Early Childhood STEM Ecosystem NSF Planning Grant

External Evaluation

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Creating an Early Childhood STEM Ecosystem, Ida Rose Florez, Ph.D. (Principle Investigator), Reuben H. Fleet Science Center, San Diego, California (Sponsor)

This evaluation report provides a brief review of the National Science Foundation (NSF) planning grant, *Creating an Early Childhood STEM Ecosystem*, as of August 2019. The purpose of the evaluation was to provide an external, independent overview of the work completed and some of the lessons learned to date. Draft products were reviewed (see deliverables chart at end) and goals and objectives, in some cases revised over time to reflect learning from the work, were also considered (see side bars). The approach used for the evaluation stems from Developmental Evaluation principles (e.g., Patton, 2011) and a strategy framework that describes *intended, deliberate, unrealized and emergent* as components of an effort's final realized strategies. (Patton, 2011, Mintzberg, 2008).

***Program Goal**:*
To enhance the infrastructure of early STEM education by providing a model for the planning and development of early childhood focused coalitions around the topic of STEM learning and engagement. In addition, identifying how to bridge STEM learning experiences between home, pre-k learning environments, and formal school addresses a longstanding challenge of sustaining STEM skills as young children transition between environments. community, and policy experts to identify the elements, activities, and community relationships necessary to cultivate and sustain a thriving regional early childhood (ages 3-6) STEM ecosystem.

In 2015, the National Science Foundation awarded one-year funding to Principal Investigator (PI) Ida Rose Florez, Ph.D., to "bring together an interdisciplinary planning team of informal and formal STEM educators, researchers, scientists, community, and policy experts to identify the elements, activities, and community relationships necessary to cultivate and sustain a thriving regional early childhood (ages 3-6) STEM ecosystem." In 2017 an extension was granted and this evaluation focuses on the work completed since that time.

The work focuses on "understanding the needs and interests of young Latino dual language learners from low income homes, as well as identify regional assets (e.g., museums, afterschool programs, universities, schools) that could coalesce efforts to systematically increase access to developmentally appropriate informal STEM activities and resources, particularly those focused on engineering and computational thinking." The original proposal described a participatory approach with a whole-systems view and "specific planning strategies [that] include the use of group facilitation techniques such as World Café, graphic recording, and live polling."[1]

ECOSTEM Original Planning Grant Objectives/Deliverables:

1) a literature review on STEM ecosystems;
2) an Early Childhood STEM Community Asset Map of southeast San Diego;
3) a set of proposed design principles for identifying and creating early childhood STEM ecosystems in low income communities; and
4) a theory of action that could guide future design and research.

The information used to inform this report included sample project documents, key stakeholder interviews, and communication with the principle investigator.

The two evaluation questions addressed by this brief evaluation report encompassed the following:

A) Have the deliverables and proposed work been completed?
B) What are key insights, lessons learned and challenges from the process to date?

[1] Planning Grant Proposal.

In short, the answers to these questions are yes, core work has been accomplished, deliverables have been drafted and final versions are in progress, and key lessons have emerged throughout the process. The remainder of this report highlights the key evidence for that progress. The final project report will provide evidence in detail.[2]

Have the deliverables and proposed work been completed?

The project did create a core planning team, which had several meetings/communications throughout the grant period, and did conduct parent focus groups, surveys and an interactive community stakeholder event that included Latino families from southeast San Diego together with local experts to reflect on and consider the community assets and learn from local and national STEM-related resources and individuals. The results from these meetings informed the PI's thinking and are cited in the asset map document. The literature review summarizes a broad set of STEM-relevant early childhood conceptual frameworks and offers recommendations for future work in the area. The asset map document also includes a description of both local assets and a broader theory of action that uncovers the complexities of offering high quality, authentic and culturally-relevant STEM experiences that help build deep connections to local communities.

What are key insights, lessons learned and challenges from the process to date?

As part of the external evaluation, five (5) key stakeholders were interviewed. (Interview questions are included in the Appendix). Those interviewed included members of the core planning team, local school/agency staff members who attended the core team planning and/or community stakeholder event, a participating parent, and the project manager.[3] The PI was also interviewed separately about strategies and lessons learned.

Most Exciting: Those interviewed described the ***high potential*** and ***intriguing possibilities*** of the project as some of the most exciting aspects. The value of getting input "on the ground" and what *could* be done for a "real early learning ecology" as well as projects at the school(s) involved provided high energy and engagement. Staff appreciated working directly with families and parents and felt that what they learned from the events and focus groups was "eye opening." The "hopes and dreams of the community" and "gift of opportunity" for children and families to learn more about STEM connected directly to the overall purpose of the planning grant. One participant "loved the core planning meeting" and the "external" meeting with community partners.

What was Learned: "It's all about ***opportunity***." The impact of the visit from Sylvia Acevedo, Girl Scouts of USA, was noted several times as being particularly important. She was engaging and an important role model as a Latina who studied science (she's an engineer). One of the interviewees recalled that a young girl in the audience asked her, "Is Girl Scouts real?" The positive response she elicited from the audience was so great that for the first time, the local school has a Girl Scouts program. "We are all scientists" and "it doesn't have to be intimidating" were other key takeaways from this event. They learned "what parents want for their kids" and valued that it was a "very personalized and in touch" event as well. "Everything that has to do with STEM… We didn't know anything before… Didn't know about computer coding." "Seeing the little kids and their knowing and curiosity" was invigorating for parents.

[2] **Note:** This report does not replace regular project annual reporting nor is it intended to be a comprehensive program evaluation nor an academic treatise on the project's content. This is a brief snapshot of the progress related to key evaluation questions. For more detailed documentation and description of the project's activities and outcomes, please refer to specific Early Childhood ECOSTEM project reports, documents, articles and other products forthcoming.

[3] Stakeholder interviews were conducted in July 2019 by ZOOM or phone with the following individuals: Julia Bridi, San Diego County Office of Education; Charissa Lucille, Early Childhood Systems Solutions; Kris Mooney, Fleet Science Center; Steven Snyder, Fleet Science Center; Lucia Urias, parent participant

Other learnings included that "the ***community really wants this***!" and yet "doesn't know how to advocate for it." Furthermore, "top down doesn't work." It's most important to "***speak with families and create plans that meet their needs***." The opportunity to "***interact with people of different expertise and different perspectives***" was noted as a value for the core planning team. At the same time, questions arose because of uneven momentum during the length of time from the initial grant award (2015), the core team meetings and other events, and the time since during which the deliverables and products were being created. "What are the next steps?" and "Now what?" were key questions asked by core planning team members.

Thoughts on Approach Used: Educators valued the experiential "not just sit and deliver" approach where hands-on activities were included and work was done together. "This works for me too!" noted one staff member. The overall approach to parents (bilingual, accessible instead of overwhelming technology) was valued and Sylvia Acevedo was again noted for talking about her experience and life story as relatable and communicating that it (STEM) can be done. The large group feedback seemed to work and a switch was also made from laptops/online to hard copy surveys to get more reliable results with a less frustrating method.

Challenges: Key challenges for future efforts identified by those interviewed centered on ***maintaining connection and momentum*** and ***continuing to find ways to involve parents***. Specific challenges mentioned are listed below.

- Continued advocacy and follow-through on behalf of parents.
- Not starting too big—smaller chunks done well (or "it will be overwhelming and not done with fidelity and quality")
- Building capacity along the way—planning for sustainability of effort beyond any grant funding.
- Coordinate and pay attention to details of who does the implementation (e.g., a school site, community facility or other?). Human capital and personnel capacity are critical.

Challenges experienced during the planning grant and possibility for future similar projects include:

- Getting the kids there. Getting people involved and participating. Events can be inconvenient with jobs/child care, etc.
- Opening parents' minds to get them more involved. "It's hard to reach out." "Do it through the kids!"
- The time it ended up taking (e.g., year three in a one-year project)—there are a lot of changes that can happen in that time.
- The fall off of the core planning team. "There were many months with no updates, timelines kept getting pushed back, lots of delay."

Advice/Important to Keep in Mind: Most of the comments related to ***communication and engagement***, both of parents and planning team members. For example,

- Continued conversations with people "on the ground" about what was actually planned and done.
- Regular (monthly?) meetings and quality assurance steps.
- Keep it very personalized and connected.
- Knowing the time commitment and constraints of stakeholders- not done in isolation but with leaders in the community. "You want schools to be allies."
- Continue to offer programs, meetings, documents, handouts and other pieces in language appropriate to the families (i.e., bilingual, multilingual). Language is key—one parent said that homework is frustrating because they can't help their child with it because they don't understand English well enough.
- Show how STEM applies to life.

- Make it easy for parents to get involved. Understand and speak their language, establish close relationships to parents.
- Establish the next phase with the "right" organizations for it to be successful for full level of NSF support.
- Keep people up to speed and don't let long stretches of time go by when "nothing happens/no communication."
- Communication is key—stay connected.
- Listening to the community and core team is important.
- "Hard to say unless I know direction—haven't seen the literature review yet or asset map."

Other questions/comments: When asked if there was anything else they wanted to say that wasn't already asked about, most reiterated related ideas already included above such as:

- Involve ***parents as community advocates***—hard to do but work diligently and find the time to figure it out.
- Looking forward to results and a plan of action that can be taken.
- Haven't seen the plan so don't know results.
- More frequent meetings and more messaging, connection and follow-through.

The interview with the Principle Investigator echoed the results reported above and underlined several main elements for moving to a next phase on the development of an early childhood STEM ecosystem. A key aspect to include is that "the work has to be situated on the ground, where the people are, and people doing the work (the leaders and creators) need to be from the community." All others need to act as bridge in a supportive or coaching role.

The PI also identified activities and effort of the grant that can be described as deliberate (intended strategy that was implemented), unrealized (intended strategy that was either altered or not done as originally conceived), and emergent (new learning, work and activities that arose during the whole process).

Deliberate: A community meeting was held, input was solicited and received from community members, community members were surveyed and an asset map is in progress, family focus groups were held and a core planning team was created with meetings in the 1st and 2nd years. The literature review is in process. Basically, all deliverables have been met or are close to completion.

Unrealized: The core planning team was discontinued after it served its initial start-up purpose. The benefits and value of individual members outweighed the ongoing cost of meeting as a group and the decision to focus energy and effort with the community members such as engaged parents paid off in the end with successful community and parent events and focus groups. The literature review content and conceptualization has shifted to encompass the complexities of working within child development, systems and STEM development theories and practice.

Emergent: The structure of the core planning team as leaders for decisions shifted to engaging parents as implementers and key informants for key, grounded insights into how to create culturally-relevant and centered early childhood STEM engagement and learning. "This needs to be a systems approach—engaging families and not just students and empowering them (e.g., Funds of Knowledge work). Moms need to learn with their kids (e.g., teaching them how to code.)" "Teach us first so we seem smart" and so they can help their children.

In sum, the Early Childhood ECOSTEM project has made considerable progress and engaged families and community members in the process. The potential for key insights and frameworks for a next phase is high and relies on dissemination of the insights from the literature review and asset map documents as well as any articles that can be shared with the community stakeholders and broader STEM audiences. The following table highlights the progress on the project-specific deliverables. Additional details and more examples will be included in the project's annual/final report.

Planning grant deliverables	**Status**
Literature review on STEM Ecosystems	Draft completed, final in progress.
Early Childhood STEM Community Asset Map of southeast San Diego	Draft completed, final in progress.
A set of proposed design principles for identifying and creating early childhood STEM ecosystems in low income communities	Draft included in Asset Map document.
A theory of action to guide future design and research	Draft included in Asset Map document.

In closing, a quote from Michael Quinn Patton is shared below as a reminder that planning and creating require a different kind of learning and action than implementation of already-designed programs.

> "In double-loop learning, those involved go beyond the single loop of identifying the problem and finding a solution to a second loop that involves questioning the assumptions, policies, practices, values, and system dynamics that led to the problem in the first place and intervening in ways that involve the modification of underlying system relationships and functioning. Making changes to improve immediate outcomes is single-loop learning; making changes to the system either to prevent a problem or to embed the solution in a changed system involves double-loop learning." (Patton, 2011)

Program "thinking" that overemphasizes immediate outcomes or strict implementation process at the expense of deep learning and reflection about systems with those most impacted by them can steer high potential ideas into narrow spaces. The value of planning grants with flexibility can offset the seemingly risky nature of exploring the unknown.

References:

Mintzberg, H. (2008). *Tracking Strategies: Towards a General Theory of Strategy Formation.* Oxford University Press.

Patton, M.Q. (2011). *Developmental Evaluation: Applying Complexity Concepts to Enhance Innovation and Use.* Guilford Press.

APPENDIX

ECOSTEM Key Stakeholder Interview Guiding Questions

You were invited to participant because you have worked as a partner with the ECOSTEM Planning Grant.
These questions are for Ida Rose Florez, project and funding partners.
The information gathered from these interviews will, in combination with other information and data,
…help the ECOSTEM staff, partners and funders know the value and challenges facing the effort,
… help planning for future work as well as summarize lessons learned for the funders and administrators.
Won't quote you by name—list of names of those interviewed will be included. Any questions before we begin?

1. Briefly, describe your role/connection to ECOSTEM. What brought you to be associated with the project?

2. What is the most exciting part of working with ECOSTEM for you? (Personally and/or professionally)

3. What have you learned from working with ECOSTEM? Any AHAs? Can you describe a moment from your work with ECOSTEM that stuck out as particularly important? (e.g., demonstrating STEM learning valued by the community, or when you saw what is important to parents and children)

4. What ECOSTEM approach worked best to yield tangible results? (e.g., World Café, STEM Minds Start Early Panel/Event, Sylvia Acevdo visit, etc.)

5. What might be some challenges/what is the biggest challenge?

6. What's important for staff and program managers to keep in mind in the future? (e.g., Advice you would give to ECOSTEM staff and partners?

7. Is there anything else I didn't already ask?