>
<td>Intent</td>
<td>1</td>
<td>0.67</td>
<td>0.671</td>
<td>0.883</td>
<td>0.34879</td>
</tr>
<tr>
<td>Residuals</td>
<td>170</td>
<td>129.27</td>
<td>0.760</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**=p<.01

Table 4.9: ANOVA results for responses on “Animals, birds, and plants should have fewer rights than humans.”

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum Sq</th>
<th>Mean Sq</th>
<th>F-value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>1</td>
<td>0.78</td>
<td>0.780</td>
<td>0.723</td>
<td>0.39630</td>
</tr>
<tr>
<td>Member</td>
<td>1</td>
<td>0.02</td>
<td>0.020</td>
<td>0.019</td>
<td>0.89072</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>0.21</td>
<td>0.212</td>
<td>0.197</td>
<td>0.65769</td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>7.17</td>
<td>7.170</td>
<td>6.648</td>
<td>0.01077*</td>
</tr>
<tr>
<td>Education</td>
<td>1</td>
<td>8.46</td>
<td>8.463</td>
<td>7.847</td>
<td>0.00568**</td>
</tr>
<tr>
<td>Intent</td>
<td>1</td>
<td>7.08</td>
<td>7.077</td>
<td>6.562</td>
<td>0.01129*</td>
</tr>
<tr>
<td>Residuals</td>
<td>170</td>
<td>183.34</td>
<td>1.078</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**=p<.01, *=p<.05
Table 4.10: ANOVA results for responses on “My relationship to nature is an important part of who I am.”

<table>
<thead>
<tr>
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<th>DF</th>
<th>Sum Sq</th>
<th>Mean Sq</th>
<th>F-value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>1</td>
<td>0.549</td>
<td>0.5494</td>
<td>2.966</td>
<td>0.08686</td>
</tr>
<tr>
<td>Member</td>
<td>1</td>
<td>0.187</td>
<td>0.1874</td>
<td>1.012</td>
<td>0.31595</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>0.560</td>
<td>0.5599</td>
<td>3.023</td>
<td>0.08390</td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>1.354</td>
<td>1.3541</td>
<td>7.310</td>
<td>0.00755**</td>
</tr>
<tr>
<td>Education</td>
<td>1</td>
<td>0.036</td>
<td>0.0360</td>
<td>0.195</td>
<td>0.65975</td>
</tr>
<tr>
<td>Intent</td>
<td>1</td>
<td>0.074</td>
<td>0.0736</td>
<td>0.397</td>
<td>0.52938</td>
</tr>
<tr>
<td>Residuals</td>
<td>170</td>
<td>31.488</td>
<td>0.1852</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**=p<.01

Table 4.11: ANOVA results for responses on “Conservation is unnecessary because nature is strong enough to recover from any human impact.”

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum Sq</th>
<th>Mean Sq</th>
<th>F-value</th>
<th>P</th>
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</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>1</td>
<td>0.055</td>
<td>0.0554</td>
<td>0.340</td>
<td>0.56068</td>
</tr>
<tr>
<td>Member</td>
<td>1</td>
<td>0.133</td>
<td>0.1326</td>
<td>0.813</td>
<td>0.36846</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>1.205</td>
<td>1.2048</td>
<td>7.386</td>
<td>0.00725**</td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>0.022</td>
<td>0.0216</td>
<td>0.132</td>
<td>0.71655</td>
</tr>
<tr>
<td>Education</td>
<td>1</td>
<td>0.040</td>
<td>0.0397</td>
<td>0.243</td>
<td>0.62246</td>
</tr>
<tr>
<td>Intent</td>
<td>1</td>
<td>0.083</td>
<td>0.0829</td>
<td>0.508</td>
<td>0.47678</td>
</tr>
<tr>
<td>Residuals</td>
<td>170</td>
<td>27.728</td>
<td>0.1631</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**=p<.01
Table 4.12: ANOVA results for responses on “The state of non-human species is an indicator of the future for humans.”

<table>
<thead>
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<th>Source</th>
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<th>Mean Sq</th>
<th>F-value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>1</td>
<td>0.21</td>
<td>0.206</td>
<td>0.349</td>
<td>0.5552</td>
</tr>
<tr>
<td>Member</td>
<td>1</td>
<td>0.04</td>
<td>0.036</td>
<td>0.061</td>
<td>0.8048</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>3.29</td>
<td>3.294</td>
<td>5.588</td>
<td>0.0192*</td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>1.42</td>
<td>1.423</td>
<td>2.414</td>
<td>0.1221</td>
</tr>
<tr>
<td>Education</td>
<td>1</td>
<td>0.01</td>
<td>0.012</td>
<td>0.021</td>
<td>0.8856</td>
</tr>
<tr>
<td>Intent</td>
<td>1</td>
<td>0.03</td>
<td>0.034</td>
<td>0.058</td>
<td>0.8105</td>
</tr>
<tr>
<td>Residuals</td>
<td>170</td>
<td>100.21</td>
<td>0.589</td>
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<td></td>
</tr>
</tbody>
</table>

*=p<.05

Participants’ membership status at the Arboretum also accounted for significant differences between groups on an additional question as reported in Table 4.13.

Table 4.13: ANOVA results for responses on “I don’t often go out in nature.”

<table>
<thead>
<tr>
<th>Source</th>
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<th>Sum Sq</th>
<th>Mean Sq</th>
<th>F-value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>1</td>
<td>0.27</td>
<td>0.2724</td>
<td>0.540</td>
<td>0.4636</td>
</tr>
<tr>
<td>Member</td>
<td>1</td>
<td>1.98</td>
<td>1.9800</td>
<td>3.923</td>
<td>0.0492*</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>0.00</td>
<td>0.0001</td>
<td>0.000</td>
<td>0.9888</td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>0.13</td>
<td>0.1302</td>
<td>0.258</td>
<td>0.6122</td>
</tr>
<tr>
<td>Education</td>
<td>1</td>
<td>0.43</td>
<td>0.4293</td>
<td>0.851</td>
<td>0.3577</td>
</tr>
<tr>
<td>Intent</td>
<td>1</td>
<td>0.83</td>
<td>0.8312</td>
<td>1.647</td>
<td>0.2011</td>
</tr>
<tr>
<td>Residuals</td>
<td>170</td>
<td>85.79</td>
<td>0.5047</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*=p<.05
Findings related to age, gender, education-level, and membership status differences in the pool are explored further in the discussion section that opens Chapter 5.

**Additional Arboretum items.** The items added to the Natural Relatedness scale to make up the modified instrument used in this study all related to the Arboretum’s key performance indicators for the N-ACT program specifically. In addition to the demographic questions that were added, participants were also asked to respond on a Likert scale to the following statements:

- My N-ACT courses increased my understanding of connections in the local ecosystem.
- My N-ACT courses strengthened my belief that my actions can have a positive impact.

Participants were also asked a yes/no question on whether they had implemented any conservation practices they had learned via an N-ACT course in their own yards or local natural areas. These additional questions directly reflected the intended learning outcomes of the N-ACT program in ways not reflected in the existing Nature Relatedness items, necessitating their inclusion. The additional questions corresponded directly to assessing the program’s impact on how participants thought (Question 22 regarding “understanding”), feel (Question 23 regarding “belief”), and act (“applying course content to own yard” question) toward nature.

ANOVA results for all three additional questions are presented in Tables 4.14, 4.15, and 4.16 below. There were statistically significant differences for the engagement groups on all three items: “understanding” (F (11.292), p<.005), “belief” (F (9.669), p<.005), and whether participants were implementing N-ACT content in their surroundings (F (9.804), p<.005).
Results from all three of these questions reject the null hypothesis of each sub-question asked by this study; longer engagement in the N-ACT program does appear to lead to the Arboretum’s intended mission-aligned outcomes, a change in how participants think, feel, and act toward nature.

Table 4.14: ANOVA results for responses on “My N-ACT courses increased my understanding of connections in the local ecosystem.”

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum Sq</th>
<th>Mean Sq</th>
<th>F-value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1</td>
<td>6.47</td>
<td>6.468</td>
<td>11.292</td>
<td>0.000961***</td>
</tr>
<tr>
<td>Member</td>
<td>1</td>
<td>1.58</td>
<td>1.582</td>
<td>2.762</td>
<td>0.098394</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>1.13</td>
<td>1.130</td>
<td>1.974</td>
<td>0.161876</td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>0.37</td>
<td>0.366</td>
<td>0.640</td>
<td>0.424995</td>
</tr>
<tr>
<td>Education</td>
<td>1</td>
<td>1.26</td>
<td>1.260</td>
<td>2.199</td>
<td>0.139937</td>
</tr>
<tr>
<td>Intent</td>
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<td>2.35</td>
<td>2.347</td>
<td>4.098</td>
<td>0.044499*</td>
</tr>
<tr>
<td>Residuals</td>
<td>170</td>
<td>97.37</td>
<td>.0573</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***=p<.0005 *=p<.05
Table 4.15: ANOVA results for responses on “My N-ACT courses strengthened my belief that my actions can have a positive impact.”

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum Sq</th>
<th>Mean Sq</th>
<th>F-value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>1</td>
<td>5.75</td>
<td>5.754</td>
<td>9.669</td>
<td>0.0022**</td>
</tr>
<tr>
<td>Member</td>
<td>1</td>
<td>1.15</td>
<td>1.155</td>
<td>1.940</td>
<td>0.1655</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>2.82</td>
<td>2.819</td>
<td>4.737</td>
<td>0.0309*</td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>0.09</td>
<td>0.090</td>
<td>0.151</td>
<td>0.6981</td>
</tr>
<tr>
<td>Education</td>
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<td>1.81</td>
<td>1.810</td>
<td>3.042</td>
<td>0.0829</td>
</tr>
<tr>
<td>Intent</td>
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<td>2.11</td>
<td>2.106</td>
<td>3.539</td>
<td>0.0616</td>
</tr>
<tr>
<td>Residuals</td>
<td>170</td>
<td>101.16</td>
<td>0.595</td>
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</tbody>
</table>

**=p<.005 *p<.05

Table 4.16: ANOVA results for responses on “Have you used what you learned in your N-ACT course(s) in your own yard or local natural area?”

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum Sq</th>
<th>Mean Sq</th>
<th>F-value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>1</td>
<td>0.731</td>
<td>0.7312</td>
<td>9.804</td>
<td>0.00205**</td>
</tr>
<tr>
<td>Member</td>
<td>1</td>
<td>0.752</td>
<td>0.7521</td>
<td>10.085</td>
<td>0.00178**</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>0.127</td>
<td>0.1273</td>
<td>1.706</td>
<td>0.19322</td>
</tr>
<tr>
<td>Gender</td>
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<td>0.033</td>
<td>0.0326</td>
<td>0.437</td>
<td>0.50928</td>
</tr>
<tr>
<td>Education</td>
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<td>0.007</td>
<td>0.0071</td>
<td>0.095</td>
<td>0.75869</td>
</tr>
<tr>
<td>Intent</td>
<td>1</td>
<td>0.225</td>
<td>0.2249</td>
<td>3.015</td>
<td>0.08428</td>
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<tr>
<td>Residuals</td>
<td>170</td>
<td>12.679</td>
<td>0.0746</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**=p<.005

**Open-ended survey question.** The modified Nature Relatedness also included multiple open-ended questions intended to generate additional insight into participant responses as well as
serve as a starting point for discussion items in the focus group discussion used to gather qualitative data in Phase II. An open-ended question asking participants what their largest takeaway was from taking N-ACT courses was used to provide discussion points to explore via the focus groups during Phase II. This question was answered by 158 of the 177 survey respondents, and responses aligned with four major themes:

1. N-ACT courses being a tremendous source of knowledge and basic information:
   Courses like “Basic Plant ID” and tool use courses were praised as sources of both vast information and information specifically tied to an issue participants were interested in and could return back to. Responses coded in this group included comments like “The Wetland Plant ID was chock full of information and I wish I could remember it all” and “I now have better knowledge of the plants in our area, what is invasive, and what isn’t.”

2. N-ACT courses leading to greater appreciation/awareness for how people impact their surroundings: Many responses connected N-ACT courses being a font of knowledge to their own awareness of and appreciation for growing. Responses coded into this group included comments like “I know that there is a tremendous amount to learn and that I can make a difference” and “Now I consider more than what is on the surface.”

3. N-ACT courses leading to participant action or a sense of responsibility for their surroundings: Several participants commented on sensing a call to action that their N-ACT coursework had helped them hear, and that they were motivated to the point of communicating about the interconnectedness of their surroundings to others as well. Responses coded into this group included comments like “I realized how impactful our actions (or inactions) have on the environment,” “That it might not be as hard as I
thought to do some work myself,” and “In the age of Climate Change and the assault on biodiversity, we all need to be involved in combating these issues.”

4. **Complaints** about general Arboretum practices or “N/A” answers: A handful of participants used the open-ended questions to mention issues with Arboretum practices regarding how programs are scheduled or the distance they traveled to attend. Interestingly, these responses were concentrated in the first half of survey responses, all coming between the survey opening on February 20th and the last negatively coded response on February 22nd. This was the one theme from the open-ended questions that did not emerge in the focus group discussions of Phase II.

An open-ended question is a way to include some unstructured responses in the modified instrument and give respondents a chance to expand on feedback they have to give about their experience in the program. A full recap of responses to what participants’ key takeaway from the N-ACT program were is presented in Appendix K. Phase II of the study exists to provide an even greater opportunity through the collection of focus group discussion data, which would be based on responses to the survey’s open-ended question. In a shift from the initial study design the Phase II focus groups were conducted online via Zoom conferences instead of in-person, but still followed the Arboretum’s focus group protocols as detailed in Chapter 3.

**Phase II: Qualitative Data**

**From survey to focus group participants.** Out of 177 survey participants, 53 indicated they were interested in participating in the in-person focus groups of Phase II. These 53 respondents served as the recruiting pool for Phase II. Unfortunately, the in-person sessions that were scheduled for late-March occurred in the midst of the 2020 COVID-19 outbreak, meaning
gatherings of any kind were being limited on an increasing basis. To complete Phase II, the focus groups were converted to a pair of online video discussions, conducted via Zoom teleconferencing in early April 2020. This allowed for as regular a discussion as the situation permitted, with 11 of the 53 participants contacted registering to attend virtually. Two sessions were conducted, with 7 of those 11 registrations participating in total. Each participant is profiled in the following sub-section, with only their first names used to keep participant anonymity. These first names are also attached to direct quotes from focus group participants moving forward. Hosting the focus groups digitally also allowed for a video record of the discussion to be created, which were automatically transcripted through the zoom platform’s services for cloud storage. This meant points from both focus groups could be referred back to in three ways: the video recording of each session, an audio recording of each session, and the written transcript from each session which thanks to Zoom’s practice of highlighting the video of each person as they speak in real time, was fairly accurate to the researcher’s notes in terms of which point came from which participant.

Conducting the focus groups via Zoom teleconferencing allowed both discussions to adhere closely to the Arboretum’s established focus group protocols as described in Chapter 3. Both meetings were conducted in Zoom’s “meeting” format with video cameras and audio options for all participants on throughout the meeting to encourage real-time discussion and interaction between participants. Following the same protocol online as they would have in-person, both sessions consisted of:

- Exposure to a bigger picture. After an introductory ice-breaker moment for participants, sessions began with the researcher sharing a brief slide show summarizing the mission of the Arboretum and how the N-ACT program’s outcomes align with that mission. These
slides were referred to occasionally throughout both discussions as participant prompts, and are included as Appendix L.

- Feedback on the program itself. With a sense of how N-ACT is intended to support the Arboretum’s mission, the focus groups shifted to the N-ACT program itself and the groups’ participants’ experience engaging with different courses. Participants had the chance to share their feedback on the program and were asked if they had applied what they had learned in classes to a specific site. If they had, they were asked where.

- Testing key performance indicators. Most discussion prompts for the sessions involved exploring the participants’ sense of whether the program had achieved its intended outcomes in the form of the key performance indicators that had been established for the program. Results from the Phase I survey data were also shared with participants, both to act as a validity check on the survey itself and to confirm conclusions that were being drawn by the researcher.

- Open-ended questions. The Zoom format demonstrated a high degree of utility with both discussion groups, as interactions between participants, including the researcher, were free-flowing. Both sessions closed with participants having the chance to ask anything else they were curious about in terms of N-ACT or the Arboretum, and the researcher following up on points as possible for a member of the Arboretum staff. The morning session of the focus groups surpassed the 60-minute mark, giving the researcher time to follow up on themes that had emerged over the course of the session and explore commonalities between participants in greater detail.

**Focus group participant profiles.** Participants were each asked to introduce themselves to the group and include information like where they were from, how they heard about the N-
ACT program, and whatever other information they were comfortable sharing. As the contextual setting for the study, compiling these details about program participants can be very helpful to gain insight into audiences as a part of how the Arboretum evaluates programming, hence its inclusion here as part of the participant profiles. This information was used to summarize the participant profiles below. The focus group participants were:

1. Ron – A retired accountant, Ron was a member of the Volunteer Stewards Network (VSN), a group that offers scholarships to enroll in N-ACT courses at no cost to participants. His first two courses “blew him away” and he has continued to take courses, expanding to also complete burn trainings and pesticide application certification through other sources, skills he uses volunteer at multiple nature site in the Barrington, IL area.

2. Katie – A Chicago resident, Katie is a lead steward in the Chicago Park District’s volunteer network, and has lead monthly workdays at McKinley Park in her neighborhood for the past five years. Also a VSN scholarship participant, Katie appreciated taking N-ACT’s “Volunteer Leadership” course in the blended format, after also enrolling in a plant ID course that was entirely online that she ended up not engaging with. Before having children Katie was a CPS kindergarten teacher for 10 years, and likened her volunteerism to taking her kids into the voting booth with her as part of her responsibility as a parent. She took over the lead steward role for McKinley Park after hearing about the position being open for a prolonged period which lead her to think “not on my watch.” Katie is also the one focus group participant who was in the “low” engagement category, having enrolled in only two courses and participated in only one of those, a point that will be further discussed in Chapter 5.
3. Beth – Local to the area surrounding the Arboretum as a native of Lombard, Illinois, Beth grew up going to the Arboretum and was a volunteer with the Arboretum’s Heritage trail restoration group when she started taking N-ACT courses. A marketing professional for an adventure travel company, Beth often incorporates course messages about how every individual’s actions can impact their surroundings, even when her work finds her in other countries.

4. Emma – By her account Emma has been taking courses through the Arboretum for at least 12 years, and was not surprised to hear she had taken an N-ACT despite not having a specific memory of noticing that was a part of any courses. She actually knew another participant in the session, Jon, from organizing workdays at the Arboretum, and feels she has become extremely engaged at a local level thanks to lessons she has learned from the Arboretum and constantly finding new ways to apply that knowledge.

5. Stew – A retired cartographer, Stew moved to the area from St. Louis a few years ago. He is active with several conservation groups, including not only the Arboretum but the Nature Conservancy as well, working at multiple sites in the area. He’s been taken with the difference in the local ecosystem even just from St. Louis to the Chicago-area, and feels N-ACT has been critical to his learning local invasive plants versus natives.

6. Jon – Originally from Indiana, after spending years in northern Virginia Jon moved back to the area to be closer to his son and daughter-in-law. Having volunteered at national parks in Virginia, the then titled “Woodland Stewards Program,” now N-ACT, immediately appealed to him. He participates in the “Woodland Ranger” volunteer program at the Arboretum, but has also applied what he learned in courses not only in his yard after moving, but now in his son and daughter-in-law’s new yard as well.
7. Marty – A former high school guidance counselor who started taking Arboretum courses through one of Illinois’ state-funded programs encouraging educators to partake in continuing education in the summer months, Marty has been an Arboretum volunteer since 1996. She also worked on the Heritage trail group, same as Beth, but is not as interested in the physically demanding work that some volunteer days demand. She is also a committed organic gardener, and appreciated N-ACT’s approach to alternative pesticides. By her own admission, she “is who she is today thanks to what she’s learned at the Arboretum,” perhaps the most ideal encapsulation of the idea of people as a product of their unique learning ecology as this project could have asked for. She puts “everything” from her courses into use in her own yard, a 1-acre plot that will be a “work in progress until the day (she) die(s).”

Focus Group Discussion Themes

Themes that emerged from the survey’s open-ended question were not only present in the focus group discussions, they were expanded upon. New connections between topics also came to light as participants shared their experiences and found commonalities between how they applied coursework in their own lives and spoke to their friends or neighbors about the importance of conservation.

**N-ACT courses as a source of knowledge.** The idea of N-ACT courses as a source of tremendous knowledge came from multiple participants, but so did the program’s tool use courses that help participants learn to safely handle the multiple tools that one can use caring for a natural area. The program’s volunteer leadership course was also mentioned by multiple participants, specifically those working at other sites who were looking for ways to make their
sites better organized and more productive. According to Ron, the volunteer management course is “a keystone of the program,” full of “not just plant knowledge, but how to communicate about it to people too. They’ve helped me not only be more involved but recruit others to do the same.”

The volunteer management aspect of the program and its ability to lead to better volunteer experiences overall became a theme from multiple focus group participants. Katie, the lead steward for McKinley Park in her south-west Chicago neighborhood, mentioned that despite the Chicago Park District already having some degree of structure to the program that appoints a lead steward at each park with a natural area her N-ACiT experience with the Volunteer Leadership course helped her be a better steward at her site. She also shared that she realized “I need to be more consistent with the communication stuff, and I can share that thinking with the wider network of the Park District volunteers,” a way of spreading the word about course content that came up repeatedly. Jon, an Arboretum volunteer who leads workdays with his group, had similar things to say about the Volunteer Leadership course supplementing the plant and tool knowledge content, a “combination of the bigger picture of why we’re doing this work, with the smaller details like plant identification. (It’s a) mix of the global picture with little pieces I can actually do.”

**Local action.** In terms of N-ACiT courses leading to participants taking action, focus group participants reported a spectrum of local action. They mentioned everything from working on riverbed restoration, to bat house construction, to helping family or neighbors clear invasive plants like buckthorn or honeysuckle they had learned about in N-ACiT out of their own yards. Beth and Jon are obviously active volunteers at other sites, but N-ACiT has helped participants shape more of their local surroundings as well. At his house in Geneva, Stew has been inspired to build a rain garden, reduce the amount of turf in his yard, and plant only with native species.
Beth had a yard that “started as a blank slate” nine years ago and has become a neighborhood gathering spot where she can show local kids what she’s learned through the Arboretum. Marty mentioned her 1-acre plot in introducing herself to the rest of the group, but she also admitted she had no idea what invasive species like buckthorn or honeysuckle were and how harmful they can be before taking courses at the Arboretum. Now she finds herself bringing up invasive species and the importance of restoration work in conversation with her neighbors without even realizing it.

**Spreading the word.** Communicating about restoration work was a point from multiple focus group participants. The sessions illuminated a link between taking action on a local stage and spreading the word about conservation to others that is not surprising in hindsight but not touched on through the survey questions. According to Marty, “it can be challenging not to feel like you’re lecturing when it comes up with people” and the topic of restoration can come up often. Frequently, the most common form of taking local action, caring for a yard, is a gateway to conversing with neighbors about what different plant species they may or may not have in their own yards, how controlling any invasive species is work anyone can accomplish, and why such work is necessary. Ron moved into a house with a yard that in his words “had been completely taken over by buckthorn, and when some new neighbors noticed (him) using controlled burn techniques to remove it” their conversations lead the neighbors to undertake removal efforts as well. Stew’s yard has drawn attention from his neighbors as well, who he’s convinced to plant native species in their yards too. Participants like Katie and Jon who work with other volunteers are certain to have conservation practices come up in conversation with like-minded others, especially as they volunteer doing the work itself. Jon even mentioned within his own family “kids might roll their eyes at grandpa the tree hugger but volunteering is a natural
conversation starter.” However, the conservation-focused interactions participants like Ron, Stew, and Marty have with neighbors as they work on their own yards also carry out the Arboretum’s mission, creating a ripple effect of impact as they spread the word about the benefits of trees and plants and the importance of doing conservation work.

Neighborly conversation about what is going on in your yard seems like a natural outcome of spending so much effort on controlling native plant species, but N-ACT participants do seem surprised at just how little those who have not taken the same courses seem to know about their local ecology. In fact, some like Emma feel as an N-ACT participant she probably takes for granted that not everyone knows or realizes how interconnected their environment is, saying “there’s so much going on around us that if you’re not doing the (restoration) work you might not know what’s going on.” Or as Marty suggested, most of her conversations are with people she already knows, and they might be politely listening to her talk about Arboretum courses, or even truly interested in learning more, but they do not seem to be aware of just how impactful anyone’s actions can be on their surroundings. As Ron succinctly put it, “if people knew more about what restoration was and how it’s important, they would find ways to do it.”

The focus groups’ comments on the conversations they have had with non-participants certainly support the idea that longer engagement in the program leads to increased belief in the power of ones actions to impact their surroundings, if the groups’ impressions of where this belief stands with their neighbors is anything to go by.

**Changing or reinforcing.** This seeming information gap between N-ACT participants and non-participants, despite participants believing their neighbors care about conservation even as they do not know much, asks the question: are N-ACT courses changing the perceptions of participants or merely reinforcing their beliefs on the importance of conservation, or the power
of their actions to impact their surroundings? This was one of the final discussion points presented to focus group participants in both sessions, and groups’ opinions were split on the matter. Some participants shared thoughts on how N-ACT courses helped change their opinions completely through new knowledge, while others shared that they came to the program specifically because they were interested in learning how to do restoration work and had that desire reinforced the more they learned, and some saying it was a mixture of both. Katie, who’s one course on volunteer leadership she considered educational and helpful, admitted the course content and the theme of the program overall merely reinforced her own ideas on why conservation was important, a line of thinking that illustrates exactly why it can be so challenging for cultural institutions to capture impact. This will be discussed more in-depth in Chapter 5.

Another thought that came up in terms of changing versus reinforcing perceptions for both sessions was the idea that even when someone knew nothing about conservation or restoration, if they learned what restoration work actually entailed, and the positive impact it could potentially have they would find conservation work worth doing. However, all it takes to make someone invested in restoration is a little education on the matter could be a projection that many participants are putting on those they have these conversations with. Katie, in particular, kept repeating that her involvement in restoration activities stemmed from a sense of responsibility, both as a parent but also as a citizen participant of her surroundings, circumstances that made her duty-bound to take some action to protect her environment. In her introduction to the other focus group participants she compared the responsibility she felt for the environment to teaching her kids about voting; “environmental responsibility is like one of my main responsibilities as a parent. With an eight-year old and a two-year old I feel like I have to
find a way to protect our surroundings for their sake.” Katie’s perspective is likely a common one for those already involved in restoration work or curious enough to explore taking an N-ACT course as a starting point, but the motivation for individuals taking those actions is not investigated by this project, a shortcoming of the study that is discussed in greater detail in Chapter 5.

Integration

The quantitative Phase I and qualitative Phase II of this study were connectively integrated through the sampling process. This occurred with focus group participants self-selecting through the survey instrument, nesting the focus group sample within the larger participant pool of the survey. For a program evaluation concerned with capturing mission-aligned impact this makes sense; to be in the study participants had to have enrolled in the N-ACT program. A member of the N-ACT program could not have participated in the Phase II focus group without having completed the survey of Phase I, and should not have completed the survey without reaching the benchmark of registering for an N-ACT course that defined being a participant.

The mixed-methods design is also integrated in terms of results from the quantitative Phase I shaping the more qualitative discussion that occurs as Phase II. Phase I of this study makes it clear that the length of engagement in the N-ACT program is indeed changing how participants think, feel, and act toward nature in a way that aligns with the Morton Arboretum’s mission and goals for its audiences. With those findings as a lens through which to examine N-ACT participants’ thoughts on the program qualitatively, Phase II sees the following themes emerge:
• Participants’ appreciation for the value of the program’s course content as a mechanism for learning.

• The N-ACT program’s ability to encourage participants to take action not just at natural area sites, but in their own backyards and local surroundings.

• One positive benefit of more local conservation work happening via N-ACT participants is a ripple effect into the community as these participants share with their friends and neighbors what they are doing, why, and how others could do the same.

• The importance of the power of actions to positively impact the environment growing as factors like climate change see their influence on nature seemingly increase exponentially.

• Although each participant begins their engagement with N-ACT as an individual product of their prior experiences at different levels of readiness to put new knowledge into action, the program was able to change participant perspective or at least reinforce relevant beliefs through new knowledge and experiences.

Focus group participants were comfortable with the researcher’s conclusions from the quantitative data, and offered examples from their own lives that they saw were relevant to the idea that they were more aware of, appreciative toward, and engaged with nature thanks to their experiences in the N-ACT program.

This last point is indicative of the final way the mixed-methods design is integrated: evaluating the data gathered in each phase as part of the whole. Narratively integrating data from Phase I and Phase II of this study tells a story of the N-ACT program delivering outcomes that align with the Morton Arboretum’s mission to catalyze audiences to take action on behalf of
trees and plants. The first half of Chapter 5, conclusions and recommendations from the data presented here, is an additional opportunity to integrate Phase I and Phase II into one coherent whole. Chapter 5 will draw conclusions from the data presented in Chapter 4, make recommendations for actions the Morton Arboretum can take due to those conclusions, and explore ideas for both a broader audience of public garden institutions to implement as well as ideas for future research.
Chapter 5: Conclusions, Discussion, and Future Research

Summary of the Study

Before stating conclusions from the data presented in Chapter 4 and making recommendations for future practice and research, this chapter will first summarize the purpose and design of the study. This study was conceptualized as a way to apply higher education assessment practices in an informal educational setting, building a set of practices cultural institutions could use to capture the mission-aligned impact their programs are capable of having. Specifically, the Morton Arboretum’s N-ACT program was examined to see what if any impact the length of someone’s engagement with the program had on how that participant feels, thinks, and acts toward nature. Such outcomes align directly with the Arboretum’s mission to encourage the public to take action on behalf of trees, a mission and institutional history that were described in the study’s opening chapter.

Chapter 1 set the contextual stage of the study, describing the Arboretum as an institution and reviewing commonalities between a science-focused outdoor museum and an institution of higher learning. The literature review of Chapter 2 discussed the idea of education as a transformative experience, whether that experience occurs in a classroom setting or in the entirety of someone’s surroundings; their “learning ecology.” The role cultural institutions like the Arboretum play in that ecology was also reviewed, as well as the history of attempting to capture impact of that role by cultural institutions. These attempts have historically relied on easily gathered attendance numbers, which fall short of addressing the specifics of any mission an institution has been founded around. Museums face questions regarding capturing their impact similar to those addressed by higher education to document the benefits completing a
degree has for graduates. Literature on typical museum visitors was also reviewed in order to gain a sense who the Arboretum’s participants might be. Finally, the Arboretum’s setting as a place to manifest biophilia, the genetically hard-wired need to learn and be close to nature, set the thematic framework for the study.

The study’s design was described in Chapter 3. That chapter also reviewed why a mixed-methods design was chosen as a way to build a bridge between the academic motivation for this study, and the practitioner need to be able to quantify the impact of informal education programs. The mixed-methods approach was modeled on practices typical in higher education learning outcome assessments in the hopes of being able to demonstrate to other cultural institutions how these existing practices could be applied to capture changes cultural institutions are able to elicit in audiences as demonstration of mission-focused impact. The success of this design for that intent will be discussed later in this chapter in terms of implications for Arboretum practices and for cultural institutions more broadly.

To deploy the explanatory convergent case study design, the researcher used a modified version of an existing survey instrument, the Nature Relatedness scale, which measures an individual’s cognitive, affective, and behavioral connection to nature. The instrument was modified to include items investigating the presences of specific intended outcomes of the N-ACT program, as well as demographic items to categorize participants. The primary manner in which participants were grouped involved their length of engagement with the N-ACT program, which addresses a series of research questions from this study on how someone’s time spent engaging with the program could impact their connection to nature. Based on the number of N-ACT courses taken, participants were placed into “high” and “low” engagement categories for the quantitative analysis of Phase I of the study. This was followed by the qualitative Phase II,
where survey participants willing to attend a focus group session met virtually to discuss their experience in the N-ACT program in more detail.

Chapter 4 presented findings from both phases of the study and began the process of integrating them into a single narrative on the effectiveness of the N-ACT program to achieve its intended outcomes. There is quantitative and qualitative evidence in the findings to reject the null hypothesis for each of the research question’s three sub-areas, a conclusion that will be further explored in this chapter. The qualitative data from Phase II also brought new connections between the intended outcomes of the N-ACT program and the mission of the Arboretum to light, which are discussed further in this chapter. The mixed-methods design’s ability to capture new connections between outcomes also adds to the argument that this higher education-modeled series of practices does in fact resonate with a cultural institution’s efforts to capture the impact of informal education, a point that has implications to discuss in this chapter.

As the close of this study, Chapter 5 not only summarizes conclusions from the quantitative and qualitative data collected, but also explores what these conclusions mean for the Arboretum as an institution as well as what higher education practices have to offer for capturing the impact of informal education programs. Implications for other cultural institutions as an additional broader audience are also discussed. Limitations of the study and challenges that occurred in its implementation are discussed, before delving into possible directions for future research. The idea that higher education can shape the practices of cultural institutions seems to be fertile grounds for future work. Chapter 5 ends with a broader discussion of the importance of the work this study conducted, tying back into the significance to audience sections discussed in the opening chapter and placing the study’s findings in the larger context of the issues with which cultural institutions currently wrestle.
Conclusions

Length of Engagement

The null hypothesis for each of the study’s three sub-questions is rejected by the engagement categories having significantly different scoring on multiple questions.

- Sub-question one, on whether participation in the N-ACT program would lead to an increase in feelings of affinity toward trees and nature was supported by significant findings for length of engagement on:
  - Participants feeling connected to all living things on the earth ($F(5.942), p=.02$).

- Sub-question two, on whether participation in the N-ACT program would lead to an increase in the belief that someone’s actions can positively impact their surroundings was supported by significant findings for length of engagement on:
  - Participant responses on N-ACT courses strengthening their belief that their actions can have a positive impact on their environment ($F(9.669), p=.002$).
  - Participant responses on N-ACT courses increasing their understanding of connections in the local ecosystem ($F(11.292), p=.001$).

- Sub-question three, on whether participation in the N-ACT program would lead to an increase in conservation action was supported by significant findings for length of engagement on:
  - Participants’ having taken local conservation action in their own yard or area ($F(9.804), p=.02$).
  - Participants feelings about nature affecting how they live their everyday lives ($F(4.131), p=.04$).
Results from these five items of the modified Nature Relatedness scale represent changes in how N-ACT participants feel, think, and act toward nature thanks to their length of engagement with the program. These findings both reject the null hypothesis for all three research sub-questions, and align with the Morton Arboretum’s mission-focused outcomes for the N-ACT program as part of its informal education efforts to catalyze the public to take action on behalf of trees and plants. The multi-variate analysis applied to each of these questions controls for how much variance each of the independent variables like engagement level, age, gender, membership status, and intent in registering for the program have on each other, meaning the significant findings for length of engagement on multiple items reveal there is in fact an outcome-related effect for how long someone engages with the N-ACT program. Significantly different responses between engagement groups on these five items demonstrate the N-ACT program’s ability to change participants’ thoughts and actions in a way that align with the Arboretum’s institutional mission. Additionally, capturing a measure of the institution’s impact with its audience in a quantitative fashion can also be used for reporting to external audiences, a point explored further in the implications section. That these findings were present on a mix of questions that were original to the existing Nature Relatedness scale and added for the purposes of this study to better match the intended outcomes of the program is positive support for the idea that cultural institutions can use existing instruments to capture impact, but is also worthy of further discussion in the section on limitations of the study later in this chapter.

**Age and Gender**

As mentioned in Chapter 4, participant age and gender frequently resulted in significant differences between groups on responses. Generational and gender differences are unsurprising, and many of the questions where age alone was the significant difference found make sense upon
further review. Specifically, that age would be a significant difference on a question regarding an ideal vacation spot being a remote wilderness area (\(F(7.519), p=.007\)) or how aware someone is of environmental issues (\(F(13.805), p=.0003\)) align with previous findings on age differences regarding the importance of conservation and the reality of climate change (Otto & Kaiser, 2014).

An interesting trend in these results was a significant difference in responses based on gender for questions regarding someone’s relationship to nature being an important part of who someone is (\(F(7.310), p=.008\)) and whether someone’s actions have the power to change problems in other places or parts of the planet (\(F(6.428), p=.004\)). Gender also lead to a significant difference in responses on the survey item regarding how connected to all living things on the earth (\(F(4.267), p=.04\)) cited above as support for rejecting the null hypothesis on sub-question one. That men and women responded to these questions differently is not a surprise; differences in awareness of environmental issues and the power of actions to impact surroundings by gender come up consistently in conservation literature (McCright & Xiao, 2014; McCright & Xiao, 2012; Hunter, Hatch, & Johnson, 2004). Beyond these findings aligning with past studies, there does appear to be some commonality between these three questions specifically that could be investigated further. This commonality and the gender differences that drew attention to these items as a group in the findings could be an area for future research in addition to those discussed later in this chapter.

Overall, findings from Phase I aligned with past research into age and gender differences in attitudes toward nature. More importantly, the findings on the impact of engagement length give the Arboretum a demonstratively quantitative view of the impact engaging with the N-ACT program had on how connected participants felt toward nature, the extent to which participants
believed their actions could positively impact their surroundings, and the extent to which participants undertook conservation action in those surroundings. Quantitatively capturing mission-aligned impact in such a way represents tremendous progress in terms of the Arboretum’s efforts to document how engaging with the institution’s informal education programs can in fact change an audience’s thoughts, feelings, and actions toward nature.

Qualitative Themes

Even after being moved to an online format due to the COVID-19 outbreak, Phase II’s focus groups were able to gather qualitative data that supplements and enriches the quantitative data from Phase I. Participant discussions give greater depth to the survey’s open-ended responses on N-ACT courses representing a tremendous amount of knowledge participants can tap into. More than being stores of knowledge, courses give participants the ability to put that knowledge to use in local settings in addition to natural areas where they might volunteer. It is this localized action that leads to additional impacts in the community, an insight into the positive impact of the N-ACT program that would not have been accounted for without the qualitative data collected for Phase II.

Action leading to communication. In addition to supporting the conclusions drawn from the quantitative data, the focus groups also illustrated a connection between participants taking local action and the opportunity that action can lead to of spreading their knowledge to family and friends. Having program participants communicate about the benefits of conservation and why their restoration work is necessary to non-participants nearby is another mission-aligned outcome for the N-ACT program; each program participant that in turn advocates to new audiences on the importance of conservation and the power of an individual’s actions to impact
their surroundings is another continuation of the Arboretum’s mission and goals of moving the public to take action. The focus groups unveiled a direct connection between N-ACT participants taking local action and that action leading to more opportunities for participants to communicate to others about conservation and restoration topics, a point that demonstrates the need for cultural institutions to collect both quantitative and qualitative data in their evaluation practices. This point is explored further as an implication for cultural institutions later in the chapter.

Changes in awareness. The way focus group participants described how they interact with friends and neighbors about their conservation habits adds another facet to the quantitative data’s ability to reject the null hypothesis for each of the three sub-questions. The focus groups’ participants’ surprise at how much restoration and conservation knowledge is absent in the general public illustrates just how much power to change perspective exists in the N-ACT courses. The participants themselves as a product of their learning experiences may not have even been able to put the change in their thinking into words, but a thought that was expressed from multiple participants was just how little the broader public knows about the basics of invasive plant identification and removal without having engaged with the N-ACT program or something similar. While it is true this type of knowledge is foundational to the work restoration volunteers have to do and a critical piece of N-ACT content, it is not inherently present in someone’s thinking without learning it somewhere first. The focus group participants would not have been able to notice this knowledge gap if they themselves had not participated in the N-ACT program and other Arboretum or conservation resources. Across engagement levels with the N-ACT program, all focus group participants commented on this knowledge gap to some extent and how it surprises them each time.
The insights into participants’ perspective on the knowledge gap they had been able to build thanks to their engagement with the N-ACT program provided an opportunity for this study to come full circle. The argument for the use of higher education practices in an informal setting stems in part from the idea that people are all products of their learning ecologies; learning is transformative regardless of setting and everyone’s settings are unique. That uniqueness is part of what makes assessing the impact of a cultural institution’s informal education programs so challenging. The focus groups’ recognition of the fact that their conservation and restoration knowledge sets them apart from those who have not taken an N-ACT course capture the very challenge for institutions like the Morton Arboretum that this study was designed to address. The participants’ discussion of their perceived knowledge gap with non-participants is evidence of both the change an institution like the Arboretum is seeking to make, but also why it is so difficult to capture that change has happened. Thankfully, the mixed-methods design of the study made it possible to document this impact, and suggests an implication for the Arboretum and the broader cultural institution audience as a whole in terms of changes that are needed for future evaluative efforts.

**Implications for the Morton Arboretum**

This study’s findings and their documentation of the mission-aligned outcomes a program like N-ACT is capable of having suggest there are several ways the Arboretum can carry this evaluation work forward, both in terms of how N-ACT is engaging participants in a meaningful nature and how informal education programming in general is evaluated. This study illustrates that there are ways to use higher education practices to capture impact in an informal setting, and the implications for both the Morton Arboretum and cultural institutions in general suggest what these practice could be.
Capturing Impact

As a cultural institution regularly looking for external funding opportunities, the measure of positive impact this study represents is a significant point in the Arboretum’s favor. The mixed-methods process applied in this study seems to have addressed the challenges of assessing a program’s ability to elicit change in a spectrum of participants who are all unique products of their own learning ecologies by controlling for different independent variables in the quantitative study and asking the right questions to generate meaningful qualitative discussion in the qualitative portion. This design and its application to N-ACT participants produced findings that demonstrate the N-ACT program is in fact achieving precisely what it was intended to achieve in terms of catalyzing individuals to take action by changing their thoughts and feelings toward nature. The findings of this study will likely be a part of the Education department’s narrative on why its programs exist for the foreseeable future because of the mission-aligned impacts that have been captured, but these findings will also serve as motivation to apply these evaluation practices to other programs as well, increasing the Arboretum’s ability to demonstrate the change it inspires in the community over time. Even with the challenge of assessing elicited change in a group of participants arriving at programmatic engagement at different levels of readiness to be changed, this study moves the idea of programs shaping the minds of their participants from the anecdotal to the demonstrated. The mixed-methods design and its higher education-inspired procedures will be applied to the evaluations of more Arboretum programs in the future.

Establishing Practices

On a broader level, the changes in evaluative practices applied in this study suggest the impact of a cultural institution can be quantified to some extent, a discussion members of the
Arboretum are already engaged in with other gardens and arboreta around the country. This study will bolster the Arboretum’s argument that evaluative processes need to be focused on more than simple attendance numbers, and demonstrate that both quantitative and qualitative measures must be in place to capture the full dimensions of mission-aligned impacts institutions are seeking to have.

The application of higher education assessment practices to capture the impact of one of the Arboretum’s informal education programs makes it clear that the mixed methods design does in fact capture the reality of a practitioner’s education program in a robust, detail-rich manner. The ability of the focus group’s data to unearth the idea that participants taking local action as illustrated in the survey findings also leads to increased communication about the benefits of conservation is a powerful messaging point, but also demonstrates why both types of data need to be present when evaluating a program in a practitioner setting. The quantitative Phase I certainly gives credence to the idea of the N-ACT program having measureable impact, but the program’s evaluation needed the additional depth of qualitative investigation to bring additional connections between the N-ACT program’s intended outcomes and the Arboretum’s broader mission to the surface.

For this study, one lesson in terms of establishing future evaluation practices for the Arboretum and cultural institutions in general is the need to have both types of investigation present in an evaluation cycle. While this study’s mixed methods design will give institutions a roadmap to capturing their own programs’ impact, that roadmap also requires additional work to complete, a critique of this study regarding the gap between researcher and practitioner perspective that will be further explored later in this chapter.
Another implication for cultural institutions stemming from this study is the need to curate additional resources for increased audience research if mission-aligned impact is to be more readily captured. This is illustrated by the Nature Relatedness scale’s ability to touch on some aspects of the Arboretum’s mission, but also several other facets of an individual’s connection to nature that have little to no bearing on the intended outcomes of a program like N-ACT. This disconnect between mission and instrument is explored in more detail in the critiques section below, but what it implies for the Arboretum is that if existing instruments are not complete matches for the program being evaluated and its outcomes, more resources are needed to create instruments that do match. In higher education, general education assessments can frequently use existing instrumentation created specifically to assess outcomes like critical thinking, global perspective, or communication for students (Blankenberger et al., 2017). For cultural institutions, the context of a unique mission guiding programs is not as general, and likely need more specialized instrumentation. While the mixed methods approach is one all cultural institutions should consider implementing, doing so with instrumentation that is incompatible with the impact programs are intended to have sets the institution up to fail.

**Implications for Broader Cultural Institution Practice**

Chapter 1 of this study established the Morton Arboretum as a cultural institution of some global renown; the Arboretum has a vocal presence within national and international organizations that gives the institution some influence on how gardens conduct themselves. This influence makes it a distinct possibility that implications from this study for the Arboretum can eventually become implications for a broader audience of other cultural institutions. As a recent example, in February of 2020 at the American Public Garden Association’s Education Symposium evaluation findings from another Morton Arboretum program, the Youth Volunteer
Program summarized in Chapter 1, were presented by this researcher as part of a session on how changing the evaluation approach to informal education programs changes the stories institutions can tell about them. In its 15-year existence, evaluating the Youth Volunteer Program has been a microcosm of the struggle all museums have over how to capture their impact; success factors have gone from purely attendance-based, to including some focus group discussion, and finally to a pre/post program survey instrument to capture changes in perspective related to items aligned to the Arboretum’s mission after finishing a season of the program. Those quantitative survey results are also supplemented by interview testimonials from participants, as well as follow-up contacts with participants who have gone on to enroll in college. This evaluation evolution has given the Arboretum a much deeper understanding of the impact the Youth Volunteer Program is capable of having, and as such the stories the institution tells to outside observers have become much more powerful. Sharing that approach with other garden and arboretum institutions is one way to help these other cultural institutions achieve similar results.

The N-ACT program evaluated for this project has progressed through a similar development cycle, with this study intended to be shared with the broader cultural institution audience to demonstrate what the application of higher education practices could help informal education achieve. Multiple chapters of this study have touched on the challenges of capturing impact at cultural institutions; the temporary nature of program engagements, the workload and skillsets of staff not always accommodating evaluation, the need to better align outcomes to mission are all challenges this study was intended to address and has to various extent. However, the findings of the study alone may not be enough to convince an audience of other institutions to change their practices. If these findings are part of an argument the Arboretum makes to gain
additional funding and is successful, then the motivation for other institutions to find a way to apply these practices will increase.

The debates surrounding the value of a higher education degree and the impact of informal education programming are philosophically the same. In both scenarios, outside observers are requesting evidence that engaging with a program that has intended learning outcomes results in said outcomes, whether they are preparation for further study or professional careers in the case of higher education, or changes in perspective and behavior after engaging with an informal education program. With these similarities, it stands to reason that the same practices that allow higher education to prove the worth of a degree program can be implemented in an informal education environment to the same effect. The findings here support that idea, demonstrating that a process modeled on higher education assessment practices can be applied to informal education programs. While any such change can never be completely attributed to the program alone with each participant being a product of the entirety of their experiences, the use of these practices does capture a snapshot of the changes in participants while they engaged in said program that cultural institutions can use to build a case for support.

The implications for cultural institutions as a whole are that evaluation practices need to evolve and higher education practices have some degree of utility in demonstrating how. As Jacobsen (2016) states, “museums aren’t wrong, they’re just behind.” Cultural institutions have struggled with how to capture the impact they are capable of having with their audience, and applying practices from higher education’s efforts to quantify the impact completing a degree can have can help museums do just that. If education is transformative, then practices to assess the degree to which transformation has occurred in learners engaging with an experience intended to elicit a specific change can work in formal as well as informal settings. This study,
for all its critiques listed in the following section, is one that demonstrates just how formal education assessments can help informal education answer similar questions.

**Critiques of the Study**

**Cumbersome Design**

While the advantages of a mixed-methods design include a richness of data and “opportunities for the exploration of the quantitative results in more detail” (Ivankova, Creswell, & Stick, 2006 pp 3) that make it clear this type of design needs wider implementation at cultural institutions, the same phased design that allows for such detail make the methodology itself time-intensive to carry out. For institutions already struggling to find resources to conduct program evaluations, the feasibility of such a design may be limited. A mixed-methods design’s ability to dive deeply into the happenings of a specific program is certainly a strength, but that strength comes at a cost of time and resources that make a wider implementation of this or similar designs a challenge outside of an academic or research setting. Any implications for practice need to actually be implementable for the audiences of this study to be meaningful, and despite the promise of providing a greater understanding of a program it is applied to, the mixed-methods design of this study may be an unrealistic standard to set for many institutions. From that perspective, while this study was able to capture the specifics regarding the mission-aligned impact of the N-ACT program, demonstrating this process’ ability to capture impact exposes other cultural institutions to a design they could be unable to sustainably undertake as practitioners.
Positionality and Qualitative Data

Being a practitioner at the cultural institution that was the setting for this study undoubtedly influenced how the author interpreted the data collected for this project. As mentioned in Chapter 3’s positionality statement, the author is just as much a product of a unique learning ecology as the N-ACT participants who shared their feedback. A significant part of that ecology is the professional role the author plays at the Arboretum. It would impossible for this background not to color how the focus group testimonials were interpreted, although even the formality of the mixed-methods design and its multi-phased approach provides a metaphorical layer of intellectual insulation between the author’s roles as both practitioner and researcher. This project was intended to bring higher education practices to a more informal environment, while at the same time the author was a practitioner trying to employ the more rigorous evaluative process of a researcher. In a parallel to the challenges museums have with each visitor arriving at an engagement at unique levels of readiness to be changed, it is difficult to quantify the amount of separation the researcher was able to achieve from the role of practitioner.

The author’s insider status at the Arboretum may be a point of concern for the study in general but it is better to acknowledge it and discuss how it may have influenced any findings versus sweep it under the rug completely. Apart from the idea of positionality, being a Director for the department responsible for delivering the N-ACT program while simultaneously conducting focus groups with N-ACT participants does put the researcher in a position that could be interpreted as authority by said participants. It is possible, however unlikely, that participants in such a discussion would be hesitant to openly or completely share their feedback for fear of offending such a staff person. This is a risk any study that leans toward an action research perspective takes; the same professional responsibilities that give practitioners uniquely qualified
insight into a specific scenario could also blind those same practitioners to whether or not they are simply hearing what participants think they want to hear. The nature of studies with human subjects is rarely black and white; this study sit comfortably in a shade of gray where findings can be used to improve the practices of cultural institutions but can also be viewed with a healthy dose of skepticism.

Changes Mid-Study

The 2020 outbreak of COVID-19 that occurred during the data collection for this study was another complication that could have some influence on findings. While the Arboretum was fortunate to already have several digital resources to employ while local residents sheltered in place, having to move focus group discussions from in-person to online was a deviation from the method as originally designed. There was some irony in discussing the participants’ experience in the N-ACT program and how it impacted their feelings of connection with nature via a digital platform, but that irony did not seem to impact the process of conducting multiple focus groups to any major extent. The COVID-19 outbreak itself was also a point of discussion that was unplanned for; while the shelter in place mandate took effect the Arboretum initially kept its grounds open but buildings were closed, and ultimately closed completely just prior to the discussions happening. The Phase II focus groups being run by a researcher who was also an Arboretum employee gave participants a chance to ask questions to a staffer they otherwise would not have had, which lead to additional topics being discussed. While these additional topics did not seem to detract from or stop the intended topics being discussed, including the focus groups as a method to gather qualitative data provide a possibility for distraction that institutions looking to apply a mixed-methods design would be wise to avoid.
Self-Reported Data

The self-reported data making up the quantitative findings of Phase I could also be considered a limitation of the study. There are bound to be participants misremembering their experiences in the N-ACT program, confusing it with other Arboretum courses or even trainings from other similar organizations. It was a point heard multiple times in the Phase II focus groups; for those interested in conservation and restoration work the Arboretum is not the only game in town. Also in terms of self-reported data, “high” versus “low” engagement as defined by two or fewer courses may have also been too broad a characterization of how participants have engaged with the N-ACT program. That meant “high” scores ranged from 3 to as many as 14 as reported by respondents. Again, the self-reported nature of the data also means this data could be inaccurate, but it illustrates part of why cultural institutions have struggled with these issues for decades.

While this study captures that level of engagement as defined here does in fact have a significant effect on how participants feel, think, and act toward nature, this could also be a reflection of the idea that people who feel more closely connected to nature might be more likely to take more courses at the Arboretum to begin with. The qualitative Phase II addresses this concern to some extent, by asking participants directly if they were motivated by their experience in the N-ACT program to think and act differently in regards to their surroundings. Part of the challenge of completing a study on the impact of cultural institutions is that everyone in that institution’s audience is a product of their combined learning ecology. This is one of the points this study springs from to begin with; everyone’s perspective is a summation of their total experiences. There is no way for cultural institutions to control for how ready to take mission-
aligned impact an audience member is, and different dosages of program exposure will have
different levels of impact on each individual audience member.

The inability to control for someone’s prior experiences is represented in the qualitative
data collected by having Katie as a focus group participant. Katie was the only focus group
participant out of 7 who was categorized as “low” engagement in Phase I by virtue of having
enrolled in fewer than three courses. More so, she had enrolled in two but only engaged with
one, finding it difficult to connect with the online-only format. However, despite being in the low
engagement category with the N-ACT program, she is actively engaged in a conservation site
closer to her home in Chicago and is the lead steward at the Chicago Park District’s McKinley
Park. Testimonials from Katie’s participation in the focus group session suggest her survey
responses likely aligned with what was hypothesized for someone in the “high” engagement
category, but for the purposes of this study her information likely skews the “low” engagement
responses. That is the challenge for cultural institutions in general; while the most potential for
change is represented in an audience member that is a blank slate in terms of interest, informal
education programs as a free-choice endeavor tend to attract a majority of participants who are
already like-minded to some extent. Deeper dives with audience members like the one that
happened in this study are the only way to set a baseline for where their audience is starting
from, and doing that for each audience member in each program or engagement when visitor
counts top 1 million annually does not feel possible, let alone sustainable. Institutions may be
able to complete snippets of audience impact data, but capturing impact in its true totality may
indeed be “immeasurable” as Borun (1977) put it. The unknowable background experiences of
program participants is summarized here as a critique of this study and a point explored in
Chapter 2’s literature review as well, but it also makes findings from this study even more
impressive. That there was still an effect for level of engagement even when participants like Katie could find themselves in the “low” engagement category makes the presence of an effect for length of engagement all the more worthy of note.

Instrumentation

The use of an existing instrument was intended to make the process of capturing mission-aligned impact less of a challenge for institutions like the Arboretum; institutions would theoretically benefit from using an existing measure both in terms of bringing more scientific merit to their in-house program evaluations, and also keep the workload of creating an entirely new instrument and ensuring it was reliable and valid off of current staff. What is more, the use of an existing instrument for an informal education program could be a bridge between researcher and practitioner that helps both yield improved findings moving forward. The practitioner benefits by having sound thinking and reasoning behind their program, and the researcher yields findings with true application possibilities.

For this study, using an existing instrument proved more challenging through the attempt to apply the instrument in a practical setting, with an institution and program with their own unique context surrounding the circumstances of public engagement. Just as the time-intensive process to ensure this project was rigorous enough to meet academic standards can make similar approaches challenging for practitioners not pursuing graduate degrees, the use of a modified version of an existing survey instrument is not necessarily an easier path to evaluating a program. Specifically, the Nature Relatedness scale captures cognitive, affective, and physical relationships to nature that are according to the instrument’s originators “relatively stable over time” (Nisbett, Zelenski, & Murphy, 2009) and not easily influenced. This study suggests that is
very much not the case, and engaging in a program like the N-ACT does in fact have the potential to change how someone thinks, feels, and acts toward nature. These findings do not suggest the Nature Relatedness instrument is not a valid and reliable measure, but do illustrate of the gap between researcher and practitioner realities that makes a cultural institution’s efforts to accurately capture impact so challenging to begin with. While it is true that responses on some questions from the existing Nature Relatedness scale did in fact demonstrate a difference between groups based on their engagement with the program, cultural institutions might not find much stopping them from creating their own imperfect questions that closely align with their program outcomes instead of trying to find an existing instrument that has been vetted and tested but does not explore what their programs are trying to accomplish in a close enough fashion to be meaningful.

**Missing Motivation**

Finally, there is a significant piece of the audience puzzle missing from this study; the question of what motivates an audience member to take enough of an action to enroll in a program like N-ACT in the first place. This study did include a survey item on a participant’s intent in enrolling in a course to begin with, whether they were looking to enroll in a single course on a specific issue or complete the entire certificate. But there is much more that goes into what convinces someone to engage with an institution like Morton Arboretum, and this study could not explore that motivation while also attempting to quantify the impact of the N-ACT program.

Several museum-based studies explore motivation as a factor in audience decisions as cited in Chapter 2, but they are overwhelmingly set at institutions like art museums, zoos, or
aquariums. There is enough similarities between genres of cultural institutions that some
parallels can no doubt be drawn between what motivates someone to interact with an open-air
zoological collection and an outdoor tree museum, but there is also knowledge to be built by
exploring what makes the motivators for each audience unique. For an institution like the Morton
Arboretum, if this study demonstrates that its programs can have mission-aligned impact for a
range of participants whether they are in their first program or have taken 12, the next step to
furthering its mission is examining what motivations triggered different audience members to
engage with the Arboretum in the first place. That knowledge can then be used to try and engage
even more audiences, in an ever-increasing cycle. With all the threats our environment currently
faces, there is no time like the present for the Arboretum to engage as many people in its mission
as it can, and more research on audience motivation should be a step toward making that happen.

**Recommendations for Further Study**

In addition to continuing to explore what motivates members of the public to be more
engaged with a nature-based institution like the Morton Arboretum, the idea of cultural
institutions creating more of their own measures to evaluate impact suggests a fertile ground for
additional research, specifically practitioner-informed research that truly represents the best of
both practices. Museums, zoos, aquariums, and gardens are all doing engagement work with
impact that can likely be captured through a process similar to this study, but it is unlikely every
cultural institution in existence has mission outcomes that align with an existing instrument. The
reality is that between the context of each individual program in its own contextual surroundings,
the intricacies of institutional mission, and the challenge of engaging guests of different
readiness to change, unique instrumentation is likely needed to accurately capture whether the
intended impacts are achieved in each case. That instrumentation would in turn need to be tested
and validated as part of the applied evaluation process, and could keep a field of researchers busy for years to come. While the debate about the value cultural institutions provide their communities does not appear to be slowing, the gap between researcher and practitioner approaches to exactly how that impact can be captured suggests there is still very fertile ground for additional research into what impact institutions like the Morton Arboretum can have with the broader public.

The differences in responses according to gender are also worthy of further study, a point that is clearly already in the mind of a significant portion of conservation practices researchers whose work findings from this study align with. That findings from this study align with pervious work is not necessarily particularly fertile ground for future research, but the individual specifics of the Arboretum’s unique audience profiles does mean more can always be learned by conducting deeper research dives into that audience. For the Arboretum itself, more audience research will not just be an implication for practice, but an area to funnel additional resources and time toward.

Beyond the testing of unique instrumentation that should accompany more institutions using a mixed-methods approach and the Arboretum’s own possible future efforts at increased audience research, the findings of this study suggest one additional avenue for future discussion: why cultural institutions found themselves so far behind in their evaluation efforts in the first place. This question was touched on in Chapter 2; attendance numbers as a measure of success represented a simple way to attach quantitative measures to ideas of impact that can be difficult to define. And the unique skillsets required to conduct more in-depth investigations into what changes programs are able to elicit in participants are often lacking when cultural institutions are staffed by discipline experts that spent their entire academic career preparing to focus on one
specific genre of art, species of fish, or field of science. But the benefits of being able to demonstrate that impact are unquestionable; why was such a gap between programming and evaluation allowed to develop? This may not be a research question that could support an entire field of study, but it is certainly one capable of producing the occasional published piece or presentation. If changing the evaluation practices of cultural institutions will allow them to tell better stories to external audiences about what their programs do, there must also be a way to tell the story about why those changes were necessary in the first place.

Significance to Audiences

A final thought regarding audiences; one interesting aspect of setting this study at a cultural institution is the nature of cultural institutions having other institutions as audiences in addition to their general public visitors. Morton Arboretum is connected socially and professionally to several gardens around the globe; staff move on from the Arboretum to lead gardens like Holden Arboretum in Kirkland, Ohio, and the Huntsville Botanic Garden in Alabama. Arboretum staff regularly travel the globe and represent the institution at conferences attended by other members the APGA, BGCI, the American Alliance of Museums (AAM), the Institute of Museum and Library Sciences (IMLS), even the Visitor Studies Association (VSA) where studies like this one might be very well received. As such, these other institutions represent a second-level audience beyond the general public. This study and its findings can have implications for the Morton Arboretum as the host institution of the program that was evaluated, but changes to practices at the Morton Arboretum have the potential to influence gardens and arboretum everywhere because of the Arboretum’s influence and reputation in the field.
The cultural institutions willing to dedicate more time and resources toward how they might assess the impact they are having on the community in turn have audiences of their own, giving this capstone a chance to impact other institutions represented in that second tier of audiences. A richer assessment of a specific program at the Morton Arboretum helps the Arboretum better capture its positive impact, but the process of creating that assessment can be modeled to other gardens and arboretums as they also address capturing their own impact, giving this study a secondary audience of significance beyond just the setting of the Morton Arboretum. By helping other institutions better capture the positive impact they can have, this capstone study has an even broader audience comprised of everyone who engages with the institutions Morton Arboretum can model this process to. That ripple effect into other audiences, combined with the knowledge gap of an entire field this capstone will contribute to filling, give this project a tremendous potential for significance moving forward. As with any study, exactly who is motivated to use findings in their own work is essentially out of the researcher’s hands, but the methodology taken to address these questions are a combination of practitioner and researcher practices, resulting in valid findings that ideally can be directly applied in future scenarios. Because of the unique setting of this study and the background of the researcher behind it, this capstone does have advantages not commonly found in typical higher education studies. It will be up to cultural institutions as an audience whether those advantages lead to changes in practice.

Ultimately, while this study serves as an improved evaluation process for the Morton Arboretum’s N-ACT program, the fact that the design implemented for the study resulted in a richer, more in-depth evaluation also demonstrates the utility of higher education’s practices in an informal setting. The academic context for this study as a student research project required the presence of more formalized processes and addressing specific research questions, but even
without that formalized structure an institution applying a similar mixed-methods design collecting quantitative as well as qualitative data would have a much clearer picture of the impact a program was having versus the simple attendance numbers that are so readily used by cultural institutions. This study and its findings will lead to much stronger narratives around the impact of the N-ACT program as an example of the positive impact the Arboretum is capable of having, and implementing similar designs to evaluate more of the Arboretum’s programming is expected to have the same result. Even when positive mission-aligned impacts are not found, implementing these evaluation practices can lead to changes or improvements in efforts to reach a program’s intended outcomes, still resulting in positive change. This can be true for more institutions that just the Arboretum as well; by the Arboretum sharing its thinking and approach toward better its evaluation practices, these practices could take root in more cultural institutions and yield them all similar results. Regardless of the formal or informal nature of the education program being examined, it is clear that the mixed-methods design used in this study can be utilized to gain a clearer picture of the participant experience in said program.
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Appendix A: “Nature Relatedness” instrument

For each of the following items, please rate the extent to which you agree with each statement, using a scale from 1 to 5, 1 being “disagree strongly,” 5 being “agree strongly.” Please respond as you really feel rather than how you think “most people” feel.

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<tr>
<td></td>
<td>Disagree strongly</td>
<td>Disagree a little</td>
<td>Neither agree or disagree</td>
<td>Agree a little</td>
<td>Agree strongly</td>
</tr>
</tbody>
</table>

1. I enjoy being outdoors, even in unpleasant weather. __
2. Some species are just meant to die out or become extinct. __
3. Humans have the right to use natural resources any way we want. __
4. My ideal vacation spot would be a remote, wilderness area. __
5. I always think about how my actions affect the environment. __
6. I enjoy digging in the earth and getting dirt on my hands. __
7. My connection to nature and the environment is a part of my spirituality. __
8. I am very aware of environmental issues. __
9. I take notice of wildlife wherever I am. __
10. I don’t often go out in nature. __
11. Nothing I do will change problems in other places on the planet. __
12. I am not separate from nature, but a part of nature. __
13. The thought of being deep in the woods, away from civilization, is frightening. __
14. My feelings about nature do not affect how I live my life. __
15. Animals, birds, and plants should have fewer rights than humans. __
16. Even in the middle of the city, I notice nature around me. __
17. My relationship to nature is an important part of who I am. __
18. Conservation is unnecessary because nature is strong enough to recover from any human impact. __
19. The state of non-human species is an indicator of the future for humans. __
20. I think a lot about the suffering of animals. __
21. I feel very connected to all living things and the earth. __
Appendix B: Modified Nature Relatedness survey instrument

What is your current zip code? __________

In what year were you born? __________

Please select the option(s) that best describe your gender identity.
   a) Female
   b) Male
   c) Non-binary
   d) Other (please specify): __________
   e) Prefer not to answer

With which of the following categories do you identify? Please select all that apply.
   a) American Indian or Alaska Native
   b) Asian
   c) Black or African American
   d) Hispanic, Latinx, or Spanish origin
   e) Middle Eastern or North African
   f) Native Hawaiian or other Pacific Islander
   g) White
   h) Other (please specify): __________
   i) Prefer not to answer

What is the highest level of education that you’ve completed?
   a) Some high school or less
   b) High school graduate or GED
   c) Some college or technical training
   d) Technical college or technical training
   e) Associate degree
   f) Four-year college degree (Bachelor’s degree)
   g) Professional degree (MD, JD, CPA)
   h) Graduate degree (Master’s degree, PhD, MBA)
   i) Prefer not to answer

What was your intent in enrolling in N-ACT courses?
   a) Complete the N-ACT certificate
   b) Complete a single course that interested me
   c) Complete 2 or 3 courses that interested me

How many N-ACT courses have you completed? __________

Are you still engaged in conservation practices? Yes/No

If no, why not? _____________________________

Have you used what you learned in your N-ACT courses in your own yard or local land? Yes/No
If no, why not? _____________________________

What was your biggest takeaway from taking N-ACT courses? _____________________________

For each of the following items, please rate the extent to which you agree with each statement, using a scale from 1 to 5, 1 being “disagree strongly,” 5 being “agree strongly.” Please respond as you really feel rather than how you think “most people” feel.

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<tbody>
<tr>
<td>Disagree strongly</td>
<td>Disagree a little</td>
<td>Neither agree or disagree</td>
<td>Agree a little</td>
<td>Agree strongly</td>
</tr>
</tbody>
</table>

1. I enjoy being outdoors, even in unpleasant weather. __
2. Some species are just meant to die out or become extinct. __
3. Humans have the right to use natural resources any way we want. __
4. My ideal vacation spot would be a remote, wilderness area. __
5. I always think about how my actions affect the environment. __
6. I enjoy digging in the earth and getting dirt on my hands. __
7. My connection to nature and the environment is a part of my spirituality. __
8. I am very aware of environmental issues. __
9. I take notice of wildlife wherever I am. __
10. I don’t often go out in nature. __
11. Nothing I do will change problems in other places on the planet. __
12. I am not separate from nature, but a part of nature. __
13. The thought of being deep in the woods, away from civilization, is frightening. __
14. My feelings about nature do not affect how I live my life. __
15. Animals, birds, and plants should have fewer rights than humans. __
16. Even in the middle of the city, I notice nature around me. __
17. My relationship to nature is an important part of who I am. __
18. Conservation is unnecessary because nature is strong enough to recover from any human impact. __
19. The state of non-human species is an indicator of the future for humans. __
20. I think a lot about the suffering of animals. __
21. I feel very connected to all living things and the earth. __
22. My N-ACT courses increased my understanding of connections in the local ecosystem. __
23. My N-ACT courses strengthened my belief that my actions can have a positive impact. 

Thank you for completing this questionnaire! Morton Arboretum will also be conducting some focus groups with N-ACT participants in the next few weeks. If you are interested in participating, please add your name and contact information below. Your information will be kept separate from survey responses as to maintain anonymity.

Yes, I am interested in participating! My name: ________________

My email: _____________________
Appendix C: IRB Student Research Narrative

Jeremy A. Joslin
NLU ID: N00460233

Institutional Review Board Application

Student Research Narrative

2.12.2020

Research purpose: This study is an exploration of how higher education assessment practices, those typically used in a degree program evaluation or for accreditation purposes, can be used by more informal education programming found at cultural institutions to capture mission-aligned impact. Specifically, recent participants of the Natural Areas Conservation Training (N-ACT) program at The Morton Arboretum will be surveyed and participate in focus groups in a phased, mixed methods explanatory convergent design to examine whether the length of time spent participating in the program impacts how participants think, feel, and act toward nature. This study could be informative to both the Arboretum as a way to improve evaluation practices and provide feedback on a specific program, but also to other museums, gardens, and other science-focused cultural institutions that frequently struggle with how exactly they can quantify the impact they have with their audiences.

Participants: 1794 people have participated in the N-ACT program in 2018 and 2019. N-ACT is part of the Arboretum’s suite of education programming for the adult audience, with an age range starting at 23 years old all the way through the mid-70’s. There is no upper age limit on Arboretum programming but the active nature of N-ACT course does limit participation to some extent. N-ACT participation by gender is a fairly even split, with 43% of the participants male, 57% female.

The Phase I survey/interview methodology described in the “Data collection” section below is not expected to yield 100% participation from all 1794 N-ACT participants in this study, and a conservative 9% participation rate would result in a participant pool of 160. All 1794 recent participants will be invited to participate.

Phase II, the focus group portion of the study to collect qualitative data, is expected to have a 5% response rate of participants self-selecting after completing the survey and offering their contact information, for a participant pool of 8.

Recruitment: Participants will be recruited via email from the researcher, who is also the Director of Education at the Arboretum. The text of messages sent to participants is included here as Appendix A and follows the requirements of NLU’s informed consent documents. Email is a preferred method to recruit evaluation participation for Arboretum programs, especially those that offer online content like N-ACT does. The N-ACT program has multiple partner organizations throughout the region and not all participants live close enough to attend in-person, necessitating the use of digital communication.
Data collection: The invitation to participate in the study will include a link to the survey instrument used, which is based on the “Nature Relatedness Scale,” an existing survey instrument that examines the participant’s cognitive, affective, and behavioral relationships with nature. The existing survey is included here as Appendix B. The existing survey does not include the demographic data necessary to categorize Arboretum participants, so a modified version of the original instrument will be used in Phase I of the study, and is included here as Appendix C. Completing the survey is a one-time commitment of approximately 10 minutes. After the survey is closed to further responses, a debrief letter will be sent for Phase I of the study, included here as Appendix D.

The survey includes a pair of questions that ask anyone interested in participating in the focus group interview portion of this study to include their contact information. Those that complete these questions will receive a second invitation email outlining the focus group procedures, the text of which is included here as Appendix E. The discussion points for the group interviews are also included as Appendix F, and the focus group debrief letter is included in Appendix G.

Risks and benefits: Completing/participating in the survey and focus groups pose minimal risk to participants. However, because one use the Arboretum will derive from this study is data that can be included in continuous improvement initiatives for programs, giving feedback on N-ACT will lead to more engaging and impactful programs in the future, something participants could benefit from if they continuing engaging with the Arboretum. The debrief form sent out to all N-ACT participants reinforces this thinking, and is included as Appendix H.

Consent and assent: Despite risk to participants being minimal, the recruiting letter does mention that completing the survey requires a participant’s completed consent form, which is included as Appendix I. The focus groups as Phase II of the study also have a second consent form, which is included as Appendix J.
Appendix D: Survey consent form

You are being asked to participate in an online survey that serves as both an evaluation of the N-ACT program and for my student research project for the EdD program at National Louis University. My student research uses higher education assessment practices to evaluate one of the Arboretum’s informal education program and will occur from February 29th 2020 through April 15th 2020. It is my hope that different evaluation practices will help the Morton Arboretum better capture the impact of our programs, and your participation in the survey will help document this. This document is to provide you information on the purpose of this survey and your rights as a participant.

Please understand that the purpose of this study is to build best practices for informal education programs to capture impact based on practices that have been used by higher education, using N-ACT as a case study. Participation in the study will include:

Completion of the following online survey, expected to take no more than 10 minutes.
The survey will ask you about the number of N-ACT courses you’ve taken, and your feelings on the purpose of the program.

There is a second phase of the study that you can self-select into, consisting of focus group discussions. If you would be willing to participate, there is a question on the survey for you to provide your contact information.

There are no anticipated risks or benefits to participating, no greater than that encountered in daily life. Further, the information gained from this study could be useful not only to Morton Arboretum but museums in general as they look to improve their efforts to capture impact.

Upon request you may receive summary results from this study and copies of any publications that may occur. If you would like to make a future request, or have questions about the survey, the N-ACT program, or the Morton Arboretum in general, please feel free to contact the Director of Education, Jeremy Joslin, with the contact information provided below.

If you have any concerns or questions before or during participation that has not been addressed by the researcher, you may contact Dr. Brian Hamluk, my research committee chair, at bhamluk@my.nl.edu, or the co-chairs of NLU’s Institutional Research Board: Dr. Shaunti Knauth (shaunti.knauth@nl.edu; 312.261.3526) or Dr. Kathleen Cornett (kcornett@nl.edu; 844.380.5001). Co-chairs are located at National Louis University, 122 S. Michigan Ave, Chicago, IL.

Thank you for your consideration.

Consent: My signature on the form below serves as my consent to participate in this study. I am aware that I can drop out at any time, and my responses will remain anonymous.

Name: __________________________  Date: __________________________
Thank you!

Jeremy Joslin
Director of Education
jjoslin@mortonarb.org
630.719.2461
Appendix E: Phase I dismissal/debrief form

Greetings, N-ACT participant! You are receiving this email as someone who enrolled in at least one of the Morton Arboretum’s Natural Areas Conservation Training (N-ACT) program courses in 2018 or 2019. Recently, The Arboretum conducted an evaluation of the program that also served as my capstone project in my doctoral program at National Louis University, and I wanted to thank the 177 of you that participated for responding. Your responses helped give us a fuller picture of the impact N-ACT is capable of having, an invaluable part of our continuous improvement process that will inform how we engage our audience for years to come. It also helped illustrate the types of practices are needed to fully capture the impact of our informal education programming, an important outcome of my own research. I am grateful for your engagement with The Morton Arboretum on multiple levels.

The survey portion of this project is now closed, but there is still an opportunity to participate in the focus group portion of the project if you are so interested. To do so, please contact me with the information below; you can participate in-person at the Arboretum or over the phone. But I hope you are all willing to participate in future evaluations as the Arboretum continues to refine and improve how we assess our programs. And if you have ideas or questions about these changes please feel free to reach out to me with the contact information below. Thank you again!

Jeremy Joslin
Director of Education, The Morton Arboretum
jjoslin@mortonarb.org
630.719.2461
Appendix F: Focus group questions/discussion guide & item mapping

How did you hear about N-ACT?
What courses did everyone take?
What was the most useful thing you learned?
Where did you use it?
Did anyone take the online courses?
How far did everyone travel to take an in-person course?
Where did you do most of your conservation work?
Are you still working there?
Do you ever talk to other people about conservation?
How do you start that conversation?
How engaged are you on social media?
Do you ever post online about conservation actions/issues?
What other nature-focused topics are you curious about?
Where do you go when you look for information on these topics?
Did N-ACT change your perspective on conservation or reinforce it?
What could have made your experience in the program better?
Is there anything else you’d like to tell me about your experience in the program?
Discussion item mapping to sub-questions

<table>
<thead>
<tr>
<th>Discussion point</th>
<th>SQ 1</th>
<th>SQ 2</th>
<th>SQ 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>How did you hear about N-ACT?</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>What courses did you take?</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>What was the most useful thing you learned</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Where did you use it</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Did anyone take an online course</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>How far did you travel to take courses</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Where did you do your conservation work</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Are you still working there</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Do you ever talk to others about conservation</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>How engaged are you with social media</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Do you ever post online about conservation issues</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What other nature topics are you curious about</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Where do you look for information on these topics</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Did NACT change your perspective on any issues</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>What could have made your experience better</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there anything else you’d like to say about your experience</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Appendix G: Focus group consent form

Our focus group discussion today will take about an hour, and will be recorded for clarity if you agree. We can stop recording at any time, and you withdraw your consent to participate at any time. Our discussion points revolve around your experience in the N-ACT program, and will ask you about the number of N-ACT courses you’ve taken, and your feelings on the purpose of the program. If you have questions about the survey, the N-ACT program, or the Morton Arboretum in general, please feel free to contact the Director of Education, Jeremy Joslin, with the contact information provided below.

My electronic signature on the form below serves as my consent to participate in this study. I am aware that I can drop out at any time, and my responses will remain anonymous.

Name: __________________________ Date: __________________________

Thank you!

Jeremy Joslin
Director of Education
jjoslin@mortonarb.org
630.719.2461
Appendix H: Focus group information letter

Thank you for agreeing to participate in today’s focus group. These discussions will help The Arboretum better understand both the impact of our programs and the best ways to capture those impacts moving forward.

There are multiple sessions of similar focus groups scheduled, and our discussion today will be recorded in order to be transcribed and coded as common themes emerge across groups. These discussions are also part of my own graduate research at National Louis University, as I finish a thesis on how informal education programs can better capture their impact.

Don’t think you have to wait to be invited to a focus group to share your opinion on your experience with an Arboretum program; we are always happy to hear what you have to say, positive, negative, or in-between. Thank you again for agreeing to spend an hour of your day participating in today’s discussion, and please don’t hesitate to contact me if you have further questions or comments in the future!

Jeremy Joslin
Director of Education, The Morton Arboretum
jjoslin@mortonarb.org
630.719.2461
Appendix I: Focus group dismissal/debrief

Greetings, N-ACT participant! You are receiving this email as someone who enrolled in at least one of the Morton Arboretum’s Natural Areas Conservation Training (N-ACT) program courses in 2018 or 2019. Recently, The Arboretum conducted an evaluation of the program that also served as my capstone project in my doctoral program at National Louis University, and I wanted to thank everyone for reading but especially the 177 of you that participated for responding. Your responses helped give us a fuller picture of the impact N-ACT is capable of having, an invaluable part of our continuous improvement process that will inform how we engage our audience for years to come. It also helped illustrate the types of practices are needed to fully capture the impact of our informal education programming, an important outcome of my own research. I am grateful for your engagement with The Morton Arboretum on multiple levels.

Both the survey and focus group portions of this project are now closed (something that is a HUGE relief to announce), but I hope you are all willing to participate in future evaluations as the Arboretum continues to refine and improve how we assess our programs.

It is my intention that the findings from this work be published through Arboretum information channels, and a final notice on this project will go out at that time. And if you have ideas or questions about these changes please feel free to reach out to me with the contact information below. Thank you again!

Jeremy Joslin
Director of Education, The Morton Arboretum
jjoslin@mortonarb.org
630.719.2461
Appendix J: Final dismissal/debrief notice

Greetings, N-ACT participant! You are receiving this email as someone who enrolled in at least one of the Morton Arboretum’s Natural Areas Conservation Training (N-ACT) program courses in 2018 or 2019. Recently, The Arboretum conducted an evaluation of the program that also served as my capstone project in my doctoral program at National Louis University, and I wanted to thank those of you that participated for responding. Your responses helped give us a fuller picture of the impact N-ACT is capable of having, an invaluable part of our continuous improvement process that will inform how we engage our audience for years to come. It also helped illustrate the types of practices are needed to fully capture the impact of our informal education programming, an important outcome of my own research. I am grateful for your engagement with The Morton Arboretum on multiple levels.

The final findings of this project will be available on the Arboretum website at in the near future, and there are a few points you may be interested in:

- The more someone engages with the N-ACT program, the more connected to nature they feel! Additionally, the more they take what they learn and apply it in their own surroundings.
- Taking local action is a surprisingly prominent gateway to discussing conservation and what you do with your friends and neighbors, people who might not have the faintest idea about some of what you’ve learned through N-ACT.

It was my hope that completing such a project at the Morton Arboretum, one of the leading public gardens and arboreta in the country, that we could help other gardens capture the positive impact their programs have as well. As we continue to improve our programs, we can also help gardens around the US demonstrate the positive impact they bring to their communities, and you participation in this project will have been a large part of that. I thank you again for participating, and please feel free to reach out if you have questions or comments in the future.

Thank you!

Jeremy Joslin
Director of Education, The Morton Arboretum
jjoslin@mortonarb.org
630.719.2461
APPENDIX K: Open-ended modified Nature Relatedness survey item

What was your biggest takeaway from taking an N-ACT course?

Answered 154
Skipped 27

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Date</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mar 22 2020 10:01 PM</td>
<td>Community knowledge as well as guidance from experts in the field.</td>
</tr>
<tr>
<td>2</td>
<td>Mar 15 2020 03:43 PM</td>
<td>That the environment is all our responsibility.</td>
</tr>
<tr>
<td>3</td>
<td>Mar 12 2020 02:17 PM</td>
<td>Have not taken any yet</td>
</tr>
<tr>
<td>4</td>
<td>Mar 11 2020 01:49 PM</td>
<td>The high knowledge &amp; experience of the instructors and their desire to share it</td>
</tr>
<tr>
<td>5</td>
<td>Mar 08 2020 02:30 PM</td>
<td>In person is the way to learn the most.</td>
</tr>
<tr>
<td>6</td>
<td>Mar 08 2020 09:37 AM</td>
<td>That nature needs us!!</td>
</tr>
<tr>
<td>7</td>
<td>Mar 08 2020 07:18 AM</td>
<td>The education of conservation practices and basic understanding of plants and trees.</td>
</tr>
<tr>
<td>8</td>
<td>Mar 07 2020 09:09 PM</td>
<td>Understanding the ecosystem of the region and the problems that it's facing.</td>
</tr>
<tr>
<td>9</td>
<td>Mar 07 2020 05:50 PM</td>
<td>Very practical tips by experienced teachers</td>
</tr>
<tr>
<td>10</td>
<td>Mar 07 2020 10:32 AM</td>
<td>HOW I CAN MAKE A GREATER POSITIVE IMPACT</td>
</tr>
<tr>
<td>12</td>
<td>Mar 06 2020 08:21 PM</td>
<td>In general, helpful to review and add to knowledge</td>
</tr>
<tr>
<td>13</td>
<td>Mar 06 2020 05:59 PM</td>
<td>information regarding personal interests in nature and habitat restoration.</td>
</tr>
<tr>
<td>14</td>
<td>Mar 06 2020 03:56 PM</td>
<td>Look out for sterile lemmas</td>
</tr>
<tr>
<td>15</td>
<td>Mar 06 2020 02:15 PM</td>
<td>Plants id</td>
</tr>
<tr>
<td>16</td>
<td>Mar 06 2020 01:05 PM</td>
<td>Practical hands-on knowledge that I can use in real life.</td>
</tr>
<tr>
<td>17</td>
<td>Mar 06 2020 12:26 PM</td>
<td>More knowledge</td>
</tr>
<tr>
<td>18</td>
<td>Mar 06 2020 09:22 AM</td>
<td>Everything is connected</td>
</tr>
</tbody>
</table>
My actions can have impact in my surroundings.
That it might not be as hard as I thought to do some work myself.
What I can do to help in the natural areas.
I am new to restoration work and so I learned quite a bit about the process of restoration.
The number of native prairie plants is astounding.
winter plant id basics
There are so many resources available to further my educations to share with others.
the infrastructure of the eco system; the interconnectedness. Now I consider more than what is on the surface.
environmental practices
A better understanding of the subject.
Further advancing the understanding that we are all connected and the future of life depends on humans to take action to save it.
Nothing in particular.
I enjoy taking an online course and then going to the Arboretum to practice what I learned.
"The active engagement with so many enthusiastic people."
Learning that almost every river begins with an ooze. (That is most memorable thing I learned.)
knowledge and appreciation that there are more people with my interest
Awareness
Plant ID
Knowledge and benefits of habitat restoration
Knowledge about local animal populations.
The difference between correct and incorrect activities is sometimes very small.
Added knowledge
Spread knowledge in your local community
That my actions could impact a larger ecosystem
Propogation is more difficult than I thought for spring ephemerals.
better understanding of ecology
How to identify trees
I have a greater appreciation for natural prairie and wetland plants that support wildlife and insects. I would like to see more corridors of supportive landscaping instead of the ubiquitous lawns and decorative plantings we have today that do not support the web of life.
I want to complete the program because I have hopes of creating a prairie area at my school. Sadly there have been circumstances that have stopped me from completing classes.
Develop a better understanding of nature and how I can help maintain it.
Framework for understanding a particular topic
Knowledge
Just the ecology of how it all relates and how choosing better plants and companions to those plants can have a big impact
Identification of invasive species and removal
Feeling more confident in my practices and the information I share with others on conservation.
I can now determine which plants are beneficial in my veggie garden.
Applying what I have learned into everyday life
Best practices for reclamation and conservation of habitats
A better understanding of plants and the ecosystem
Greater appreciation for natural and preserved areas. Better knowledge about tool for conservation work.
Gaining a better understanding of the underlying strategies around planning for work in local lands in order to manage their restoration.
Knowledge that has helped me personally and will aid in educating the community.

Gardening info

Applying the restoration plan to the site I help manage

Learning new methods to learn about nature and the areas that I live in, as well as methods to use & pass that information to others

"It was too preachy. It was prejudicial." if it isn’t native it is no good. “ very snooty “My garden is all natural...”.

Good science and plant ID’s. Long walked in the woods. Interesting to see that even some plants rebel against being reintroduced.

Glad they are learning more about controlled burns and not doing them so much.

Worry about the loss of insects that are part of the ecosystem. Even mosquitoes have a purpose.

"Land management

It seems as if the conversation about conservation is finally becoming more mainstream.

A chance to put skills I have been working on into use.

not sure

Planting natives is key to promoting a healthy and sustainable environment for us all.

Plan knowledge and ecological restoration principles, application and resources.

It made me humble. The instructors and many of my classmates are/were so knowledgeable. Gives me incentive to keep learning.

I keep building my knowledge that I can apply at home, and other sites about restoration / recreation of native landscapes.

Better understanding of soil, how climate change is affecting the eco-balance everywhere, and tree management.

I can't say anything because I don't know

Learning how to research past land usage history.

learning from instructors and other participants;
Looking at Ecological restoration from a broader perspective

A more focused knowledge of conservation and ecology. Research on my own takes time to hunt down reliable sources and piece together information.

The knowledge learned about what plants are invasive and how to best control them

knowledge

understanding ecosystem cycles and restoration;

appreciating restoration efforts

Trees are neat.

The online identification resources.

I have taken a number of classes at the Arboretum. I'm not sure which one(s) are N-ACT classes.

Unsure

Content knowledge that I can apply in restoration

"Having realistic expectations regarding the pace and success of our restoration efforts."

Long term plan needed for invasives

Again, which class was an N-ACT course?

Instructors very knowledgeable

How much there is to learn on the subject.

I learned the importance of making human connections. You have to build a community and be part of the broader community to gain support for the work.

Opportunity to learn more about plants and conservation

Clarification of best practices

Every person needs to understand the importance of taking care of our planet

Although an avid gardener, I didn't know as much about the preservation and restoration of natural areas. I took the classes to learn about this.

Learning about botanicals and how to identify them.
Conservation is a philosophy

I didn't know much about plants and trees before taking the classes.

I've taken classes periodically over a number of years, and I'm not certain if they were all N-ACT courses. But these classes have given me a greater understanding of healthy natural environments.

General information

Desire to take courses with more relevant material to what I do.

I already had a good start. The course made me much more knowledgeable and confident.

How impactful our actions (or inactions) have on the environment.

That there is a tremendous amount to learn and that I can make a difference.

Knowledge of instructors and students.

Tree identification skills

The Wetland Plant ID was chock full of information and I wish I could remember it all. I live in Lake County where wetland plant knowledge is very useful.

people value the habitats around them more when they know and understand them.

More knowledge of eco systems

In the age of Climate Change and the assault on biodiversity, we all need to be involved in combating those issues.

Wow too many. Probably just a better appreciation for the world I live in. As well as a great knowledge of how it all works and works together.

General knowledge that I apply to my own gardening and to my volunteer work as a Master Gardener.

Bought two books on gardening and learned a lot about home gardening.

Learned more about bird ecology and behavior.
Fun and informational. Interested in native species level and restoration, ecosystems, ecology, changing the 'garden' & humans destroying nature paradigm.

The overall need to be involved with the natural environment.

Greater appreciation of the value of conservation activities

I took them to learn more about Illinois flora and fauna after moving to the area. The biggest learning for me was the importance of proper management techniques, especially burning, for prairie and similar environs.

Becoming more educated in a new field.

Lots of resources are available to help us.

I would like to take more courses at the aboretum; it is great being able to see plants in person. However, class times don't align well with the metra schedule on the weekend, and it's not worth it to me to spend 8 hours of my time to take a 2 hour class

Plant identification

How conservation seems to be larger than the pockets of areas that are conserved, and how even small pockets can improve/preserve natural life.

How much I don’t know

Awareness of how widespread the problem is

Solid bedrock of ecological & plant knowledge I had not been exposed to. Also I loved the magical experience of the trip to a fen in McHenry county for the Natural Areas Mgmt class -- I was totally unfamiliar with this type of ecosystem and it was a case study in all of the considerations of conservation & land use issues.

The complexity of restoring prairie

appreciation for identifying invasives

Increased my background knowledge of the natural environment

Empowerment

It will take time and dedication

plant ID resources, skills, and contacts
The huge beneficiary impact of native species

I have learned that ordinary people can have an impact on our environment.

That there is a lot I can do with social media to recruit volunteers, document our work, and thank them after our events.

Plant identification

Prioritize invasives in small numbers near high quality areas.

significant knowledge gained about conservation practices, and knowledge about specific species of plants and animals

More information to use

How we can impact the environment in a positive way.

Better knowledge of the plants in our area, what is invasive, and what isn’t.

Not much from the last one, I wasn’t able to manipulate the online course well enough to finish it

the diversity of our native communities and how very precious and important they are

NA

N/a

Better understanding of native plants

NA

Supplemental education

The course offerings are fantastic but are difficult to follow with respect to planning, online, offline, costs, dates, times, etc. It seems like it can be better organized because the syllabus and course lists are not intuitive.

It was a refresher on tips/tricks for winter tree ID
APPENDIX L: Focus group session slide show

N-ACT Participant focus group
Friday, April 3, 2020

Today’s agenda

• Introductions
• Discussion
  -What got you started
  -Enrolling/taking courses
  -Since your last course
• Survey results
• Your questions
• Wrap-up
Introductions

• A little bit about you
Where you’re from
What brought you to the Arboretum
Any other details you’d like to share

N-ACT courses

Natural Areas Conservation Training N-ACT Program

Basic Plant ID (Online)
Gain the knowledge needed to identify plants. Whether you are a nature enthusiast, volunteer, or professional, this course provides the fundamentals you need to get started. Registration closes Monday, April 12, 2020, at 11:59 p.m. Course available beginning as soon as Monday, April 13, 2020.

Intro to Ecological Restoration (Online and in-person)
Discover the principles and practice of ecosystem restoration at The Morton Arboretum. This program has been cancelled.

First Aid and CPR (Online and In-person)
This first aid and CPR blended learning course will teach you the skills you need to keep yourself and others safe while volunteering at the Arboretum or in local natural areas. Course materials must be completed before in-person session on Thursday, April 9, 2020, 1:00 p.m. to 2:00 p.m., or Sunday, April 19, 2020, 10:00 a.m. to 12:00 p.m. In-person registration closes two weeks before in-person session.

Woodland Ecology (Online Only)
Learn the essentials of woodland ecology and the woodland management techniques necessary to maintain a healthy forest. The Morton Arboretum, Monday, April 20, 2020, at 11:59 p.m. CST Central time. Registration closes Tuesday, April 7, 2020. Noon CST. Central time. Online course becomes available.

Basic Tree ID (Online Only)
Learn to identify the common tree species in local preserves or in your neighborhood in this extremely class at The Morton Arboretum. Registration closes Wednesday, April 22, 2020, 11:59 p.m. Available online Thursday, April 23, 2020, 11:59 p.m.
N-ACT courses

Natural Areas Conservation Training N-ACT Program

Basic Plant ID (Online)
Get the basic knowledge you need to identify plants. Whether you are a natural resources volunteer or specialty gardener, naturalist, or artist, this course provides the fundamentals you need to get started. Registration closes Monday, April 13, 2020, at 11:59 p.m. Course available beginning as soon as Monday, April 13, 2020.

Intro to Ecological Restoration (Online and in person)
Discover the principles and practices of ecosystem restoration at The Morton Arboretum. This program has been canceled.

First Aid and CPR (Online and in person)
The four-hour and CPR-blended course will teach you the skills you need to keep yourself and others safe while working on the Arboretum or in local natural areas. Online materials must be completed before in-person session on Saturday, April 11, 2020, 10 a.m. to 12:30 p.m. In-person registration closes two weeks before in-person session.

Wildland Ecology (Online Only)

Real Tree ID (Online Only)
Learn to identify the common trees you see in local preserves or in your neighborhood in the online-only class from The Morton Arboretum. Registration closes Wednesday, April 22, 2020, at 11:59 a.m. Available online Thursday, April 23, 2020.

Field work
What was the one thing that popped into your head when you heard about a focus group?

What's the one “I have to tell them…” you have left?
Q14 What was your biggest takeaway from taking an N-ACT course?

Evaluation findings

- Grouping responses by high vs low courses taken, see differences in:
  - how connected feel to all living things
  - how N-ACT has strengthened their belief that actions can have positive impact on their environment
  - that N-ACT courses increased their understanding of connections in local ecosystem
  - feelings about nature affecting how they live everyday life
  - have taken local conservation action, either in own yard or area.