KickStarter: Providing Hispanic Serving Community Colleges with Technical Assistance to Improve their Federal Funding Competitiveness (Experience)

Ms. Cynthia Kay Pickering, Science Foundation Arizona

Cynthia Pickering is a retired electrical engineer with 35 years industry experience and technical leadership in software development, artificial intelligence, information technology architecture/engineering, and collaboration systems research.

In September 2015, she joined Science Foundation Arizona (SFAz) to lead the Girls in STEM initiative and translate her passion for STEM into opportunities that will attract, inspire and retain more girls in STEM to make it the new norm. She has also architected SFAz's enhanced Community College STEM Pathways Guide that has received the national STEMx seal of approval for STEM tools. She integrated the STEM Pathways Guide with the KickStarter processes for improving competitive proposal writing of Community College Hispanic Serving Institutions.

Throughout her career, Ms. Pickering has written robotics software, diagnostic expert systems for space station, manufacturing equipment models, and architected complex IT systems for global collaboration that included engagement analytics. She holds a US Patent # 7904323, Multi-Team Immersive Integrated Collaboration Workspace awarded 3/8/2011. She also has twenty-five peer-reviewed publications.

Caroline VanIngen-Dunn, Science Foundation Arizona

Caroline VanIngen-Dunn is Director of Community College STEM Pathways at Science Foundation Arizona, providing services for Maximizing the Educational and Economic Impact of STEM. Ms. VanIngen-Dunn is the inspiration behind the programs and resources designed to assist community colleges, particularly rural and Hispanic Serving Institutions (HSIs), through a rigorous process leading to improvements in their capacity building, infrastructure, and proposal development efforts that support students in their STEM education and career pathways pursuits.

Prior to Science Foundation Arizona, Ms. VanIngen-Dunn served as President of CVID Consulting, building on years of experience as engineer and project manager in human crashworthiness and safety design, development and testing, working for contractors in commuter rail, aerospace and defense industries.

VanIngen-Dunn has an MS degree in Mechanical Engineering from Stanford University and a BSE degree in Biomedical Engineering from the University of Iowa. She serves on the University of Iowa's College of Engineering Advisory Board, the YWCA Metropolitan Phoenix Board of Directors, and the Maricopa Community College Workforce Development Leadership & Innovation Council, among other advisory committees.

Ms. Anita Grierson, Science Foundation Arizona

Anita Grierson is a Program Officer at the Science Foundation Arizona where she provides technical assistance to Hispanic Serving Community Colleges via the NSF-funded KickStarter program. Prior to joining SFAz, she was the Director of the METS Center for Motivated Engineering Transfer Students in the Ira A. Fulton Schools of Engineering at Arizona State University. Ms. Grierson has over twelve years of corporate experience in Program Management, Business Development, and Biomechanical Engineering, with products as diverse as air bag systems for helicopters, body armor, and orthopedic implants. She received her Bachelor's degree in Mechanical Engineering from the University of Michigan in 1990, her Master's degree in Mechanical Engineering from Northwestern University in 1994, and a Master's in Business Administration from Arizona State University in 2000.

Anna Tanguma, Science Foundation Arizona

Anna Tanguma brings 10 years of STEM strategic planning and program management experience in higher education environments and initiatives. Anna has a history of promoting and increasing enrollment in the programs she manages, as well as developing collaborative relationships with corporate and

community members. Anna has provided successful direction to federally funded programs within the higher education field. Anna spearheaded the relationship with Health Pathways Grossmont-Cuyamaca Community College District, and University of California-San Diego Moore's Cancer Center to develop their first-ever nursing internship summer program and offering a value-added learning experience for the students.

In her role at Science Foundation Arizona (SFAz), Anna is working with Hispanic Serving Community Colleges as part of the National Science Foundation (NSF)-funded KickStarter Program. The goal of KickStarter is to enhance the enrollment of Latino students in STEM fields by helping colleges with their STEM planning and maximizing the competitiveness of their federal grant proposals to fund those plans. As a Program Officer for the Community College STEM Pathways Initiative, Anna works closely with all community college teams, guides them through the KickStarter process, and connects them to community and industry partners.

Anna brings a unique skillset to this position with Bachelor's and Master's degrees in Behavioral Science/Educational Counseling from National University; CA. Anna is pursuing her Ph.D. in Psychology with an Emphasis on Integrating Technology Learning. Prior to SFAz, Anna was the Manager of Alumni & Community Relations for National University. Anna developed partnerships within the community colleges and non-profit industry throughout San Diego and Los Angeles for National University.

Assemblywoman Lorena Gonzalez and State Senator Ben Hueso recently recognized Anna for her work in the MANA De San Diego Latina Success Leadership Program.

KickStarter: Providing Hispanic Serving Community Colleges with Technical Assistance to Improve their Federal Funding Competitiveness for STEM Initiatives (Experience)

Introduction

KickStarter, an NSF-funded program, began Fall 2014, and has included two Cohorts of 11 Community College Hispanic Serving Institutions (CC-HSIs) across five states. The five-phase KickStarter Process has provided a blueprint to build, sustain, and augment a strong STEM foundation with innovations in STEM education to enable Latina/o (Latinx) STEM student success at CC-HSIs. KickStarter interacts at three levels within each CC-HSI - individual, team, and organizational. All three levels are key to institutionalizing successful organizational change. For example, KickStarter facilitates STEM planning discussions that increase faculty engagement, leadership, and collaboration, with visibility to CC-HSI executives to gain endorsement of a college-wide STEM plan. KickStarter also tailors its technical guidance to the CC-HSI experience level and provides a safe place for learning, resulting in NSF awards for STEM education innovations. This paper will describe the experience and details for the implementation and evaluation of the KickStarter program, including reflections, benefits and drawbacks of the approach, and lessons learned.

Program Overview

The **goal** of the KickStarter program is to improve the recruitment and retention of Latinx students in STEM fields and careers by enhancing CC-HSIs' participation and competitiveness in NSF-funded STEM initiatives.

Primary **objectives** for KickStarter are to:

1. Increase the number of CC-HSIs who compete successfully as lead grantees on NSF projects;
2. Strengthen CC-HSIs' STEM infrastructure (i.e., their capacity to increase recruitment and retention success rates among Latinx students); and
3. Engage CC-HSIs with a broader range of partners in K-12, industry, four-year institutions, and researchers to help sustain STEM programs and improve CC-HSI federal program competitiveness.

Key **deliverables** of the KickStarter program include:

1. Sustainable proposal development technical assistance infrastructure at Science Foundation Arizona (SFAz) tailored to the needs of CC-HSIs, which will increase the submission of competitive NSF proposals;
2. Robust collection of mutually-beneficial, widely-informative, STEM-focused, online networks and professional learning communities (PLCs) that support critical partnerships needed to be competitive at NSF;
3. Data-capture capabilities that support CC-HSIs' ability to improve their NSF competitiveness and effectively implement projects; and
4. Roadmap that other Hispanic-serving institutions can adapt to accomplish similar goals.

As a result of the CC-HSIs' involvement with the KickStarter program, participating CC-HSIs will have effected the following **outcomes**:

1. Each CC-HSI will have submitted a minimum of two proposals to NSF during the project period, with a goal of having at least one of those proposals funded directly or as a result of the CC-HSI's partnership with other institutions/organizations;

2. Improved STEM infrastructure and capacity at each participating institution to identify, collect, access and analyze information, thereby improving the CC-HSI's ability to provide evidence of effectiveness in future proposals to NSF programs and/or a broader range of funders;
3. Established key partnerships that will help CC-HSIs increase the number of Latinx students successfully moving through STEM pathways and will improve competitiveness at NSF and other agencies; and
4. An external CC-HSI KickStarter Support Service (KSS) that will support the participating CC-HSIs in successfully developing and implementing their funded projects, as well as helping them conceive new projects and find new partners for further expansion of their STEM-based initiatives.

The KickStarter program has two **hypotheses**:

1. Proposals developed on college-wide STEM Plans show greater potential for successful implementation and sustainability, and thus are a wiser investment of funds.
2. Technical assistance (*professional development)* that incorporates NSF principles in the process offers colleges the experience needed to develop competitive proposals.

Characteristics of the Institutions Participating in the Program

To date, SFAz's KickStarter Pilot Program has included two Cohorts (2015 and 2016) of eleven CC-HSIs across five states. The range in size and demographic distribution of KickStarter colleges is broad, with enrollments from 400 to 40,000 and percentages of Hispanic student enrollment from 29% to 97% as shown in Figure 1.

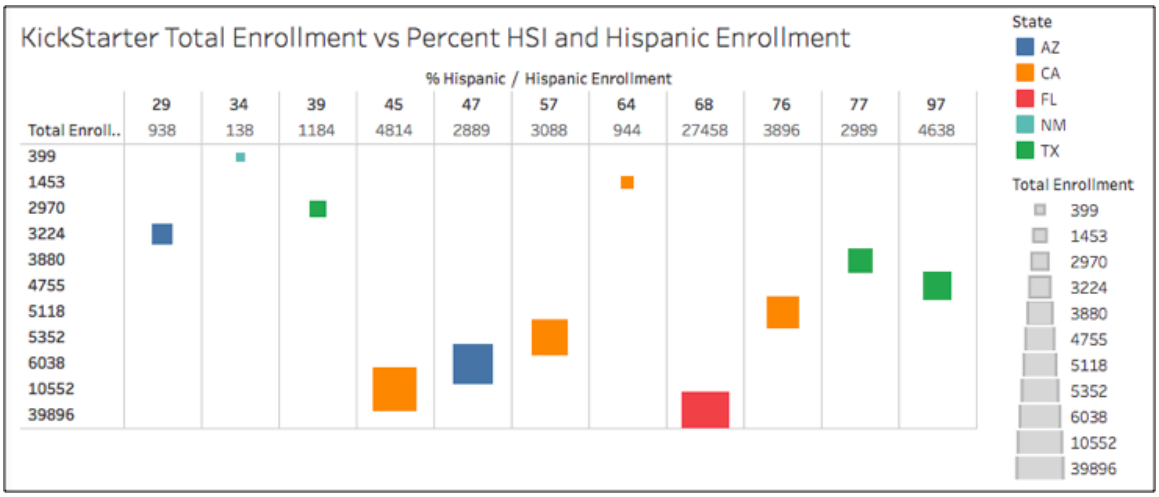

Figure 1: KickStarter Cohorts 1 and 2 States, Percent HSI, and Enrollment

The KickStarter Process

An IT architect captured the processes used to run the KickStarter program as formal process diagrams[1] that show tasks and owners, then created a document[1] to distribute and share the formal processes to enable self-service and repeatability. Developed through NSF Grant HRD-

1450661, the processes are being used to run new Cohorts and are especially helpful in onboarding new personnel.

The KickStarter Process is comprised of the five phases shown in Figure 2 and represents the two-year KickStarter Cohort lifecycle that emphasizes college-wide, plan-driven proposals for increased sustainability. The process, associated artifacts, templates and other resources are available via interactive web pages for each phase from the access-controlled KickStarter Group on the STEM Network. A common structure for each phase's page describes input, activities and outputs for the phase and provides links to templates and resources for the activities to be completed. Artifacts representing key deliverables for each phase are shown in Figure 3 and described next.

Figure 2: The KickStarter Process is provided on web pages as steps, templates and resources.

The initial phase, **Recruit/Select**, includes the *Call for Applications* and *Application Review and Selection* of eligible CC-HSIs to participate in the KickStarter Program. During the review, an external panel performs a *Readiness Assessment* to determine the likelihood that CC-HSI applicants, by following the KickStarter Process, will successfully achieve the expected outcomes, thus contributing to attainment of the KickStarter Program goals and objectives. A panel of peer reviewers evaluates the applications to assess the extent to which a college's state of "readiness" is sufficient to conceive, justify and launch an NSF project during KickStarter. Decision criteria include the level of college leadership prepared to support the proposed project; the college's existing STEM infrastructure and plans; the college's recent accomplishments in STEM-related activities; the college's network of STEM-related partnerships; and the likelihood that the college could produce a minimum of two competitive STEM-related proposals to NSF during the project period. Anonymized feedback is also sent to the colleges who do not satisfy the readiness criteria, along with the option to meet and discuss how to improve their readiness. These colleges are also added to the communications list for future *Calls for Applications*.

Startup introduces the new Cohort to the KickStarter Program, gets them signed up with access to the online Network platform and KickStarter resources, and provides training for using the online capabilities. The virtual orientation sessions are recorded and posted to the KickStarter Group for future reference. Throughout the KickStarter Process, participating CC-HSIs regularly meet as Cohorts to share experiences, best practices, and other information. This practice is established during **Startup**. The **Startup** phase also prepares the selected CC-HSIs to travel to Washington D.C. for a *face-to-face Workshop* and *to meet NSF Program Officers* responsible for programs that are relevant to community colleges. Use of virtual *Webinars* for program orientation, face-to-face planning, and pre-work assignments prior to the face-to-face maximizes the time spent together as a Cohort and with NSF in Washington D.C.

STEM Planning begins with a *STEM Pathways Assessmen*t performed by the college *STEM Planning Team* identified in their KickStarter application and activated during Startup. Shortly after completing the STEM Assessment, a 1.5-day *Site Visit* is held at the college to discuss the

Heatmap derived from the *STEM Assessment* responses, and to begin generating a *STEM Plan* based on priorities, strengths and areas for improvement identified in the *Heatmap*. The *Site Visit* includes the College President who presents the college strategy at the beginning of the meeting to provide strategic direction and endorsement for the planning activities. The President also returns at the meeting close to hear about meeting outcomes. After the Site Visit, the STEM Planning Team continues to meet regularly to carry out other activities in the KickStarter Process. Figure 4 illustrates the details of STEM Planning, which are key to testing and proving out KickStarter Hypothesis 1.

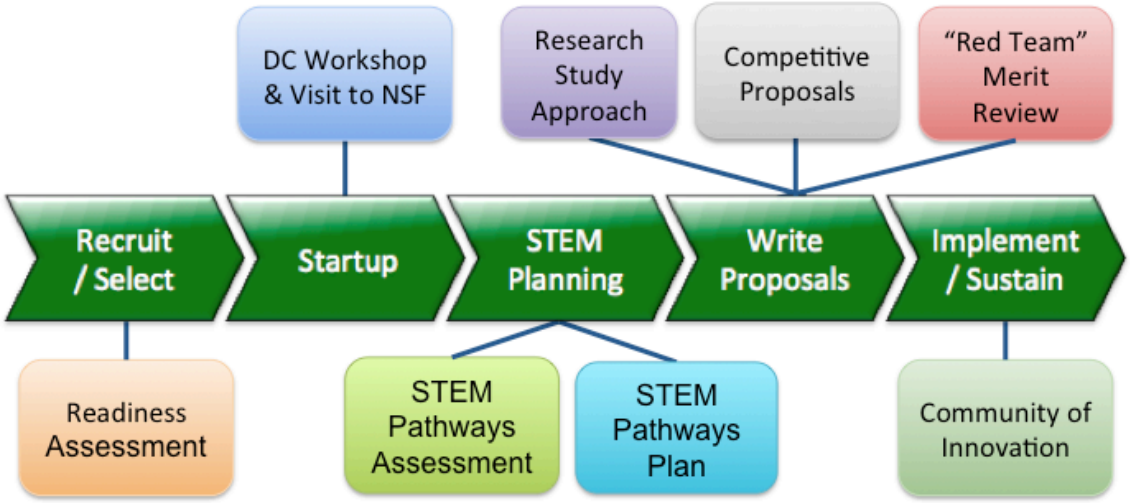

Figure 3: KickStarter Artifacts

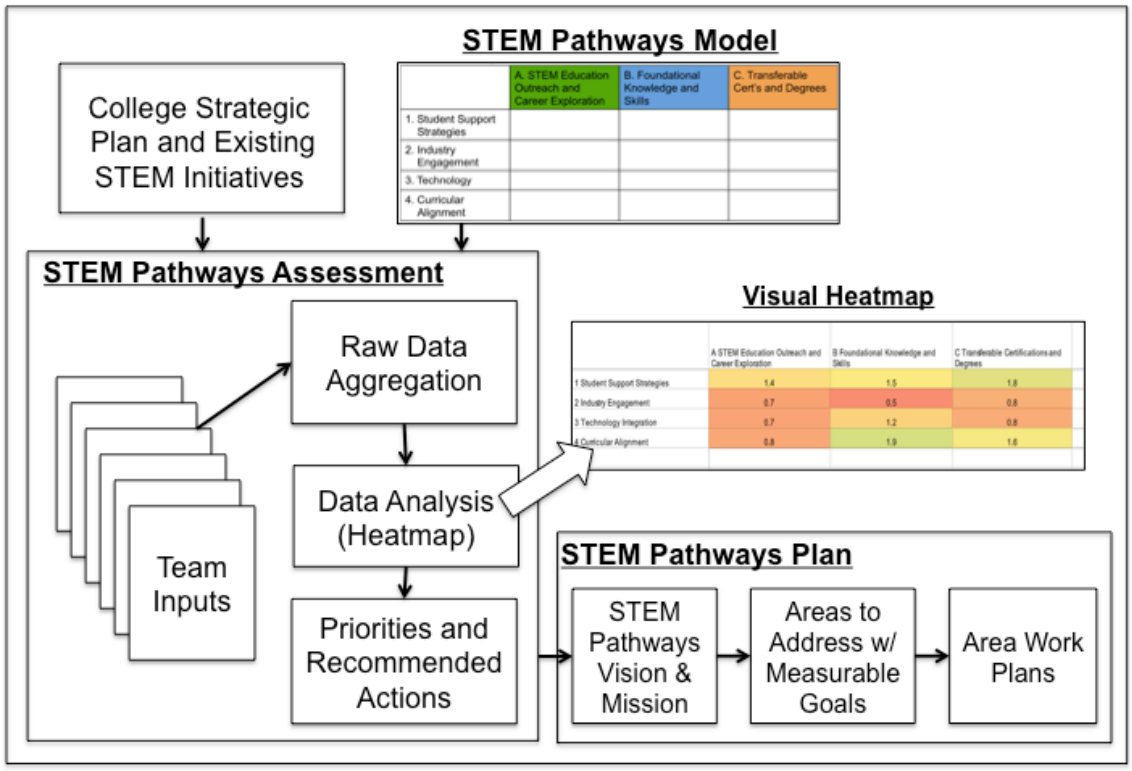

Figure 4: STEM Planning Process Details

The STEM Assessment asks members of the College STEM Planning Team to simultaneously rate the area they represent according to the extent to which it achieves each attribute using 4-point rating scale of NONE, MINIMAL, ADEQUATE, or COMPREHENSIVE, and leaving the response blank if they don't know. Participants also create notes about strengths and improvements for the item they just rated. The complete set of participant responses are rolled up for the college and a Heat Map Analysis is performed which recommends prioritized actions based on all of the team's inputs. The analysis calculates the average score for each attribute and then applies a gradient color scale with green as the highest value, red as the lowest value, and yellow at the 50% median point.

The STEM Pathways Model [2] shown in Figure 5, provides the framework for the STEM Assessment. The model was developed by SFAz in partnership with Cochise College under NSF DUE-1003847. The three columns in the matrix-based model reflect Pathways strategy components that the college owns, whereas the four rows reflect interdependencies with other entities. The intersection of each row and column describes a strategy for achieving a capability and its desired attributes. An expanded STEM Pathways Model refines the 12 strategies into 42 attributes backed by 32 examples of real programs from Cochise College that successfully increased STEM recruitment, retention, and/or transfer to the STEM workforce or a four-year institution.

PATHWAY COMPONENTS	**A. STEM EDUCATION OUTREACH AND CAREER EXPLORATION (Recruitment) - *Community college-led activities and events that generate enthusiasm and engage student interest in STEM career fields.***	**B. FOUNDATIONAL KNOWLEDGE AND SKILLS (Retention) - *Education programs and strategies that improve college students' foundational STEM knowledge and skills.***	**C. TRANSFERABLE CERTIFICATIONS AND DEGREES (Workforce) - *Job and research experiences and competency-based programs with industry that align to industry-recognized credentials.***
1. STUDENT SUPPORT STRATEGIES-*Resources, processes and strategies that encourage student success.*	*A1. Student-success strategies are incorporated in outreach activities and events that promote STEM career exploration.*	*B1. Student-support strategies lead students to achieving foundational STEM knowledge and skills.*	*C1. Student-support strategies help students optimize course selection and credits earned toward a stackable credential or degree.*
2. INDUSTRY ENGAGEMENT-*Vital to keeping schools current, providing teachers with resources, and capturing student interest in STEM careers.*	*A2. Industry plays a supporting role in outreach activities, tours and events, capturing student interest in real-world STEM opportunities.*	*B2. Industry contributes to program development and mentors students in real-world experiences.*	*C2. Industry offers internships, apprenticeships, and job-shadowing experiences that guide students to earning industry-recognized certifications and degrees.*
3. TECHNOLOGY-*Integrated across the Pathway to provide better access to education resources, virtual tours, internships and mentorship.*	*A3. College outreach activities have access to technology labs and technical equipment that generate student interest and awareness of STEM careers.*	*B3. Technology programs offer students hands-on learning experiences; technology is utilized to access instruction and student learning opportunities between institutions.*	*C3. Technical equipment is available at industry for students to gain the appropriate experience and prepare for competency-based testing and certifications.*
4. CURRICULAR ALIGNMENT-*Ensures all course credits count toward a credential.*	*A4. College Outreach activities and events inform parents and students about curricular alignment to STEM career programs.*	*B4. Dual enrollment or early college STEM academies, including intrusive advisement that lead to student success.*	*C4. Colleges and industry align curriculum with industry-recognized certifications and include credits that transfer toward stackable degree programs.*

Figure 5: STEM Pathways Model

The **Write Proposals** phase iteratively develops *Research Concepts* driven out of the STEM Plan Work Areas with SFAz providing intensive technical assistance to help develop *Competitive Proposals*. Research Concepts are identified and refined out of the STEM Plan

using a *Research Study Approach* (RSA) Template. The RSA is informed by the NSF Common Guidelines for Education Research and Development[3] to generate research questions, hypotheses, a literature search, and mechanisms to gather prior evidence supporting the problem statement, intellectual merit and broader impacts. Emphasis is placed on gaining a broader perspective of the state of the art in research practice, and the importance of forming key partnerships to discover and advance knowledge. The RSA also includes identification of internal data sources for evidence gathering to establish baseline data and help measure research outcomes and impacts.

With a well-defined research concept, the college is ready to approach an NSF Program Officer (PO), discuss the fit to the PO's NSF program, and gain other valuable feedback. If the NSF PO agrees that the research concept aligns to their program, then before proposal writing commences, the college PI must obtain approval from their STEM Planning Team and comply with the college grant writing process. Based on college needs, other SFAz assistance includes identifying and assigning Expert Mentors and/or recommending Evaluators to CC-HSIs early in the proposal-writing phase, providing them with experienced role models and extensive networks. At least one month prior to the submission due date, colleges submit their proposal drafts to a *"Red Team" Merit Review* modeled after NSF's Merit Review by external experts. This introduction to the NSF review process provides constructive feedback to the CC-HSI proposal teams for revising their proposals and gives them a good understanding of the importance of detail and development of rationale for their research. The RSA and Red Team Merit Review are key to testing and proving out KickStarter Hypothesis 2.

The **Implement / Sustain** phase provides support to participating CC-HSIs at two stages of their professional development 1) Post Award Start-up / Implementation and 2) Transitioning to Sustaining Mode after the college has achieved the desired outcomes of the KickStarter Program. When a KickStarter Community College is awarded an NSF grant, SFAz and other KickStarter associates will support initial start-up and implementation of the project as follows:

- Assist with post recommendation questions from NSF
- Refer prospective awardees to the NSF *Prospective New Awardee Guide* and *Proposal & Award Policies & Procedures Guide*
- Conduct a post award review to examine feedback and how to implement it
- Provide advice needed to smoothly transition proposals into project implementation

After a KickStarter college has submitted two competitive proposals to NSF, they are encouraged to continue as KickStarter Alumni. As colleges transition to sustaining mode, they are encouraged to continue their participation as shown in Figure 6. In this sense, they become part of a community that has the potential to continue beyond direct involvement in the KickStarter Program.

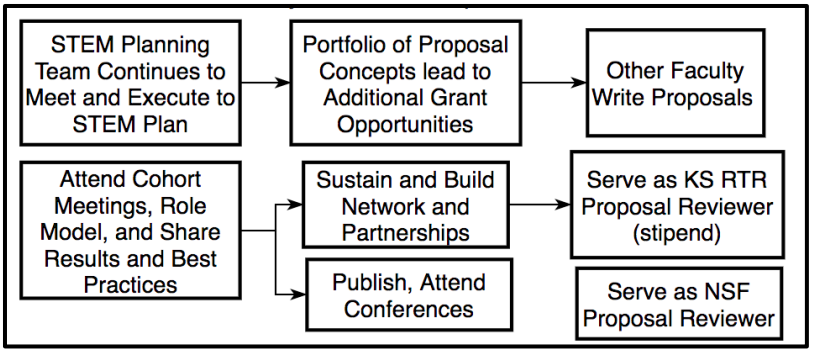

Figure 6: Options available to KickStarter Alumni to demonstrate sustainability and leadership

As Alumni, Colleges receive external motivation to keep their teams moving forward and make progress towards their STEM goals through the following forums and community activities:

- Attend Cohort Monthly Meetings to share best practices and hear from guest speakers.
- Participate in KickStarter's NSF program-specific group meetings and related KickStarter communications including access to existing resources such as NSF proposal preparation workbooks (e.g., join the S-STEM working group to share ideas and discuss aspects of the S-STEM proposal).
- Get the latest updates on NSF proposals and webinars with access to the STEM Network and KickStarter group.
- Support and training provided for new and additional faculty and proposal teams through access to the self help materials available online at the KickStarter group.
- Gain visibility to conferences and other opportunities to publish and present their work, and team with KickStarter for co-authoring and co-presenting opportunities.

Alumni also give back to the growing community and by doing so, develop their leadership.

- Share examples of Best Practices on the STEM Network / STEM Pathways Model.
- Share media related to projects. Disseminate project results through the KickStarter and STEM Networks and other Social Media Sites.
- Serve as a "role model" for new KickStarter colleges during concept development and proposal preparation by providing at least five hours of coaching or reviewing.
- Serve as a Red Team Merit Reviewer for other KickStarter colleges' proposals (Serve as individuals not as institutional representatives, honorarium provided to individual).
- Encourage PIs and Senior Personnel to serve as NSF reviewers.
- Form partnerships with other KickStarter Colleges to pursue collaborative proposals.

KickStarter Evaluation Approach

Figure 7 illustrates the qualitative and quantitative data trail that permeates the KickStarter process, beginning with the initial Readiness Assessment based on the CC-HSI Application to participate in the KickStarter program. Regular participant surveys following the Workshop in Washington D.C., College Site Visit, Midpoint, and Transitioning milestones to gather participant perceived benefits, satisfaction, and other feedback to the program. The surveys are supplemented with quantitative data gathered in the STEM Self-Assessment, and by capturing STEM partnerships, infrastructure capacity improvements, proposals submitted and awarded. Formative and summative findings and results will be described in the next section.

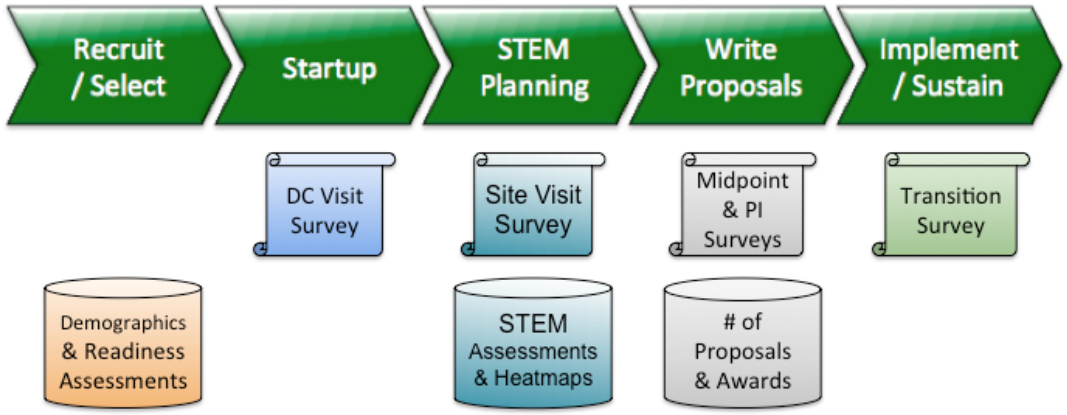

Figure 7: Qualitative and Quantitative Program Evaluation permeates the KickStarter Process

Results and Outcomes By KickStarter Process Phase

During the **Recruit/Select** phase of the KickStarter process, data are collected through the Application that is completed by each college and the college Readiness Assessment that is performed by an external panel. The Application describes demographics, STEM infrastructure, awards, declinations and lead personnel. Figure 1 shows partial demographics across the eleven CC-HSIs making up Cohorts 1 and 2. The primary outcome of the Readiness Assessment is the selection of five to six CC-HSIs for each Cohort. The combined data from the Application and the Readiness Assessment provide an initial baseline for each CC-HSI with regards to its STEM implementation, infrastructure capacity, and competitive proposal development readiness. Data captured during STEM Planning include measurable goals for STEM improvements that are subsequently linked to results from STEM plan implementations and proposal development activities at program midpoint and transitioning/closure.

During **Startup**, after the Workshop and visit to NSF in Washington D.C., participants complete a survey to provide feedback to the program. Positive comments consistent across both Cohorts include the opportunity to meet representatives from NSF, the other colleges, and SFAz; sharing strengths and weaknesses of STEM initiatives; participating in the NSF Proposal Review Workshop; and hearing other presentations by NSF PO's. Based on inputs from Cohort 1, improvements were made for Cohort 2 to include more networking time with representatives from other Colleges and NSF; conduct orientation webinars with pre-work to optimize face-to-face time for interactive discussions and networking; distribute NSF Workshop material prior to the session, and include more specifics about next steps for STEM Planning and the Site Visits. Cohort 2 suggested an improvement to incorporate more structure into the Day 1 evening reception. The response included an invited speaker and Meet and Greet with the KickStarter Advisory Council Members.

The primary data collected during the **STEM Planning** phase of the KickStarter process are through the STEM Assessment and the Site Visit Survey that is completed by STEM Planning team members after the Site Visit to the College. Auxiliary information is also encoded in the Heatmap analysis and the STEM Plan for each College, as well as team interactions and other observations captured by the external evaluators during the site visits. At the site visits, KickStarter brought together cross-disciplinary departments at the CC-HSIs to discuss their

STEM self-assessment and develop a STEM plan[2] aligned to their College Strategic Plan and endorsed by the College President. The STEM self-assessment surfaced STEM strengths and areas for improvement that increased awareness across departments who often were not aware of each other's work and expertise. At many colleges, the Career Technical Education (CTE) faculty had strong partnerships with local industry in contrast to Science and Math faculty who often were not connected to industry. CTE experience opened doors to strengthen connections and partnerships with local industry across the entire college. KickStarter-facilitated STEM planning discussions at the CC-HSIs increased faculty engagement, leadership, collaboration, and visibility to College executives, in addition to gaining their endorsement of the STEM plan. One of the outcomes of KickStarter STEM Planning by CC-HSIs was redirection of Title V funds to strategic STEM priorities identified in the STEM Assessment that better aligned the funds to institutional strategies supporting Latinx STEM students.

Survey Data from the colleges after the site visits indicated that participants learned things that they felt would enhance their ability to expand their STEM-based initiatives and develop competitive NSF proposals. Ratings were slightly higher for Cohort 2 after the site Visit, indicating that the increased structure, tools, and resources for STEM Assessment and Planning were viewed as helpful. Undertaking the STEM self-assessment and planning process positioned CC-HSIs to think more strategically about future ideas (including collection of relevant data in advance of proposal development) so that ideas were ready to go when funding opportunities became available.

Participating in KickStarter has resulted in colleges realigning institutional resources and modifying infrastructure to support their STEM Plans and increase capacity and sustainability:

1. Los Angeles Mission College hired a STEM Counselor and STEM Career Center Coordinator.
2. San Joaquin Delta College promoted their Research Analyst to interim Director of Institutional Research.
3. Palo Alto College promoted their Grants Writer to Director College Grants Development and hired a Grants Writer from a 4yr-institution.
4. Lee College is creating a STEM Center and hiring STEM staff using Title V funds. They promoted their Title V Director to Exec. Director for the STEM Center and all HSI initiatives (Title III, V, KS).
5. West Hills Coalinga College is hiring a Workplace Learning Liaison Coordinator.

Quantitative data from individual college Heat Maps as well as the Aggregated Heat Map data in Figure 8 indicate the common gap in industry partnerships across participants. In response, the KickStarter program put increased emphasis on developing this capability early on, during STEM planning, especially for those colleges that had not included evidence of industry partnerships in their Applications to KickStarter.

SCALE: 0=NONE, 1=MINIMAL, 2=ADEQUATE, 3=COMPREHENSIVE

	Avg. A. STEM Education Outreach and Career Exploration	Avg. B. Foundational Knowledge and Skills	Avg. C. Transferable Certifications and Degrees
1. Student Support Strate..	1.7	1.6	1.8
2. Industry Engagement	1.1	1.0	1.1
3. Technology Integration	1.3	1.4	0.8
4. Curricular Alignment	1.2	1.7	1.7

Figure 8: Aggregated Heat Map Analysis for KickStarter Colleges

The importance of industry partnership was re-emphasized regularly when developing research concepts and **Writing Proposals**. In the 2017 PI Survey, increases in partnerships with other two-year and four-year colleges were reported in the form of articulation discussions (42.86% of participants reported increases), joint proposals (14.29%), and joint events (57.14%). Increased engagement and partnerships with Industry were reported in the form of internships (85.71% of participants reported increases), industry volunteers in outreach activities (14.29%) and Advisory Boards (28.57%).

Qualitative comments from surveys indicate some preliminary evidence of institutional level changes as a result of KickStarter: “KickStarter has helped the administration (of my college) recognize the importance of developing partnerships and so I feel they are now placing more of an emphasis on allowing staff and faculty to engage with our 4-year institutions,” and “KickStarter has helped the faculty and staff recognize that industry partnerships are critical for our students and that we must proactively work toward developing connections that will help our students receive internships.”

In March 2017, the college STEM Planning teams from both Cohorts were surveyed to elicit feedback on their participation in the KickStarter project – Cohort 2 at the midpoint of the first year, and Cohort 1 being at the midpoint of the project. The midpoint questions and responses are shown in Table 1. For nine of the ten questions, 82% to 100% of the responses ranked the level of satisfaction, usefulness, helpfulness, and confidence as either Very, Quite, and Somewhat. The one question that ranked lower was question #6 (on the RSA) but mostly because half of the respondents had not examined the RSA at the time of the survey. The RSA has since become a "living" document with incremental phases that evolve over concept development. When a grant match is identified, the RSA is refined to address specific requirements of the grant, and becomes a solid basis for proposal development. The monthly Cohort Meeting format has changed to include more interaction and contributions from the Colleges, in the form of their recent STEM success stories, and goals for the upcoming year. Consequently attendance and participation is increasing.

Table 1. Midpoint Questions and Responses from Eleven KickStarter Colleges					
Question	Not at All	Not so Much	Some what	Quite	Very
1. What is your assessment of your progress to date in working with the KickStarter project/	0%	4%	13%	48%	35%
2. How useful has your STEM Pathways Workplan been in transitioning to proposal development?	0%	5%	27%	36%	32%
3. How helpful are the monthly conference calls with the S___ KickStarter team and other cohort members?	11%	11%	45%	22%	11%
4. How well are you getting your questions answered during the one-on-one phone calls?	5%	0%	5%	42%	48%
5. How useful is the RSA (Research Study Approach)?	0%	5%	21%	53%	21%
6. How useful have you found the sample RSA (on contextualizing math in CTE programs) and other online resources in developing your proposals?	25%	0%	25%	25%	25%
7. If you and your team had difficulty completing the RSA, what were the underlying causes? Check all that apply:					
a. Did not have an internal champion	10%				
b. Insufficient time	21%				
c. RSA too complex	3%				
d. Topics from STEM Pathways Plan too broad to develop a focused RSA	7%				
e. Unfamiliar with education research	10%				
f. Need more training	7%				
g. Need more examples	21%				
h. Other _____	21%				
8. How useful is the one-page proposal concept format in directing your planning?	0%	5%	39%	34%	22%
9. How confident do you feel re: your capacity to submit two proposals and receive funding for at least one proposal in the next two years?	5%	10%	35%	20%	30%
10. How likely would your experience with KickStarter thus far prompt you to encourage other community colleges to work with S___?	0%	0%	10%	33%	57%

Coupled with the use of formal and structured proposal development processes including seeking NSF feedback early and often, strong focus on literature reviews and educational research[3], and creating a timeline sufficient for building partnerships and industry support, participating CC-HSIs became better prepared to submit competitive proposals to applicable NSF programs. KickStarter results to date include increasing the rate of CC-HSI NSF proposal awards while also

gathering data and information to support eleven CC-HSIs with strengthening their capacity to increase recruitment and retention success rates among Latinx students.

To date, the eleven Community College HSIs in Cohorts 1 and 2 have achieved a proposal award rate of 50% with $2.8M funded (Table 2).

Table 2: KickStarter Campuses' Proposal Submission Rates to NSF

Proposals	2016	2017	2018	Totals		Types of Proposals	Sub-mittals	Awards	In Review
Submissions	8	10	5	23		S-STEM	10	2	3
Declinations	5	3		8		ATE	6	5	0
Awards	2	6		8		IUSE	2	0	1
In Review	1	1	5	7		AISL	1	0	0
						DRK-12	1	0	1
						HSI Progr.	3	1	2

Both Cohorts have submitted a total of twenty-three proposals and 100% of the Cohort 1 colleges have submitted two or more proposals to NSF. All Cohort 2 colleges have submitted at least one proposal to NSF.

Prior to KickStarter, the primary reasons for NSF proposal declinations included lack of research questions, insufficient literature search and research citations, and logic model and evaluation weaknesses. In response, during Cohort 1, KickStarter provided deeper technical assistance for generating robust logic models and provided connections to experienced evaluators. KickStarter also coached the colleges on how to find relevant research connections in the NSF database and how to reach out to form partnerships and alliances. For Cohort 2, KickStarter introduced the Research Study Approach (RSA). The RSA also included identification of internal data sources to support the problem statement and provide evidence to validate the research hypothesis and measure desired outcomes. When evidence-gathering gaps were detected, the KickStarter program team recommended infrastructure improvements and/or appropriate coverage in the evaluation plan. In spring 2017, three S-STEM proposals used the RSA; two were awarded. A DRK-12 and four ATE proposals submitted fall 2017 also used the RSA. Three of the four ATE proposals received awards and the DRK-12 remains under review. Moving into 2018, the RSA has become a standard activity for developing research concepts. Using the KickStarter process, Colleges are also assimilating a portfolio of future research ideas aligned to their STEM Plan that can be methodically targeted to new funding opportunities as they arise. For example, most federal grant agencies publish a regular schedule of grant opportunities and their due dates. As colleges learn more about these programs and the associated expectations, armed with knowledge from their KickStarter Proposal Development, they are able to put in timely and competitive proposals.

During **Implement / Sustain**, data collection and evaluation focus primarily on transitioning away from the need for intensive technical assistance to a sustaining mode within the college and providing assistance to newer Cohorts. The Transitioning Survey is the primary instrument used to collect data from participants as they graduate from the KickStarter program. It asks them to confirm what they have learned and achieved from their KickStarter experience, whether they will continue to meet as a STEM team within the college to manage the STEM plan and develop

future STEM proposals, if they will continue to participate in KickStarter Cohort meetings, plans for publications and presentations to disseminate their work, and willingness to help coach others. Currently Cohort 1 is transitioning to a sustaining role, becoming the initial members of a nationwide Community of HSIs. After the formal transition meeting with the SFAz KickStarter team, four of the five Cohort 1 colleges continue to participate regularly in the monthly cross cohort meetings. One College is leading an NSF HSI conference; two are co-presenting with SFAz at the AHSIE 2018 conference. A PI is taking a leadership role in pulling together the next round of S-STEM proposals, with newer colleges benefitting from her experience.

Observations, Highlights, and Lessons Learned

This section describes observations, highlights, and lessons learned from the perspectives of the participating HSIs and the SFAz KickStarter Program Team.

Chartering and forming a cross college STEM planning team at each HSI provided a solid foundation for STEM Planning, Proposal Writing, and Sustaining activities:

- Functional units were well-represented as prescribed by the STEM Pathway Guide.
- STEM teams with Academic and CTE faculty learned a lot from each other about industry connections, outreach and other activities throughout the colleges.
- Faculty and staff became engaged and willing to own and develop STEM programming overall.
- The STEM Planning Team identified positive activities that needed to be implemented college-wide and captured them in a Formal STEM Plan
- Information shared with the executive team, and other college leadership gained further buy-in and endorsement to keep moving forward with activities in the STEM Plan including proposal development for STEM funding. Executive support was vital to ensure faculty and staff had support for proposal development activities.
- At the midpoint and closure of their Kicktarter experience, Teams have consistently reported progress towards activities specified in their STEM Plan. Many colleges have developed multiple concepts which can be turned into proposals when appropriate funding opportunities arise.

Proposal writing improves over time as colleges gain more experience:

- Sharing ideas with NSF Program Officers regarding domain of study increases confidence in proposal development team.
- “Research Study Approach” (RSA) helps CC-HSIs embrace education research methods. Formulated to address recognized weaknesses in prior proposals and in the experience of some faculty and grant writers, the RSA uses a phased approach in a living RSA document to turn initial concepts into solid educational research questions.
- “Red Team Review” emulates NSF Merit Review 4-6 weeks prior to due date. External reviewers and the SFAz KickStarter Program Team notice improvements to proposal quality over previous iterations. Colleges are learning to assess and respond to prior proposal declination feedback.
- All-in-one Workbook designed to help track proposal activities/components and manage timeliness and compliance of proposal submissions.

- Multiple regular meetings with STEM Planning Team provide Technical Assistance (professional development) opportunities for proposals and keeps proposal development on track.
- Faculty release time continues to be an issue. Most community college faculty are on overload with insufficient time to write proposals, implement projects, sponsor undergraduate researchers and provide mentoring and career counseling to STEM students.

Organic Communities of Innovation[4][5][6][7][8]have emerged at CC-HSIs:

- STEM Planning Teams continue to meet regularly to own and develop STEM programming overall. Faculty & staff have become engaged, empowered and willing to participate and continue to deepen administrative commitment and support.
- The KickStarter Process has fostered networking and mentoring between institutions as well as within institutions.
- Prior Cohort participants serve as role models to newer Cohort by sharing ideas, best practices, and new concepts during monthly meetings.
- Cross Cohort Meetings became much more inclusive and animated as participants were asked to share a STEM highlight, goal or other item at each meeting. Dedicated presentations by Colleges with recent NSF awards stimulated dialog among participants and an opportunity to rehearse presentations to broader audiences.
- Individual meetings with Colleges for staging proposal writing have been recently converted to group meetings that include several colleges who are writing the same type of proposals. The Group setting provides additional opportunities for leadership and role modeling by earlier cohorts and optimizes logistics aspects of proposal processes.

High Touch, Moderate Touch, and Light Touch Technical Assistance:

- During research concept and proposal development participants requiring "high touch" technical assistance continue to meet separately with KickStarter Program Team and may be assigned a mentor with prior NSF program experience and/or an education research consultant.
- Access to pre-recorded training webinars, tools and templates can provide sufficient assistance for routine STEM planning and proposal activities. For some participants, the self-service, "light touch" approach is sufficient to navigate the KickStarter Process.
- Other participants, while not entirely self-service, require some coaching that is "moderate touch" with a less intensive level of technical assistance.

Conclusion

KickStarter results and lessons learned to date indicate achievements toward the three proposed program objectives:

The number of CC-HSIs who compete successfully as lead grantees on NSF projects has increased: All five Cohort 1 colleges submitted at least two proposals for a total of 16 submissions, at a 54% award success rate, with eight proposals still under consideration. Cohort 2 has submitted seven proposals to date, with 1 awarded and four of which are still pending.

CC-HSIs' STEM infrastructure has been strengthened: Participating institutions have hired grant writers, for example, and promoted Title V Directors to oversee an entire STEM portfolio, all toward helping to increase recruitment and retention success rates among Latinx students.

CC-HSIs are engaging with a broader range of partners: Increases in partnerships with other two-year and four-year colleges were reported in the form of articulation discussions (42.86% of participants reported increases), joint proposals (14.29%), and joint events (57.14%). Increased engagement and partnerships with Industry were reported in the form of internships (85.71% of participants reported increases), industry volunteers in outreach activities (14.29%) and Advisory Boards (28.57%).

In terms of proposed key deliverables and outcomes, the KickStarter program has:

- Established and fully documented a repeatable and sustainable proposal development technical assistance process that is tailored to the needs of CC-HSIs;
- Leveraged its existing online STEM Network (stem.sfaz.org) and established its participating CC-HSIs into cohorts of mutually-beneficial, widely-informative, STEM-focused, online networks and professional learning communities (PLCs) toward supporting critical partnerships needed to be competitive at NSF;
- Incorporated the use education researchers to assist CC-HSIs with their data-capture capability toward improving their NSF competitiveness and effective project implementation; and
- Created a roadmap for CC-HSIs to progress from Readiness Assessment, Startup, STEM Planning, Proposal Development, Program Implementation and finally, to Alumni status, that other Hispanic-serving institutions can adapt to accomplish similar goals.
- Developed the foundation upon which to build a sustainable service that will support the participating CC-HSIs in successfully developing and implementing their funded projects, as well as helping them conceive new projects and find new partners for further expansion of their STEM-based initiatives

These outcomes begin to support the two hypotheses, that:

1. Proposals developed on college-wide STEM Plans show greater potential for successful implementation and sustainability, and thus are a wiser investment of funds. Already, Colleges are assimilating a portfolio of future research ideas aligned to their STEM Plan that can be methodically targeted to new funding opportunities as they arise.
2. Technical assistance (*professional development)* that incorporates NSF principles in the process offers colleges the experience needed to develop competitive proposals. To date, the eleven KickStarter CC-HSIs have achieved a proposal award rate of 50% with $2.8M in funding. 100% of the Cohort 1 CC-HSIs have submitted two or more proposals to NSF; and 100% of these colleges have been awarded a grant from NSF representing a 54% grant award success rate.

Questions for Future Exploration and Discussion

1. In the long run: How does this approach affect success rates among Latinx students?

2. Can this approach be generalized to other minority serving colleges (e.g., African-American, American Indian)?
3. How does the KS CC-HSI proposal award success rate compare to non-KS CC-HSIs?

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