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Building Local Systems of Programmatic Support for STEM Learning:

A Practical Guide for Developing Regional Communities of Practice

STEM²
THE POWER OF DISCOVERY

CONTENTS

> **"Communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly"**
>
> – *Etienne Wenger, Social Learning Theorist*

Introduction

The term "Community of Practice" although relatively new to contemporary educational settings, has longstanding roots in social learning theory (Lave & Wenger, 1991) as a mechanism for promoting meaningful, situated learning opportunities between individuals with varying levels of expertise related to the topic at hand. These group-learning contexts are dynamic and involve all participants in ongoing discourse in which they share information about their practice, experiences, and knowledge. In essence, communities of practice (CoPs) are developed by a group of individuals who share a common interest and intend to engage in a process of collective learning in this shared domain (Wenger, 2000). As such, these CoPs can occur in a variety of contexts and formats and can therefore involve diverse groups of participants.

In the field of Expanded Learning, CoPs are emerging as a promising strategy for building sustainable peer networks that ultimately can function as systems of support within a local region. These regional systems of support are intended to build the capacity of the leaders of local expanded learning programs such that they are equipped to improve the quality of their respective programmatic (point of service) and/or administrative practices either within or across particular areas of focus (e.g., STEM, Youth Voice and Leadership, Quality Staffing). More specifically, the recent development of a network of five regional communities of practice across California has demonstrated the value of utilizing the CoP structure as a primary mechanism for engaging local expanded learning leaders in increasing the quality and quantity of STEM learning opportunities offered to children and youth statewide. This three year Initiative, the Power of Discovery: STEM², was gen-

erously funded by the Noyce, S.D. Bechtel Jr., and Samueli Foundations and has provided important insights regarding the development and implementation of CoPs as a capacity building strategy within diverse local contexts statewide.

The purpose of this resource guide is to synthesize these instructive insights so that the CoP model can continue to be leveraged and improved upon in order to promote the systemic and cultural changes necessary for expanded learning programs to sustainably offer consistent, high quality STEM learning opportunities to all of the participating children and youth. The content of this guide is based upon the work of the Power of Discovery: STEM² Initiative. In addition to general descriptions of design and implementation strategies and considerations, it also contains practical examples of how a CoP can look and feel across diverse regional contexts. More specifically, two of the five Regional Innovation Support Providers (RISPs) that are part of the Power of Discovery: STEM² Initiative completed case studies which provide rich descriptions of the evolution and current status of their regional communities of practice. These case studies are included in the Appendix and serve as illustrative examples of how CoPs are conceptualized, implemented, and continuously improved within a unique regional context.

This guide is intended to serve as a resource for those interested in building a community of practice within or across organizations, communities, and/or regions. The conceptual framework applies across contexts and can inform the strategic planning process for diverse stakeholders at school, district, county, and regional levels.

Defining a CoP for Expanded Learning

As previously described, communities of practice are authentically structured collaborative learning environments that are co-constructed by all participating members so as to create opportunities for joint activities intended to improve their collective knowledge and practice. These learning communities can vary in focus from STEM to particular elements of program quality (e.g., Quality Standards for Expanded Learning in California[1]) yet share the same underlying purpose (overarching outcomes) and infrastructure. The overarching goals of a community of practice include the following:

1. **To develop a sustainable peer network of local practitioners** (e.g., program and/or site level administrators, site staff) such that participants can discuss common challenges, support one another, and share information, expertise, and resources. Building solid relationships built on trust and respect is essential in this time-intensive networking process.

2. **To improve participant knowledge and skills related to the focus of the community of practice**

3. **To promote collaborative planning of special events designed to leverage existing knowledge within and/or outside of the community in order to create meaningful, needs-based professional development opportunities for participants.** These events can and should be diverse in content and structure as they are intended to be based on the unique needs of the group. Examples of such events might include intentionally planned site visits to participating program sites in order to observe a particular promising practice (e.g., design-based learning) and/or partial or whole day cross-agency trainings for leadership and/or front line staff. The STEMpower Conference, hosted annually by the Region 9 Technical Assistance Center at the San Diego County Office of Education, is one example of a collaborative learning experience that leverages the existing expertise of participating programs in order to provide a comprehensive professional development opportunity for after school educators on all levels from program to front line staff.[2]

It is critical to understand that communities of practice are socially organized learning environments that are distinctive from other more traditional professional development settings in that they are <u>not</u> focused on content delivery but rather are designed as a <u>"by us, for us"</u> collective learning space. This concept is often unfamiliar (although not unappealing) to many participants and it should be expected that it take some time for participants to adjust to the expectation that they actively guide and construct their own learning experience. This typically becomes a very empowering experience for participants as they realize that what they learn and how they grow is completely contingent upon their own needs and investment in the group. As a result, effective communities of practice ultimately achieve high levels of participant ownership and investment, which in turn ensures that the content and structure of meetings are consistently relevant and valuable for informing practice.

Being dependent on the needs of participants, the content and structure of the group meetings will likely vary over time which highlights the need for a skilled facilitator, especially in the initial phases of CoP development. An effective facilitator will be able to lead constituents toward mutually agreed-upon, actionable plans. Models for facilitation and eventually co-facilitation (by participants) of CoPs will be described in greater detail in subsequent sections as will specific implementation strategies and considerations.

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1   California Department of Education, After School Division & California After School Network (2014). *Quality Standards for Expanded Learning in California: Creating a Shared Vision of Quality.* Retrieved online on June 2, 2015 from http://www.cde.ca.gov/ls/ba/as/documents/qualstandexplearn.pdf

2   The Regional Technical Assistance Center at the San Diego County Office of Education coordinates the After School STEMpower Conference on annual basis (since 2013): http://sdcoe.k12oms.org/1087-75345.

Implementing a Regional CoP to Support STEM Learning

Given the operational definition of a community of practice provided in the previous section, a clear picture has already been established of the conceptual foundation of a CoP specifically focused on building local program capacity to improve and expand quality STEM learning opportunities. The regional CoPs that were developed as part of the Power of Discovery: STEM² Initiative are diverse in terms of scope, content, and structure; however, they all share the foundational elements of a peer network, relevant STEM learning opportunities, and a move toward collaborative event planning for diverse stakeholder groups. What remains to be described is the actual process for planning and implementing this kind of learning community. This section includes information about the stakeholders involved in CoPs (both in terms of those convening and those participating), how to plan for and implement effective meetings, how to build a sense of community amongst participants, and how to anticipate and cope with common challenges associated with the initial start up.

Who is involved in a CoP?

Conveners

It is important to first identify who it is that actually convenes a CoP. This particular guide is written to reflect the experiences of those involved in the Power of Discovery: STEM² Initiative, a statewide project designed to build 5 regional communities of practice; however, it is worthwhile to note that this content can be widely applied to others outside of these stakeholders. That is, this guide outlines how CoPs can be developed on a regional level yet the practical strategies and processes can readily be applied to creating CoPs within an organization (e.g., for just Site Directors), district (e.g., school site administrators by program level), and/or industry (e.g., position titles across departments).

In the case of the Power of Discovery: STEM² Initiative, it was the leadership of the respective Regional Innovation Support Provider (RISPs) who convened the CoP meetings. RISPs are in essence, regional collaboratives that consist of at least two of the following types of organizations: County Offices of Education, CSL Net Regional STEM Networks, and/or Informal Community Learning Centers (e.g., museums). As such, it was a team of two or sometimes three representatives from these organizations that co-constructed and co-sponsored the CoP meetings. In terms of generalizability outside of this particular Initiative, who convenes and manages the CoP would depend upon the level of the CoP. That is, in some cases in California, it is a County Office of Education that is the convener for regional or geographically based learning communities (for expanded learning grantees); however, a given district or community based organization could also serve as a convener for a CoP intended to provide a collaborative learning experience for their own employees (e.g., for all Site Directors across an entire agency to collectively learn how to improve upon STEM learning opportunities in their respective sites). A convener will also need to decide on the number of CoPs to be implemented. In some cases, on a regional level it might make sense to have more than one CoP to accommodate geographic concerns (e.g., northern, central, and southern CoP groups within a large region), and on an agency level

it might make sense to hold distinctive, stakeholder-focused CoPs within or across organizations. ***The concept here is that there needs to be a consistent party responsible for coordinating the planning and implementation of the CoP meetings.*** This does not necessarily mean that this party is the one actually facilitating the meeting, as will be described later; however, in order to promote sustainability, there must be one central "owner" of the CoP. This "owner" can change or transfer leadership over time.

Participants:

Who participates in a CoP truly depends on what the overarching purpose of the CoP is and can therefore differ across CoPs. In general, CoPs that are designed to impact program level changes tend to involve both program and site level leadership. It is important to include programmatic decision makers and site level leaders because each provides a unique perspective on program practice. One without the other can result in a limited capacity for impacting change over time. That is, the absence of program level leadership might result in an inability to change broader program culture and policy while the absence of site level leadership might result in a limited ability to actually implement the strategies and/or content decided upon by programmatic decision makers. Including both perspectives allows for a more holistic consideration of the issues at hand and can promote the critical dialogue and negotiation of implementation strategy and practice required to ensure success.

There are two important factors to consider when recruiting and maintaining membership in a CoP:

1. **Recruit clearly defined, core teams from each participating agency**: Ensuring consistent attendance can be a challenge. Without the same people participating, it is very difficult to set and achieve stated goals and to develop a meaningful peer network. Successful CoPs tend to require that an agency identify at least one program level leader and one site level leader who will participate regularly in CoP meetings. In the event that one of the two team members cannot attend, there is still at least one constant member who can participate in CoP activities and transfer the learning to his/her team back at the agency. Depending on the focus of the CoP, the constituents of the team might look different. In some cases, it might be desirable to have content area specialists attend or even a seasoned front line staff. These strategic decisions are most appropriately made by the conveners of the CoP as part of a larger effort to impact broad change in the designated focus area. Specific recruitment strategies might include presenting at regional meetings/events for expanded learning programs and coordinating with a Regional Lead (at a COE) in order to gain email and phone access to grantees. Decisions about which expanded learning programs to invite are specific to the CoP, although in most cases, conveners tend to invite all interested programs to participate. In some cases, a purposeful sample of programs representing the spectrum of performance might be targeted. That is, exemplar programs might be invited to participate based on their capacity to be an asset to peers and struggling programs might be invited to participate based on their need for improvement in particular domains.

2. **Support participants in developing a plan or process for translating CoP learning into change at their respective agency**: It is important not to assume that participants innately know how to transfer their learning to others within their home organization. If this transfer of knowledge does not occur then there is limited capacity for impacting wider programmatic change. It is therefore important to help participants to think through how they will use what they have learned at a CoP meeting in order to impact broader change within their respective agency. In some cases, this process might entail hosting an internal staff meeting to discuss CoP content and its application to the policies and procedures within that organization. ***How the transfer or application of learning happens is not as important as ensuring that it happens.*** Engaging participants in focused discussion about what their plans are for promoting the transfer/application process should be a component of each CoP meeting. It can be as simple as asking teams to share out how they see their learning as applicable to their organization and what they plan to do as a next step for applying their new knowledge.

Preparing for a CoP Meeting:

As previously described, CoPs can and should range in focus depending on the needs of the host region, district, or organization in which they are situated. Once the focus of the CoP is specified and the appropriate participants are identified and recruited, the conveners can shift their focus to the actual planning and facilitation of the CoP meetings. This section outlines some key considerations and strategies for planning and facilitating effective CoP meetings.

Identifying the Content and Structure

Recall that CoPs are different from more traditional forms of professional development in which the presenters identify and deliver a predetermined body of content. On the contrary, CoPs are intended to be authentic, needs-based learning opportunities that are socially organized in such a way that they actively engage all members in constructing and expanding upon their practical knowledge and skills. As such,

the process for identifying relevant content and an appropriate structure for promoting participant engagement with this content is distinctive.

It is natural for the conveners to have some sense of participant needs, otherwise they would not have initiated a CoP; however, it is dangerous for conveners to presume that their notions of what participants needs represent actual needs. For this reason, *it is always important to conduct an interactive needs assessment with participants* at the first CoP meeting. *Interactive needs assessments tend to be more meaningful than survey based needs assessments when trying to build community and establish group consensus.* There is great value in providing participants with opportunities to reflect on their own program needs, to share these with a partner, and then to engage in a whole group report out in which common needs emerge and can be clearly identified by all participants. This process

tends to create a sense of communal ownership in the focus of the CoP.

Once a list of topics or needs is identified, it is important to engage participants in a discussion about how the CoP can effectively meet these needs. Participants might not be used to considering less conventional methods of learning such as site visits, thematic working meetings, and/or collectively planned professional development opportunities. This process often entails a skilled facilitator who is experienced with CoPs and can provide illustrative examples of how different CoPs are structured to meet diverse sets of

A skilled facilitator will consistently provide structured choice and voice to participants such that the CoP remains participant-driven while maintaining momentum and an appropriate level of continuity.

needs. This content can often serve as a springboard for productive group dialogue about what would work for the actual participants in this collaborative. A desired outcome of this process would be a set of formats that the group is interested in for the respective year. Once this list exists, the facilitator can work with the group to develop a plan for implementing the desired structures (e.g., a feasible process for identifying model sites for observing specifically identified quality practices and a process for scheduling visits and reflective debriefs to discuss learning outcomes). Appendix A contains case studies of actual CoPs, which include a variety of topics and formats. These case studies provide descriptive examples of how actual CoP meetings can look and feel depending on group needs and preferences.

Setting an annual meeting schedule at the first CoP meeting is an important first step in ensuring sustainability. Again, a skilled facilitator should engage the group in a discussion about the desired frequency of CoP meetings. There should be active consideration of the affordances and constraints of different meeting schedules (e.g., the balance between ensuring continuity and not inundating

calendars with meetings). Typically, more regular meetings result in a stronger peer network and more continuous learning process. CoP meetings can range in duration from one to three hours. The length of meetings will depend on the preferences of the group, although one hour tends not to be enough time for meaningful community building and learning and three hours can often be too large of a time commitment for some. *As such, a typical CoP meeting is generally about two hours long and occurs roughly every six weeks.* CoP meetings for expanded learning professionals tend to be held in the morning hours before program starts in the afternoon. Generally, CoPs meet from either 9:00 – 11:00 am or from 10:00 am – 12:00 pm. This is meant to serve as a suggestion, not a mandate, because the most important factor in ensuring the overall success of a CoP is that it consistently reflects the needs and capacities of the group members.

In addition to setting an annual meeting schedule, it is important to identify the particular focus and structure of each meeting so as to ensure a timely planning process and to allow participants to appropriately prepare for active participation in each respective meeting. This is not to say that meeting focus and structure must remain static and that it will not change over the course of the program year. A critical component of a successful CoP is its ability to adapt to group needs as they emerge within the larger context of an organized structure. Allowing too much flexibility and choice has the potential to result in indecision and inaction, which is not productive. A skilled facilitator will consistently provide structured choice and voice to participants such that the CoP remains participant-driven while maintaining momentum and an appropriate level of continuity. Effective CoPs are organic yet structured, which can be a delicate balance for a facilitator to maintain. One strategy is for facilitators to consistently check in with participants at each meeting to ensure that the CoP is meeting prioritized needs and that the action plan is still relevant.

In terms of the actual agenda planning process, unlike more conventional professional developments, CoPs are primarily planned collectively by the participants with the guidance of a skilled facilitator. The first meeting agenda will likely include elements such as: individual introductions, a community building activity, an interactive needs assessment, and a group

planning session for the year. <u>Subsequent agendas</u> will likely include some consistent elements such as a community building exercise, structured small and whole group discussion, and a whole group check in about the subsequent meeting (e.g., a review of the focus/ structure). ***In order to create a strong, sustainable peer network amongst participants and to promote meaningful learning, meetings must include opportunities for participants to engage in critical discussion within and across agencies.*** How and when these discussions occur can vary but the fact they occur is what is important. CoPs cannot be vehicles for content delivery only.

Location

Like everything else with the CoP model, where CoP meetings are held will depend on what works best for the members of the group. Typically, CoP meetings are conducted in-person. This is not to say that there cannot be virtual meetings; however, in-person meetings tend to be more conducive to the meaningful relationship building that is central to the success and sustainability of a CoP. In-person discussions and collaborative learning experiences also tend to provide a more engaging collaborative space for participants to interact with and learn from one another.

In terms of physical locations, some CoPs prefer to meet in a consistent, centralized location such as a County Office of Education. This tends to be the case for regions that are geographically dispersed. Another more common practice is for participating programs to host CoP meetings at their sites on a rotating basis. This rotation of location across a region can be more convenient for participants and also helps to promote networking by allowing participants to experientially learn from one another within diverse programmatic contexts. Often, the host program will share a brief presentation of what they consider to be a promising practice on a site or programmatic level. Programs can choose to host

a meeting at a district office or at an actual school site. In some cases, CoP participants will decide to change the time of their meeting in order to accommodate a site visit at the host site (e.g., to participate in a site visit from 3:00 – 4:00 pm and then to debrief from 4:00 – 5:00 pm about their observations). The critical factor in identifying CoP meeting location is that it represents what works best for the group and not the solely the convener. Consensus on location is generally built in the context of a group dialogue at an in-person CoP meeting. Hosts tend to provide some sort of light food and beverage service, which helps to support an informal learning and networking context.

Facilitation

Ensuring effective facilitation is critical to the ongoing success and sustainability of a CoP. Without a skilled facilitator who can recognize and respond to emergent participant needs and concerns, the CoP will likely suffer from disengagement and retention issues over time. Facilitation is a difficult art in that it is <u>not</u> about delivering or directing content, but rather about guiding learners to actively drive their own learning through interactions with one another. This can be a complicated process because authentic learning is not always linear or static but rather emergent and multi-dimensional. As such, the facilitator of a true CoP, a socially organized collaborative learning space, must be comfortable and confident with real-time thinking and acting. This entails the ability to listen actively; promote the sharing and acceptance of diverse opinions, experiences, and knowledge; and to lead the group through efficient, thoughtful consensus building and action planning.

Typically, it is the convener that initially facilitates the CoP meetings; however, in order to promote longitudinal sustainability, it is important to progressively distribute leadership responsibilities to CoP participants. More specifically, as the CoP matures (begins to solidify as a network and community), participants can be asked to volunteer to participate in the meeting planning and facilitation process. This participation would ultimately result in the member becoming a trained co-facilitator of the CoP. Ideally, two volunteers would be identified by the end of the first year of operation to serve in this capacity. It is recommended that a clear description be created and communicated regarding the expectations of this position. If participants feel overwhelmed by the responsibility then they will likely not be interested in pursuing it. However, if the opportunity is presented as a progressive professional development opportunity (to improve facilitation and planning skills), then engagement is far more likely.

Generally, this co-facilitation capacity building process begins with the volunteers participating in the planning meetings held by the conveners. During these meetings (which can be virtual or in-person) the group members collectively discuss the CoP status and needs as a basis for developing an agenda for the subsequent meeting. Initially, while the participants get used to engaging in the collective planning process, the conveners assume the ultimate responsibility for agenda creation and meeting preparation (e.g., materials). In this sense, there is not any "added work" for the participants beyond the time commitment associated with the actual meeting. Over time, the agenda creation and other preparatory actions (e.g., meeting reminders) become the shared responsibility of the two co-facilitators. This allows the gradual transfer of responsibility to actual participants without inundating either one with the bulk of the work. Throughout this transition process, the conveners coach the co-facilitators on both the planning and actual facilitation process. In addition to planning the meetings, the co-facilitators incrementally facilitate segments of meetings until ultimately they are collectively running meetings. Generally, co-facilitators tend to have "term limits" in order to prevent burn out while also maintaining a certain level of necessary continuity in leadership. Toward the end of their term, they would then identify and coach the next generation of co-facilitators. The idea is that ultimately, the initial conveners would become more peripheral in the planning and implementation of the CoP meetings and would ultimately serve as a resource rather than a driver. In this way, CoPs that follow this trajectory of distributed local leadership become more locally driven and sustainable.

Evaluation

As with most things, evaluation is essential in ensuring the ongoing efficacy and impact of a CoP. An evaluation form (survey) should be created to reflect the overarching goals of the CoP such that the data collected after each meeting can serve as a benchmark for progress toward the achievement of such goals. Forms can vary in length, content, and structure; however, it is generally true that a more succinct, easy to complete form will likely yield the highest response rate and therefore the most robust data set. Some common data points might include: position title, number of CoP meetings attended, type of employer (e.g., district, community-based organization, COE), ratings of progress toward intended outcomes (e.g., is this group becoming a useful professional network for you?), and an open-ended opportunity to provide suggestions for improving future meetings. More specifically focused items might be included depending on the content of the particular meeting. For example, if the meeting was a thematic meeting focused on improving participant knowledge of strategic planning (how to use a logic model) then it could make sense to include particular survey items related to specific knowledge or skills that would reasonably result from participating in the meeting. If possible, using an online data collection service such as Survey Monkey is advantageous in that aggregating the data for reporting and analysis is less time intensive. However, if this is not possible, then hard

copy forms can be used and manually analyzed and/or entered into an online system.

The evaluation data collected will serve as an important indicator of the efficacy and impact of the CoP meetings on participants. Reviewing this information on an ongoing basis as part of the planning process is important. Additionally, this data can provide useful content for accountability reporting and/or as evidence of a successful model and practice for future funding.

Conclusion

Based primarily on the work of the RISPs involved in the Power of Discovery: STEM [2] Initiative, the content presented in this guide is meant to provide practical strategies and information for the successful development and implementation of communities of practice across diverse contexts. A community of practice is a broadly defined and widely applicable framework for creating powerful, socially organized learning experiences for many types of stakeholders. As such, CoPs are becoming more widely recognized in the field of both formal and informal education as a mechanism for building the capacity of practitioners at all levels to expand their knowledge and to improve the quality of their work. This capacity building ultimately results in broader programmatic, cultural, and systemic changes, which contribute to higher quality learning opportunities for the children and youth participating in the programs/schools involved in the CoP.

References

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STEAM-Focused Regional Community of Practice

CASE STUDY

Region Served: Region 4

Length of Time in Operation: 2+ years

Participant types:

Position titles: District grant managers, Community-Based Organization (CBO) program managers, site supervisors/coordinators, frontline staff/activity leaders, non-profit directors/TA providers, county government managers, private foundation staff

Agencies:

school districts, CBO providers, county government, STEM-focused TA providers, private foundation,

Note: We can provide specifics on request

Meeting Information:

Times/year: 4–6 in Years One and Two; 8 monthly meetings are planned for Year Three (2015–16)

Meeting length: 2 hours, 9 am–11 am

CoP Evolution: Where is it now and where it began:

Planning process:

In Year One (2013–14) our CoP was planned and led by the two RISP leaders, Bruce Simon (Gateways East Bay STEM Network) and Jackie Shonerd (Alameda County Office of Education, Region 4 Afterschool Programs). The goals were to:

- Develop connections among afterschool providers within and across districts and CBO provider agencies to increase support and communication and build community
- Build capacity among afterschool staff to guide children's learning around STEM
- Share successful practices

Topics covered:

In Year One we focused on developing high quality STEM programs and featured multiple resources, strategies for inquiry, and opportunities for participant interaction.

- We used the framework of the Dimensions of Success (DoS) observation tool from the Harvard Program for Education, Afterschool and Resiliency (PEAR) to focus on STEM quality improvement. Each meeting highlighted one of the four strands, each with three clearly defined dimensions. This proved very successful. (Visit http://www.pearweb.org/tools/dos.html)
- In response to requests at CoP meetings and in collaboration with one of our partners, the Developmental Studies Center, we provided separate training in *KidzScience* and *KidzMath* to approximately 75 staff from two provider agencies and one school district program. These entities had previously purchased the curricula and either had not trained staff on their use, or had new staff that had never attended training. The trainings were well received and led to further engagement with participating staff and supervisors.

- We introduced *Edmodo,* a free online learning management system, as a platform to facilitate asynchronous communication and resource sharing, although this did not get much traction.

At the end of Year One we collected information from participants about what they wanted from their Community of Practice, and selected future meeting dates and locations. We were ably supported in our evaluation and planning by consultant Melissa MacDonald. We recruited three volunteer peer co-facilitators to help plan and co-lead meetings in the 2nd year.

In Year Two (2014–15), Bruce and Jackie drafted meeting agendas and revised them with the peer co-facilitators, who co-led the meetings with us and debriefed together after each meeting.

- **Topics in Year Two** were identified by participants and focused on improving program quality and sustainability, and particularly on the need to build and maintain partnerships. We scheduled one in-between meeting to accommodate the interest in creating a logic model to serve as a planning tool as well as a clear roadmap to share with current and potential partners. At the request of our participants we also facilitated a special meeting focused on developing a logic model to define program goals and the actions needed to reach them.

- **Meeting structure/format:**
  - We start with introductions and a community builder/inclusion activity, followed by the main topic that includes interactive time for sharing experiences and resources, ending with group reflections and individual written feedback.
  - Models for facilitation: shared peer facilitation of agenda items (one leads and debriefs, while another might record as needed). Short presentations by experts at 2 different meetings of 5 total, included interactive strategies. All meetings had time for both individual thinking and planning as well as pairs or group discussion, sharing, planning, and debriefing together.

- **Greatest challenges (and solutions):**
  - The geographic distances pose a barrier to attendance for many. We are planning to host next year's meetings at various locations around the region, which will also meet their request to visit each other's sites.
  - It has been difficult to maintain a collective focus with the long time between meetings. We plan to meet monthly next year.
  - Staff shortages at sites impacts meeting attendance, especially at the beginning of the year when supervisors are trying to fill vacancies.
  - There is a great variety of needs among very diverse programs. We were able to come to consensus about topics, while the conveners (Bruce and Jackie) try to address individual needs offline.

- **Greatest successes**:
  - We had a strong core group of consistent participants
  - Active and dedicated co-facilitators who will continue in 2015–16
  - Participants took advantage of other Power of Discovery events and professional development (for example the 2-day training in the Dimensions of Success STEM Observation Tool, a training of trainers in the Engineering Adventures curriculum, and Region 4 conferences)
  - A sub-group met to begin creating logic models for their programs
  - Participants requested to increase the frequency of our meetings

- **Next steps**: Collect and analyze feedback from this year's (2014–15) participants; plan and calendar meetings for next year; recruit additional participants; identify and use an online communication platform; continue to identify and share relevant resources to support STEM programs.

STEAM-Focused Regional Community of Practice

CASE STUDY

Region Served: Region 5

Length of Time in Operation: 2.5 years

Participant types:

Position titles:

Site Coordinators

Line Staff

Program Directors

Grant Managers

Agencies:

Current Participants:

Beyond the Bell

Boys and Girls Club of Silicon Valley

Campbell School District (Campbell Care/ Campbell Crew)

Catholic Charities

City of San Jose Parks and Rec

Sacred Heart Community Service

Third Street Community Center

YMCA

YWCA/ Tech Girls

Past Participants:

MESA

Meeting Information:

Times/year: Four – Five (Tech Academies met 4 times. Region CoPs met five times)

Meeting length: 2 – 3 hours (Tech Academies were 2.5 hours. Region CoPs started at 2 hours and slowly grew to 3 hours as it was apparent more time was needed)

CoP Evolution: Where is it now and where did it begin?

After a year of facilitating CoP meetings with 10 after-school program leaders around quality STEAM integration into their programs, coupled with professional development workshops offered at Santa Clara County After-School Collaborative meetings to after-school staff from a variety of programs, it was apparent that sustained, quality STEAM integration was not happening at the site level. In June of 2014, Mara Wold and Christina O'Guinn looked at the 2014 – 15 school year together and decided to take a two-prong approach:

- Mara and her Region 5 After School Partnerships staff would focus on providing North and South Region CoPs throughout the year on the cycle of improvement process and the new California Quality Standards for After-School open to staff at all levels. She would also work with ASAPConnect and COE coordinators to provide on-going professional development on Common Core State Standards—again open to staff at all levels, but particularly targeting leaders with a train-the-trainer model as the goal.
  - Region CoP Topics Covered included:
  - Safe and Supportive Environment
  - Active & Engaged Learning (The Tech provided interactive training on teaching 21st Century Skills at this CoP)
  - Youth Voice and Leadership
  - Diversity Equity and Access
  - Collaborative Partnerships (Tech Academies presented at this CoP)
  - Region CoP Format was:
  - Facilitated reflection on an area in the Quality Standards
  - Professional Development provided by a visiting expert
  - Self reflection and planning time with that particular standard of focus
- Christina O'Guinn and her team at The Tech Museum of Innovation would pilot an intensive site-level program called The Tech Academies of Innovation, in which 9 programs identified a site where they would learn and intentionally integrate engineering at their sites throughout the year and would also bring at least one team to participate in The Tech Challenge. The goal of this program would be to develop model programs from which other sites in each organization could learn.

- Tech Academy CoP Topics Covered included:
  - › Overview of the Innovation (Engineering) Design Process and Innovator Mindsets (21st Century Skills) and best practices for facilitating this process/innovative environment
  - › Engagement in an engineering design challenges building content and engineering skills that led up to Tech Challenge 2015 on Seismic Engineering. These included:
- Materials testing
- Seismic engineering vocabulary
- Seismic structural engineering (load placement, bracing, anchoring, minimizing roof drift, etc.)
- Engineering prototyping/ testing /refinement
- Scaling up—using tools
- Documenting/journaling the process
- Communicating results/process to judges
- Integration of literacy, science modeling and math
- Facilitating the development of key innovator mindsets (questioning strategies to build curiosity, messaging for perseverance through failure, strategies for developing collaboration skills).
- Tech Academy CoP Format was:
  - › Participants taught an engineering lesson of their choice before each CoP.
  - › Participants shared work samples, best practices and questions they had based on the engineering lesson they taught.
  - › The group supported each other with questions and built a bank of best practices that grew at each meeting.
  - › Participants engaged in one or more hands-on engineering activities as students focusing on specific engineering content or skills.
  - › Participants reflected on the engineering activities as educators and identified additional best practices/ areas they wanted to try.

Tech Academies Challenges and Successes

For Tech Academies, we faced far less challenges with this format than the previous years. We did face turn over of site coordinators at 2 of the sites. Interestingly, at one site this prevented implementation, but at another that had 3 site coordinators during the year, they were actually our most engaged site. (Fortunately, we had a consistent line staff member who was very passionate and the third site coordinator was also a huge champion).

I think we faced less challenges this year, because we built the model in response to previous challenges. Previous challenges included:

- Lack of consistent attendance.
- Lack of implementation at the site or program level.
- Turn over in staff.
- Lack of buy-in/ commitment.

Because of these challenges, we adopted a new model that is proving to be extremely successful:

- We have had 99% attendance from all 9 sites at all 4 CoP meetings. (1 partner was unable to attend 1 meeting and because it is a very small program, she couldn't send anyone in her place).
- 100% sites implemented numerous engineering activities at their sites.
- 6 out of 9 sites brought at least 1 team to The Tech Challenge. (3 brought 2 teams; 1 brought 3 teams and 1 brought 10 teams). At one site, two teams built structures within the strict building requirements that not only withstood 3 earthquakes of progressing levels of strength but also held twice or nearly twice the required load!
- 8 of 9 presented the impact of the programs on their sites at our year-end celebration and all had compelling stories to share that included:
  - Increased site attendance
  - Excited, engaged students who developed skills in collaboration and had fun
  - Environments where failure is embraced as necessary for learning and students persevere through obstacles to perform at a higher level
  - Staff who feel more confident teaching engineering and are excited about what they are teaching

Already this work with a few sites is beginning to spread to many others in our region! Six of nine pilot programs partnered with teachers and administrators to apply to next year's Tech Academy program. (We now require applications of teachers working in partnership with after-school and supported by their CBO, school, and district to spread the work to other sites). We are aware that two additional programs plan to apply.

- In addition, we have found that this year's program has nurtured a group of huge champions who are ready to go out and train others. Two site coordinators recruited teachers to co-apply for this year's Tech Academy program (a feat not easy for after-school staff to achieve.). One site coordinator said on multiple occasions, "Going to the trainings with The Tech to learn how to do this with the kids is a partnership, I do not want to lose. That is what I stressed to the teachers at my school. It makes you comfortable in working with the students and answering their questions."

- With these two Site Coordinators, we are already planning to co-facilitate early August workshops with ALL of their sites (a total of 200 staff at 30 sites!).
- The work is also beginning to spread across district boundaries! Through this three-year partnership, one program that has traditionally focused on literacy, has developed the capacity to over quality STEAM programming and has developed a full-time STEAM Coordinator position that is now supporting STEAM integration at sites in another school district that the program serves.

We are in the process of analyzing and compiling year-end evaluation data and look forward to sharing these data, once available.

We attribute this success to the following key strategies:

- Targeted recruitment of sites that are ready and excited to engage in this work. (We looked for sites that had established Site Coordinators who had been there for 2 years and who were excited about STEAM integration)
- Stipends of $1,000 were provided to each site based on: completion of pre-surveys and attendance at all 4 CoP meetings for the purpose of paying staff who otherwise could not attend and/or to pay for hands-on engineering materials/ transportation costs.
- Personal face-to-face meetings with all participants and program leads to ensure they understood and were truly excited about the commitment
- Meetings were scheduled well in advance (in July) and dates did not change. Schedules were given to all participants and program leads at face-to-face meetings and electronically.
- Frequent email reminders of up-coming meetings/ actions.
- Requirement of program leads to only attend the first and last CoP meetings, but keeping them looped in throughout the year.

Overall, our strategy has been to go slow to go fast. We are working intensely with sites that is helping to build program capacity that will, in time, with our continued support, spread throughout the region.

Next Steps:

In 2015–2016, we have selected eight Tech Academy of Innovation teams of teachers and after-school providers working together. Four will begin at a "Year 1 level" and will engage in a similar process to the one described above. The other four will begin at a "Year 2 Level" in which they will:

- Engage in a two-week Summer Institute this July, where they will learn about next year's Tech Challenge topic (flight engineering) and will co-develop a lesson related to this topic with a focus on a subject area of their choice (e.g. ELA, Math, Science, etc.)
- Test out their lesson with their own students
- Co-facilitate their lesson at one CoP meeting during the year
- Continue to integrate engineering into their instruction and attend all 4 CoP meetings
- Collaborate with teachers to intentionally connect the school day with after-school
- Bring one or more teams to The Tech Challenge
- Co-facilitate at least one training for at least 20 staff in their CBO, school, district or within the Region (e.g. at RevUp, SCCASC, etc.)

In this way, we will groom a growing network of model STEAM sites as well as engineering education leaders who can serve the whole region.

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