



Museums Empowered: Professional Development Opportunities for Museum Staff

Sample Application MA-40-19-0278-19
Project Category: Organizational Management

“Science Engagement and Interpretation at McWane Science Center”

McWane Science Center

Amount awarded by IMLS:	\$134,452
Amount of cost share:	\$227,377

Attached are the following components excerpted from the original application.

- Abstract
- Narrative
- Schedule of Completion

Please note that the instructions for preparing applications for the FY2020 Museums Empowered grant program differ from those that guided the preparation of FY2019 applications. Be sure to use the instructions in the [FY2020 Notice of Funding Opportunity](#) for the grant program and project category to which you are applying.

McWane Science Center (McWane), with \$134,452, grant from the Institute of Museum and Library Services (IMLS), proposes to strengthen our visitor experiences by:

- Training and certifying McWane staff and core volunteers/docents through the formal National Association of Interpretation (NAI) workshops and certification programs.
- Establishing a novel and defined science engagement interpretation framework to support visitor interaction and learning based on NAI best practices with the goal to increase visitors' science capital (science-related knowledge, attitudes, experiences, and contacts)
- Reformatting our existing hands-on, science education experiences as well as developing new programs and exhibitions in our exhibit halls that support the formalized plan above.
- Increasing the science capital (science related knowledge, attitudes, experiences, and contacts) of students, families, and the general public who visit our museum.

This will be a fifteen-month project for plan design and testing that will establish the formalized foundation for a Science Engagement interpretive model for McWane Science Center. The ultimate benefactors will be individuals—children, parents/caregivers, science enthusiast, explorers, teachers, and students—that visit our institution by building their science capital, with particular focus on low-income and underrepresented populations.

The Science Engagement model that we are currently employing is new to our organization. As such, we have not formally adopted standard program delivery methods, guidelines, and procedures that define common terminology, promote the brand and culture of McWane, and support uniformity and long-term growth. Through this project, we will officially acknowledge the constructivist learning model (learning that occurs as individuals are actively involved in a process of meaning and knowledge construction as opposed to passively receiving information) as the principle guide for designing, implementing, and evaluating our educational experiences. We will also test and propose to adopt the interpretive delivery method as a way of training our staff, designing our programs, and communicating with our visitors. This will allow us to establish a baseline through which we can assess our organization's impact on the community.

By training and certifying our Education staff on the NAI interpretation concepts, we will adopt a common language and process for better visitor engagement. This proposal also includes certification in the interpretive planning process, which provides the essentials to develop a themed exhibition for greater visitor impact. A member from our Exhibit team will participate in this certification program with the goal of working with our Education team to co-develop interpretive experiences in which the exhibition and educational programming complement each other. In addition, McWane Science Center will work with Mason Bee Interactive Planning to co-develop an interpretive plan.

McWane believes that visitors will: 1) Develop positive science-related attitudes, emotions, and identities thus helping inspire and excite continued and long-term interest in science learning and exploration; 2) Be able to relate experience gained through participation in our programs to their existing knowledge and experience thus helping reinforce learning; 3) Demonstrate increased knowledge, skills, and science application thus allowing them to comfortably and confidently initiate and engage in conversations about science; 4) Experience and demonstrate at least some mastery in key 21st Century skills like critical-thinking, problem-solving, analyzing and interpreting data, troubleshooting, designing and testing solutions, and constructing explanations or arguments based on evidence; 5) Demonstrate increased awareness about and interest in science and science related careers. While it is important to attract a more diverse range of people to STEM careers, not all our visitors aspire to those fields. The goal of increasing visitor science capital also becomes about greater access to science with ultimate objective of equipping the community to be more informed citizens.

PROJECT JUSTIFICATION:

Proposal: McWane Science Center (McWane), with a \$134,452 grant from the Institute of Museum and Library Services (IMLS), proposes to strengthen science engagement experiences within our museum. This will be accomplished by:

- Training and certifying McWane staff and core volunteers/docents through the formal National Association of Interpretation (NAI) workshops and certification programs.
- Establishing a novel and defined science engagement interpretation framework to support visitor interaction and learning based on NAI best practices with the goal to increase visitors' science capital (science-related knowledge, attitudes, experiences, and contacts)
- Reformatting our existing hands-on, science education experiences as well as developing new programs and exhibitions in our exhibit halls that support the formalized plan above.
- Increasing the science capital (science related knowledge, attitudes, experiences, and contacts) of students, families, and the general public who visit our museum.

Need: Expanded from Pierre Bourdieu's idea of social capital, science capital is defined as "science-related qualifications, understanding, knowledge (about science and 'how it works'), interest and social contacts (e.g. knowing someone who works in a science-related job)." ¹ Simplified, the concept of science capital can be thought of as a stock of everything science-related that a person gathers through their life. It ranges from what science you know and how you think about science to who you know and how you regularly engage with science. Research from the five-year ASPIRES project found a correlation between a young person's science-related career aspirations and his/her family's science capital. However, only 5% of young people surveyed classified as having high levels of science capital; most of these students were white males from socio-economically advantaged homes with high family science capital. These students were confident in their science abilities and identity. Twenty-seven% percent of students surveyed classified as having low science capital, which were mostly females from less privileged backgrounds. Students with low science capital are less likely to aspire to a science-related career and do not see science as being "for me".² Science capital is essential not only for students interested in STEM careers. With higher science capital, people discover and appreciate the role of science in everyday life and culture; they become equipped to contribute and participate in their communities as informed citizens. Our mission as a science center is to use a science capital teaching approach to create visitor experiences that specifically and intentionally include people with low science capital. The science capital teaching approach created by Enterprising Science build upon the 8 dimensions of science capital:

1) Scientific literacy, 2) Science-related attitudes, values, and dispositions, 3) Knowledge about the transferability of science, 4) Science media consumption, 5) Participations in out-of-school science learning contexts, 6) Family science skills, knowledge, and qualifications, 7) Knowing people in science-related roles, and 8) Talking about science in everyday life³ We believe visiting a science center touches upon each dimension to varying degrees. For example, a science center provides science learning in an out-of-school context. Engaging in hands-on activities and demonstrations reinforce science-related attitude, values, dispositions, and literacy. Additionally, when families visit a science center, they increase their science skills, knowledge, and qualifications by sparking curiosity that can be further explored and discussed at home. We want to make McWane Science Center an accessible, positive "science" experience within our community and leverage our potential for visitors to build science capital.

¹ Adolescent Boy's Science Aspirations: Masculinity, Capital, and Power, Journal of Research in Science Teaching, Archer, et. al., 2014

² Science Capital: A Conceptual, Methodological, and Empirical Argument for Extending Bourdieusian Notions of Capital Beyond the Arts, Journal of Research in Science Teaching, Archer, et. al., 2015

³Science Capital Made Clear, Archer et al., 2016

Building a community's science capital is the answer to the "why" of science centers, and the National Association of Interpretation (NAI) answers the "how." NAI is a professional organization for cultural and natural interpreters and defines interpretation as a "mission-based communication process that forges emotional and intellectual connections between the interest of the audience and the meaning inherent in the resource." Their certification and training programs provide a guideline for developing interpretive experiences (e.g., programs, demonstrations, exhibitions) that become personally meaningful to visitors. NAI members traditionally work at cultural and natural institutions. We want to extend the NAI interpretive approach to science centers as a way to build visitors' science capital by forging an emotional connection with science. We believe the more positive emotions a person associates with science the greater potential for them to see as "for me."

We plan to incorporate NAI's methods into an effective interpretation framework for our Education Department. Interpretation at McWane is primarily facilitated by the Education Science Engagement team. Science Engagement was created in 2016 with the specific purpose of enhancing and improving visitor interaction within our exhibit halls. Some current programs focus on sharing interesting science "facts" but do not emotionally engage the visitor or allow them to draw real-world comparisons. We believe NAI certification and training programs will transform our learning approach from mere instruction to provocation.

NAI standards require interpretive communication be purposeful, organized, enjoyable, thematic, relevant, and personal. Organization, enjoyment, and relevance are straightforward concepts. Purpose is the justification for providing interpretation and includes the institutional mission, program goals, and objectives. Objectives are specific measurables that are used for program planning and evaluation. A program's theme is the primary message visitors take with them; it answers the question, "So what?" Personality is an interpreter's creative presentation style while allowing for the experience to be guided by visitor curiosity and interest. These interpretive elements open the access to science and provides us with defined tool to personally engage visitors while building their science capital.

McWane is a beloved institution in our region. Our exhibit halls, science engagement programming, and our science learning experiences as a whole make science fun and relevant, and through our engagement with the community we have the ability to spark a life-long appreciation and love for science, innovation, and discovery that can significantly change the lives of the children, parents, teachers, and general members of our community, our state, and our region. For 20 years, we have seen success, but we have more to do to increase access to science. With your support, we can increase our capacity to prepare and support our science education team in building our community's science capital by providing program structure, training, regular assessment, and resources.

Who Will Benefit: McWane serves approximately 400,000 visitors annually, and we have welcomed over seven million individuals since our opening in 1998. Most visitors live in the Birmingham Metropolitan and surrounding areas, but we see families from throughout the state and country every year. Our visitation includes of families with children of all ages, school groups of all grade levels, individual science enthusiasts, and the general citizen that just loves learning. Our visitors represent most socioeconomic levels—in fact, McWane, through our educational scholarship fund provides admission at no charge to families from low-income and underserved communities. However, we recognize the need to better reach those in underrepresented communities. By creating science learning experiences that are personally relevant and accessible, we can invite a more diverse audience to participate in science. McWane Science Center becomes a space that is "for me" regardless of age, ability, race, gender, sexual orientation, religion, or socio-economic status. We plan to incorporate NAI's methods into an effective interpretation framework for our Education, Exhibits, and

Volunteer Services Departments. Interpretation at McWane is primarily facilitated by the Education Science Engagement team of staff and volunteers. Science Engagement was created in 2016 with the specific purpose of enhancing and improving visitor interaction within our exhibit halls. Some current programs focus on sharing interesting science “facts” but do not emotionally engage the visitor or allow them to draw real-world comparisons. Our proposal also includes certification in the interpretive planning process for a member of our Exhibits team. This certification program provides the essentials to develop a themed exhibition for greater visitor impact through which we hope to establish a better collaboration between our Exhibits and Education teams to co-create innovative learning experiences. The NAI certification and training programs will transform our learning approach from mere instruction to provocation.

Relation to Organization Strategic Plan: In 2016, McWane adopted our most recent, five-year, strategic plan. The proposed science engagement interpretive project directly supports three of the five major strategic intent areas within our strategic plan. These include:

- McWane will be a top-rated destination and an innovative, dynamic, and interactive attraction that entertains and educates visitors across the range of science, technology, engineering, and math concepts.
 1. Understand the differentiating traits of the center experience and build upon our strengths.
 2. Strategically invest in innovative and relevant facilities and exhibits that maximize learning and fun for our target audiences.
 3. Enhance science experiences to be more highly interactive and engaging for visitors.
- McWane will be known throughout the state and the region as an indispensable contributor to science education and the development of a 21st Century workforce.
 1. Identify and commit to impactful, mission-aligned programs that fit with our resource capacity and model for return on investment.
 2. Expand our role as a convener of important conversations and a source of scientific knowledge (science interpretation is key to the implementation of this objective).
 3. Fully develop and articulate our role in connecting children to 21st century careers.
 4. Expand our audience reach beyond our current demographics.
- McWane will develop and support the team necessary to enable us to fully realize our mission and vision.
 1. Create a culture of exceptional service to our visitors and to each other.
 2. Invest in leadership and team development to support the McWane strategic direction.

Relation to the Goals of Museums Empowered Initiative: The goal of the Museums Empowered initiative is to “strengthen the ability of an individual museum to serve its public through professional development activities that cross-cut various departments to generate systemic change with the museum.” This proposal would allow staff from our Education Department and our Exhibits Department to be trained and certified through NAI as we formally develop and adopt standard program delivery plans, guidelines for exhibit design, and procedures that define common terminology, promote the brand and culture of McWane, and support uniformity and long-term growth. Through our proposed training and formalization of our science engagement practices in our science center, we will officially acknowledge the constructivist learning model as the principle guide for designing, implementing, and evaluating our educational experiences. We also will test and propose to adopt the interpretive delivery method as a way of training our staff, designing our programs, and communicating with our visitors, community stakeholders, and with our fellow staff members. This will allow us to serve as a catalyst for community revitalization by equipping more people to contribute and participate in science with the hope of creating a more inclusive society.

Project Alignment with Museums Empowered Project Categories: This project supports the Museums Empowered Organizational Management project category by supporting our efforts to remain dynamic and

sustainable. McWane’s proposal to IMLS in support of Science Engagement and Interpretation at McWane specifically addresses Organizational Management in the following ways: (1) Provides needed training and development to create more resilient, innovative Education and Exhibits staff and volunteers. (2) Develops and formalizes an interpretative education model with the potential to build relevant staff capacity. (3) Helps with the assessment and realignment of our existing programs and services. (4) Helps support “meaning-making” for our visitors, allowing them emotionally and intellectually connect with and better understand the relevance of science. (5) Supports our growth and development to build upon our current strategic plan and vision. The project includes collaborating with a consultant specializing in incorporating the NAI standards within the science centers. Our goal is to create a novel and effective model with the capacity to reimagine science learning in our field.

PROJECT WORKPLAN:

Activities/Evaluation/Performance: With your support, McWane will establish a formalized science engagement interpretive model for our visitors. This will include a defined design and delivery plan; the documentation of each science experience within our museum and the objectives and learning outcomes for each; training for our staff and volunteers; and the resources to create and deliver quality, engaging science learning experiences for our visitors.

Staff Training and Certification: McWane staff and core volunteers/docents will undergo training workshops and certification the interpretative approach. These will be delivered through the formal National Association of Interpretation workshops and certification tests.

1. Thirty education staff and volunteers will be trained and certified through the Certified Interpretive Guide (CIG) program. Through the CIG program, staff and volunteers will learn the theory and practice of oral interpretive communication skills in a 32-hour training program. They will then sit for the certification examination and presentation to receive the CIG designation.
2. Two education staff members will be trained and certified to serve as Certified Interpretive Trainers (CIT). CIT candidates must complete all requirements for CIG designation as well as demonstrate the ability to facilitate training sessions, evaluate and coach staff, write measurable objectives, and plan and administer training sessions. The candidates will also complete an exam—multiple choice and essay, submit two examples of outlines and evaluations for your own training sessions, and submit a 20 to 30-minute video showing an entire staff training session from start to finish. With an onsite CIT, our interpretive model becomes sustainable with the ability to train and certify new staff and volunteers.
3. One exhibit staff member will be trained and certified as a Certified Interpretive Planner (CIP). The CIP candidate will be the one that ensures that interpretation processes and best practices are incorporated into our organization’s master planning, exhibit plans, and other comprehensive planning efforts moving forward. The CIP candidate will also be required to complete an exam that includes both multiple choice and essay questions, submit two examples of planning documents, and submit two examples of product that has been developed and implemented because of planning.

The science engagement and interpretation plan to support visitor experience: Using the constructivist learning theory and NAI training as our guide, McWane proposes to create a formal visitor engagement plan to be used internally that will:

1. Define best-practices for science engagement and interpretation within the science center setting. We will incorporate research and strategies defined by the NAI as well as our own experience and visitor research.
2. Standardize interpretive program development and delivery requirements for staff so that all our programs represent our brand and incorporate similar terminology and uniform delivery expectations.

3. List and define McWane's science engagement programs and experiences (including exhibits and signage) and the learning objectives for each.
4. Further the mission and culture of McWane Science Center to spark wonder and curiosity about our world.

McWane's science engagement leadership team has been researching and studying the interpretive strategies and best practices. These are used regularly in the museum world but have more limited testing in the science center arena. The principles and strategies defined however directly relate to the types of experiences that McWane believes that a visitor can and should have when they enter our facility. As such, we will be incorporating their best practices into the design of our formalized plan.

Interpretive Principles include:

- Education delivery methods are organized, enjoyable, and highly relevant and appropriate for the audience.
- Experiences support the mission of the organization and are delivered with passion and enthusiasm.
- Activities and programs are flexible based upon the audience and build upon past education, experiences, and interests of the individuals present at any given time. There is no one size fits all approach.

Reformatting and Developing Science Engagement and Interpretation Programs: In 2016, in response to McWane's completion of our current strategic plan, staff and volunteer leadership committed resources and effort into developing Science Engagement as a priority for our organization. McWane's Education team has always hosted educational programs in our exhibit halls, but most of our attention had been placed on our more formal collaborations and direct service educational partnerships with teachers and schools. This is still a significant priority, but we realized that this has been at the expense of quality, consistent programming for our general visitors, not coming as a part of a school group. With your support, we will continue to grow our Science Engagement interpretive programs to support the prescribed plan and strategy that we have defined above. Program development will include evaluating the popularity and effectiveness of our existing visitor programs, reformatting the existing popular programs to fit with new standards, and developing new, standard-based programs. Each program will be documented in the Science Engagement and interpretive plan outlined above. Programs will incorporate a combination of free-choice, partially directed, and mostly directed. This level of formalized processing has not been a part of our design, staff training, and program delivery in the past. Science Engagement has converted one of our most popular programs, Combustion, to align with this format so that we can test the new process with staff and our visitors. The complete description and program plan for Combustion has been included within the attachment section of this grant to help illustrate the level of strategy and preparation that will go into the redesign or design of programs moving forward.

Risks/Barriers: Risks to this program include:

- Development and use of a new strategy for science engagement interpretation will take some adjustment, especially for employees that have been accustomed to our current program delivery method as well as to those individuals outside of the Education department. Within the timeline for implementation, we will include testing, non-Education training, and demonstrations to help gain buy-in and illustrate potential impact.
- There is much less research and documentation regarding the use of the interpretation method in the science center field. As a team, we will have to test what principles work and what must be adjusted to fit our audience and delivery capacity to ensure that it supports the mission, vision, and culture of the organization.
- One of the biggest potential risks is staff and volunteer turnover. By training all staff and key volunteers, we risk losing the intellectual investment once they move on to different ventures. We feel that by investing in the plan development as well as investing in the Certified Interpretive Trainer process that we can ensure that future staff will also have the knowledge and skills to effectively deliver our programming.

Planning and Implementation of Project: Science Engagement is managed by our Education Department.. The Education Department is directed by Peggy Chowning. Peggy has a Bachelor of Science Degree in Elementary Education from University of Alabama at Birmingham. She has been in the Education Department at McWane Science Center for almost seventeen years. Alia Carter, Director of Science Engagement, will oversee the implementation of this grant proposal. Ms. Carter has a Bachelor's Degree in Mathematics from the University of Alabama at Birmingham and has worked in informal education for ten years Bethany Harris is the Coordinator of Science Engagement. Ms. Harris has a Bachelor's Degree in English from Berry College and previously served as the Coordinator of Volunteer Services. Both Ms. Carter and Ms. Harris are Certified Interpretive Guides.

Additionally, McWane Science Center will contract with Kyrié Thompson Kellet, Founding Principle of Mason Bee Interpretive Planning, to help us co-develop an interpretive plan, which is needed for the Certified Interpretive Planner requirements as well as Science Engagement interpretive programs. She will also help us implement the National Informal STEM Education (NISE) Network's team-based inquiry for staff-led evaluation.

Timeline, Resources, Progress, and Dissemination: The proposed implementation timeline for this grant will be from October 2019 through December 2021. Upon receiving notification of funding, McWane's lead staff member on this project, Alia Carter and Bethany Harris will register to begin their certification through the Certified Interpretive Trainer program. They will also arrange the most appropriate format for our Education staff and volunteers -to begin the 32-hour training for the Certified Interpretive Guide process. We will also contract with Kyrié Thompson Kellet, for her assistance in co-develop an interpretive plan which will be needed for the Certified Interpretive Planner requirements.

We will begin the workshops with our science presenters, key volunteers that deliver science engagement programming, and then the remaining education program staff. The project director and key educational staff members will begin the Science Engagement interpretive plan immediately with the proposed completion of the pre-tested draft to be completed by the end of the grant cycle. This will include the complete reformatting of select existing programs to meet the proposed interpretative development and delivery model. New programs will be designed, tested, and included in the plan as they complete the full development process. Some of this will occur during the grant cycle but will be ongoing as we continue to update and diversify our educational program library. Updates to the key Science Engagement areas of the center will be made and basic resources purchased at the beginning of the grant cycle. Remaining resources will be purchased throughout the process as we redesign and develop programming and/or program ideas. The evaluation of the various elements of the plan and staff implementation of the redesigned programs will occur throughout the grant cycle. Mason Bee Interpretive Planning will also coach our staff on the National Informal STEM Education (NISE) Network's team-based inquiry (TBI) for evaluation. TBI is an approach for education professionals to evaluate and improve their own practices. Assessment of Science Engagement interpretive plan will occur at the time of each lesson with results being compiled, interpreted, and reported upon at the end of the grant cycle. Additionally, results will be disseminated at the National Association for Interpretation conference and the Association of Science and Technology Centers conference.

PROJECT RESULTS:

With support from IMLS, McWane proposes to establish and implement formative and summative evaluation measures to assess the quality and impact of the products that will occur as a result of McWane's proposed Science Engagement interpretive planning, training, and capacity building procedures. This includes the redesign of existing Science Engagement programs and the development of new programs as well as the

incorporation of science interpretation into educational culture of our institution. Formative evaluation protocol was created internally, and it measures the potential success of any project as it relates to furthering the mission, vision, and values of our institution. The rubric for formative evaluation will include 1) Does it align with our existing resources; 2) Does it meet the needs of our audience; 3) Is it relevant, fun, and developmentally appropriate; 4) Is it safe; 5) Do we have the capacity to deliver successfully; and 6) Is the science accurate? For the summative evaluation, McWane's staff will build goals, objectives, and measurement tools into each science engagement and interpretation experience that is delivered within our center. Kyrié Thompson Kellet with Mason Bee Interpretive Planning will also coach our staff on the National Informal STEM Education (NISE) Network's team-based inquiry (TBI) for evaluation. In addition, we are in the process of formalizing an overall museum evaluation plan for exhibits and programs with Expose Your Museum.

Intended Results: As a result of the staff training, program development, and implementation of this project, McWane believes that visitors will increase their science capital - a stock of everything science-related that a person gathers through their life. By incorporating NAI's Interpretive Approach of forming a personally emotional connection to science, we hope to better serve our underrepresented audiences by encouraging them to see science as "for me." We believe that through this project visitors will: 1) Develop positive science-related attitudes, emotions, and identities thus helping inspire and excite continued and long-term interest in science learning and exploration; 2) Be able to relate experience gained through participation in our programs to their existing knowledge and experience thus helping reinforce learning; 3) Demonstrate increased knowledge, skills, and science application thus allowing them to comfortably and confidently initiate and engage in conversations about science; 4) Experience and demonstrate at least some mastery in key 21st Century skills like critical-thinking, problem-solving, analyzing and interpreting data, trouble-shooting, designing and testing solutions, and constructing explanations or arguments based on evidence; 5) Demonstrate increased awareness about and interest in science and science related careers.

What will Change as a Result of this Project? The overall goal is to create a learning environment within our institution and staff that engages visitors in and excites them about science while also interpreting science in a way that is meaningful and personal for visitors regardless of their age, developmental level, preferred learning process, socioeconomic status or any other demographic descriptor. By shifting our objective to building visitor science capital, especially in our underrepresented communities, we know have a more strategic focus for our mission and vision. While it is important to attract a more diverse range of people to STEM careers, not all our visitors aspire to those fields. The goal of increasing visitor science capital also becomes about greater access to science with ultimate objective of equipping the community to be more informed citizens.

Resulting Products: Products will include a Science Engagement Interpretive plan for our McWane Science Center; well-defined and documented Science Engagement and interpretation experiences—including facilitation guides, scripts, objectives, and measurement tools; and a trained and equipped education staff, exhibit staff, and volunteer base that can deliver our programming. We also believe this method could be beneficial to the science center field; therefore, we plan to share our resulting products at the Association of Science-Technology Centers and National Association of Interpretation annual conferences.

Sustainability: Because Science Engagement is such an integral component of our current strategic plan efforts, McWane will continue to invest in the staffing necessary to deliver quality programming. IMLS' support to assist with training, resources, and evaluation as well as the inclusion of the CIT element of staff development will help ensure sustainability long-after this grant has been expended.

Schedule of Completion

Activity	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
CIT training	■														
Plan development	■														
CIG Training			■												
CIP Training				■											
Program Design						■									
Constultant Work / Evaluation	■														