Appendix 3

Independent Project Evaluation Report

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**Abstract**

This report presents findings from interviews conducted with staff from CAST and the Boston Museum of Science about their collaboration on the Engagement and Thinking in Designed Informal Science Learning (ISL) Settings project.The interview asked respondents to discuss the goals of the project and how they related to their organization’s mission, how the partnership and the project developed, each partner’s roles on the project, how the collaboration was conducted, strengths and challenges in the collaboration, the impact that the project had on each partner organization, and future plans for utilizing findings and future collaborations. EDC interviewed three researchers from CAST and three staff members from the Boston Museum of Science for 30 – 45 minutes each via phone. The interview responses for all six respondents were remarkably similar, and overwhelmingly presented a positive portrait of the collaboration. The respondents all had similar interpretations of the goals of the project—exploring a multimodal model of engagement in informal science settings—and all felt that the project aligned very well to their institution’s mission. The partnership was initiated from a long history of mutual respect and interests, and the research plan was developed very collaboratively to align both to CAST’s theoretical interests in engagement and learning, and the museum’s practical and theoretical interests in engagement, exhibit design, and informal settings. The partner’s roles in the collaboration were described similarly by all respondents, with CAST taking a lead role in managing the project, and the museum contributing substantively throughout different phases of the project, as needed, especially in handling data collection logistics and providing input on the research plan and coding schemes. All six respondents indicated that the project had a large impact in how they thought about engagement and learning, and discussed concrete plans to collaborate in the future, including specific ideas for design-based research projects and publications aimed at both the formal and informal learning fields.

**Introduction**

This report presents findings from interviews conducted with CAST and the Boston Museum of Science about their collaboration on the Engagement and Thinking in Designed ISL Settings project. The interviews were conducted and analyzed by researchers from Education Development Center, Inc.’s Center for Children and Technology (EDC). The purpose of the interviews was to better understand the nature of the collaboration between a research organization and a museum as they worked together on a research project. The interview asked respondents to discuss the goals of the project and how they related to their organization’s mission, how the partnership and the project developed, each partner’s roles on the project, how the collaboration was conducted, strengths and challenges in the collaboration, the impact that the project had on each partner organization, and future plans for utilizing findings and future collaborations. EDC interviewed three researchers from CAST and three staff members from the Boston Museum of Science for 30 – 45 minutes each via phone. EDC then transcribed the interviews, analyzed them thematically, and summarized them. The findings and illustrative quotes are summarized below, by topic area.

**Goals and Mission**

When asked to describe their understanding of the goals of the project, all six respondents said that the goal of the project was to explore multiple measures of engagement, and most of them also mentioned that this was being done in a museum or informal setting. Three respondents said that the findings would be used to inform the museum’s design of future exhibits. As one respondent explained, the main question of the project was:

*“How do you measure engagement in museums and really building together a new framework that looks at engagement at multiple angles; how people feel, their emotional engagement and then also, what they do and how they long they spend?”*—museum staff member

The museum respondents felt that the project would help inform exhibit design to make them more engaging and to improve learning outcomes, and two of them also mentioned wanting the museum to be leaders in the field of informal learning research, as illustrated by the quote below:

*“We are really excited about this project because from a research perspective we thought it had a really great potential to change the thinking of the boarder museum field about engagement by bringing people who weren’t traditionally museum researchers…. I think that thinking about the engagement of our visitors is just so central to so many different aspects of how we think about our exhibits, so, engagement is really important for kind of longer term memories of their experience which leads to longer term kind of content retention.”*—museum staff member

The CAST respondents said that they were interested in studying how different learning environments can be designed to maximize access and engagement for a range of learners, and felt that the museum was a great opportunity to learn more about this issue in informal learning environments. Two respondents mentioned that this could inform their understanding of formal learning environments as well, as explained in the following quote:

*“The informal learning setting gives us a really great context to be able to look more deeply at engagement, because it’s a setting where kids are really able to sort of drive their own experience and are able to engage with activities and with a learning environment in whatever way is the most interesting and engaging for them. So it’s kind of the perfect context and opportunity to look at understanding engagement more deeply and how that really relates to learning, which has tons of implications for the educational setting as well.”—*CAST staff member

**Early Phases of the Partnership**

When asked about how the partnership was initiated, all of respondents said that the museum and CAST had wanted to work together for a long time because of mutual interests and respect, and that CAST was looking for a museum partner on a grant proposal and the museum seemed like a good fit, as explained in the quote below:

*“CAST and the Museum of Science have been paying attention to Universal Design for over 25 years and it’s something that’s really important to us, and so, CAST and the Museum of Science have been having ongoing conversations for a very long time. CAST has been looking for projects to partner together on…. They were looking for a museum partner, and we had always been thinking about partnering.”* —museum staff member

A few respondents provided more details about past connections and the proposal process. One museum staff member had a thesis advisor who worked for CAST, and a CAST staff member had recently been an advisor on another museum project. CAST had been working on a proposal with the New York Hall of Science with the Boston Museum of Science, and when that proposal did not work out, CAST, in consultation with the NSF and the Boston Museum of Science, decided to rework the proposal with the Boston museum instead. With CAST’s encouragement, the museum was very involved in reconceptualizing the proposal and research questions to make them relevant to their interests and the informal learning field.

All six respondents agreed that the idea for the project was developed very collaboratively through a marriage of theory and practice. CAST had theoretical questions around how to measure engagement, and the museum had more practical questions around exhibit design and conditions that enhance engagement, but all of the respondents felt that these questions complemented each other well, as shown in the following quote:

*“I think we’ve really done a nice job in this project of sort of melding together the interests of the researchers at CAST and at the museum, and I think they’ve really complemented each other. So the sort of bigger theory question in terms of what is engagement and what does it really look like and how can we measure it, that was, something that I think on CAST and was something that the researchers were really invested in being able to answer, but then the practical side of that, which fits together really nicely with the museum’s interest is then what does that mean for learning? And if given that we find that out, how is this really going to practically apply to how we design using exhibits, and how might we make changes to either the exhibits themselves or the experience at the museum that’s really going to leverage engagement in a way that really leads to learning?”—*CAST staff member

The specific conditions that the museum contributed to the research plan were about the impact of social context (whether children participated alone or in dyads with their parents) and goals (whether participants got a “purposeful agenda” or no agenda for their experience) on children’s engagement with the exhibits.

**Partners’ Roles**

In discussing the roles that each of the two organizations played in the project, all respondents, on both the museum side and the CAST side, described the partners’ roles very similarly. Generally, the respondents indicated that although CAST was the lead organization managing the project, it was a very collaborative enterprise, especially at key junctures of the project, as explained in the following quote:

*“So it’s very distributed as opposed to you do this, you do that, but the project was managed from CAST, and there were things on the museum side in terms of orchestration and negotiating with all the different departments in the museum that the museum handled that we weren’t really involved in. But, other than that, it’s been very integrative.”—*CAST staff member

Both partners worked closely together to develop the proposal, research questions, and coding scheme. Report writing and dissemination are expected to be highly collaborative parts of the project as well, with each partner taking the lead on papers that are relevant to that partner’s field. While CAST took the lead on recruitment, protocol development, data collection and analysis, the museum contributed staff time to these activities as well. The museum handled much of the logistics around access to the museum, closing exhibits, negotiating with other museum departments, and communicating with visitors. The Principal Investigator and co-Principal Investigators worked on more conceptual pieces of the project such as creating research questions, while one research associate from each organization worked together to manage logistics. The respondents also mentioned the key role that interns played in the project, especially in data collection in the second summer of the project.

When asked about changes in roles over the course of the project, most of the respondents mentioned that the director of research and evaluation at the museum got promoted to director of exhibits, which was viewed positively since she could directly use her experiences on the project to inform the design of future exhibits. She took on less of a role in the project after her promotion though, and her replacement at the museum took on a bigger role. Similarly, two CAST staff members on the project got promoted, and their roles on the project shifted, with one taking on a bigger role on the project as the other took on a smaller role.

**Collaboration**

When asked how the collaboration was conducted, in terms of communication and meetings, all of the respondents agreed that the intensity and type of meetings varied according to the needs of the project at each phase, which seemed to work well, as explained in the following quote:

*“I don’t feel like we had [meetings] on a really regular schedule. It’s sort of more as-needed… we’ll have them really frequently when we need to spend the time to think about, what is the coding protocol, and less frequently when we’re just sort of in the process [of coding].”*—museum staff member

Generally, respondents indicated that in the beginning of the project, many in-person meetings were held to look at spaces and conduct pilot testing, and regular phone meetings were held to discuss research questions and develop protocols (along with frequent emails). Logistical communications were also done in various forms, but mostly via email, between the research associates at each organization who were managing logistics. During data collection, communication tended to happen semi-regularly, via phone or via email, among the project leadership, although the partners saw each other in person to collect data. Several long in-person and virtual meetings were also conducted to look at data together, develop a coding scheme, and become reliable coders. At the time of the interviews, the partners were mostly working on coding independently, but expected to meet again during the data analysis phase.

All six respondents were effusive in their praise of the partnership and collaboration, stating that they learned a lot from the other organization’s perspective, and pointing to the high mutual respect between the two organizations as the key factor in the success of the collaboration, as shown in the quote below:

*“We absolutely loved partnering with them. We learned so much from working with CAST, they just have such a different way of doing things and… what was really key for us was that we not only learned a lot from them, but they really respected our authority and expertise as well… it was such a great two-way exchange that we just felt really enriched by it and so, and when you feel respected you give more.”—*museum staff member

Other factors cited in the success of the partnership include:

* The museum was heavily involved from the proposal and early planning stages, and CAST sought their input into research questions and conditions to make the research relevant to CAST’s theoretical interests, the museum’s more practical interests, and the informal learning field.
* Both sides were heavily involved throughout the project, making it feel like a true partnership.
* Both sides were interested in exploring the different ideas and perspectives of the other organization and drawing on each other’s strengths, without feeling threatened by differences. Differences were viewed as interesting problems that could lead to new, innovative solutions.
* Communication was very open and empathetic.
* The project was grounded in the current literature on informal learning while also building on and innovating on that body of work.
* The two organizations had a history of mutual respect going into the project, and a mutual interest in Universal Design for Learning (UDL).
* CAST was an effective project leader that got things accomplished smoothly.
* Having discrete point people to handle logistics on each side, plus parallel team structures on each side, was helpful.

Although several challenges were mentioned, they were mostly cited as either productive challenges, or challenges that were not directly related to the partnership. The “productive challenges” related to differences over coding and giving participants goals for the exhibits, which were worked out with creative solutions (see below for details). Other challenges cited were that recruiting was difficult, the project was understaffed due to a small budget, and that the NSF required them to change the research setting to exhibits instead of the overnight program that was originally proposed, which necessitated a delayed timeline and negotiating with other museum departments to shut down exhibits.

While two main major differences in perspectives were discussed by the respondents, all six respondents described the differences as very fruitful, leading to innovative solutions that ultimately enhanced the project, as shown in the following quote:

*“Coming to an understanding, and then being able to articulate that understanding, not even compromise, but new understanding that came out of those conversations in an experiment that then yielded fruit for both perspectives was… the most important and best part of the partnership was just being able to really openly communicate with each other and exchange ideas, even though when we sort of violently thought the other was really wrong.”* *—*CAST staff member

One major difference of perspective was that CAST and the museum had different ideas of what engagement looked like and how it should be measured, based on their different disciplines. CAST felt that engagement should be rated highly when participants followed directions, while the museum felt that engagement is often highest when directions are not followed. Furthermore, CAST wanted to count “objective” behavioral measures of engagement, while the museum wanted more holistic measures of engagement. For example, CAST thought that counting a behavior such as a participant’s number of smiles while interacting with an exhibit could be used to measure engagement, while the museum believed that by watching an entire video of the interaction, an observer might come to a different interpretation of that behavior, such as realizing that smiling is a nervous rather than engaged behavior for that participant.

CAST and the museum spent a lot of time watching videos together and discussing the coding scheme. The two organizations agreed to count both objective behaviors within time segments, and a more holistic overall rating of engagement. They also agreed to use a relatively basic rubric for scoring engagement, while following up later with deeper secondary analyses.

Another difference of perspective was the role of goals in exhibits, and their impact on learning and engagement. CAST, coming from a formal learning space, assumed that learning and engagement would be greatly diminished without clear and explicit learning goals for the participants. On the other hand, the museum felt very strongly that participants should be able to set their own goals for exhibits to maximize learning and engagement. The partners agreed to make one of the study conditions no agenda versus a “purposeful agenda,” which was explained as consisting of only a hint of learning goals, since explicit learning goals would have been unrealistic in the museum setting. Both sides ultimately felt that these conditions would result in an interesting experiment that would be highly relevant to the field of museum research. The following quote describes this experience:

*“When we think about learning and engagement… in the classroom, there’s got to be a really clear goal, and kids should know… what the learning goal is and what they should expect to get out of the experience by the end of it. From the museum’s perspective… that’s not the way that the museum would ever operate. It’s the kids being able to drive their own experience and really construct their own learning, and so, instead of having this condition where it’s like, half the kids, we’ll tell them exactly what to do and what they should be learning from the experience, which is not something that would actually be like a realistic thing to do in the museum settings. So instead we worked together to figure out, well, what’s a way that we could still sort of manipulate… a sort of agenda for the experience without actually giving them instructions or clear learning goals?”—*CAST staff member

All of the respondents found these differences in perspective to be quite educational. One respondent from CAST explained that these conversations particularly interesting because although they view themselves as “constructivist,” they realized that the museum was actually more constructivist than they were, largely because of differences in the fields of formal versus informal learning.

**Impact and Future Plans**

When asked about how the project findings would be utilized, all of the respondents indicated that the findings are still in progress, with some early findings pending, but they had some general ideas about how they may use the findings. Staff members from both organizations were particularly interested in exploring the implications of early findings that seemed to indicate that children had lower emotional arousal levels when they experienced exhibits with their parents.

In discussing the project’s impact on their own organization, two of the museum respondents said that they generally expected the project to have an impact on the museum’s thinking and practices around engagement and exhibit design, especially since one of the museum staff members changed positions to director of exhibits, as illustrated in the following quote:

*“I can’t wait to get the CAST findings, because then I will share it with everyone in the exhibits department, and for me it’s reawakened me to what the importance of engagement and so now I’m thinking about it in our exhibits in many different ways.”—*museum staff member

The project is likely to inform the museum’s thinking about goals and parental involvement in engagement and exhibit design. They plan to share the findings internally through informal conversations, and perhaps more formal conversations if there is interest. Members of the research department always work with exhibit designers to develop and test their ideas, so that is another way that the findings could be utilized. The museum respondents also said that they learned new ways to measure engagement, such as eye-tracking video. One respondent added that she learned a lot about conducting relatively large studies in the museum and the internal workings of the museum, and that she felt more confident in her own expertise in the field of museum research, which she said will all serve her well in future projects.

All three CAST respondents said that this project influenced their thinking about engagement, and that they were reimagining their models around engagement and emotion and its measurement, learning settings, UDL, and diverse learners, as shown in the following quote:

*“We recently gave our first several-day workshop on UDL and engagement, and this worked prominently in that, and we had the director of professional learning there, and… she was like, ‘Oh, my God, this like turns around everything that we’ve been talking out. It’s just the edge of UDL. Like everything else seemed sort of canned right now. This is like really exciting.’”—*CAST staff member

Two CAST respondents commented that they learned more about the informal learning space, which was interesting to them. One respondent added that she gained a new understanding of what good collaboration looks like, and that she was interested in further exploring the issues of constrained choice and the role of parents in engagement, all of which she will apply to future projects.

Respondents from both organizations discussed building on this project by collaborating in the future on dissemination and related project ideas, as shown in the quote below:

*“We’re sort of already kind of trying to start the wheels going as, let’s get some of this work published, and I think the next step beyond that is that we would love to do some further research with the same partnership and really take it a step further and apply it to the exhibit setting and see if we can actually manipulate some factors within the exhibit to see how what we’ve learned through this study can inform how exhibits are designed in a way that really brings about the engagement and learning for the widest range of kids.”—*CAST staff member

Some of the respondents provided greater levels of detail on specific project ideas. The museum and CAST are working on up to three project ideas. Two specific ideas were described. The most articulated idea is a design-based research grant proposal around engagement and exhibit design for a range of learners, about how learning goals affect engagement. CAST is interested in exploring this question in informal settings to inform their work in formal settings, which usually require a strong articulation of learning goals. This proposal may be submitted to the Core Research Program of the Education and Human Resources Directorate (ECR) of the National Science Foundation (NSF). Another similar idea will incorporate elements of UDL and be submitted to NSF’s Advancing Informal STEM Learning (AISL) grant competition. The partners expect the proposal development process to be very collaborative. One respondent also mentioned that the new director of exhibits wants help from CAST to redesign one of the wings of the museum.

Although one museum respondent was not sure what impact the project had on CAST, the other two museum respondents said that they believed that the project expanded CAST’s understanding of informal learning settings, which they could apply more broadly and to future projects. The CAST respondents speculated that the project would inform the museum’s thinking around research and measurement, particularly experimental research designs. They also believed that it would influence their design of exhibits, particularly around UDL and accessibility of engagement for diverse learners (rather than just considering physical accessibility).

**Conclusion**

The interview responses for all six respondents were remarkably similar, and overwhelmingly presented a positive portrait of the collaboration. The respondents all had similar interpretations of the goals of the project—exploring a multimodal model of engagement in informal science settings—and all felt that the project aligned very well to their institution’s mission. The partnership was initiated from a long history of mutual respect and interests, and the research plan was developed very collaboratively to align both to CAST’s theoretical interests in engagement and learning, and the museum’s practical and theoretical interests in engagement, exhibit design, and informal settings.

The partner’s roles in the collaboration were described similarly by all respondents, with CAST taking a lead role in managing the project, and the museum contributing substantively throughout different phases of the project, as needed, especially in handling data collection logistics and providing input on the research plan and coding schemes. All six respondents indicated that the project had a large impact in how they thought about engagement and learning, and discussed concrete plans to collaborate in the future, including specific ideas for design-based research projects and publications aimed at both the formal and informal learning fields.

The respondents described a number of elements of successful collaboration and productive challenge, many of which could be replicated in similar collaborations between researchers and informal learning institutions. These include:

* A high degree of mutual respect for each others’ expertise in their respective fields going into the project;
* A willingness and curiosity to learn from each other’s differences of perspective, and viewing differences of opinion as interesting problems to be solved with novel solutions, rather than ideological threats;
* Open and empathetic communication;
* Involving the museum early and often, and making the research questions relevant to their theoretical and practical interests (as well as CAST’s theoretical interests); and
* Effective project management, use of meetings, and organizational structures in the partnership.

Overall, the greatest strength of the collaboration was that the two organizations were able to turn their differences of perspective, on issues such as measuring engagement and the role of goals in informal learning, into researchable questions and study conditions, to deeply explore how to promote engagement in informal educational settings. These experiments led to new learnings about engagement for the two organizations and their respective fields, which could not have emerged without the intellectual contributions of both partner organizations.

**Partner Interview Guideline**

**Engagement and Thinking in Designed Informal Science Learning Settings**

**1. Understanding Your Project/Partnership**

1.1. What is your understanding of the goals of the project?

1.2. How does this project connect with your organizations’ mission?

1.3. Who is involved in the project? What are the partner’s roles and what do they contribute?

1.4. Did your/your partners role change over the course of the project?

1.5. How was the partnership initiated?

1.6. How did it develop over time?

1.7. How did you work together/collaborate with each other?

1.8. What are your plans for continuing the partnership after the current project ends?

**2. Relationship between Research and Practice in Your Project**

2.1. How did the topic that you are investigating originate? Did it arise out of practice or from theory?

2.2. What roles did you/your organization play in the different phases of the research (design, data collection, data analysis, dissemination/utilization of findings)?

2.3. How will you use the research findings to inform practice?

**3. Your Assessment of the Partnership**

3.1. What worked well in the partnership?

3.2. What challenges did you encounter?

3.3 When/where did you encounter different perspectives?

3.4. In what ways did your interdisciplinary partnership contribute to project outcomes?

3.5. What impact did the project have on your organization?

3.6. What impact did the project have on your partner organization?