



Front-end evaluation of partner representatives' background and use of *SciGirls Seven* strategies

Knight Williams Inc.

Valerie Knight-Williams, Ed.D.
Rachael Dobrowolski, MEd
Divan Williams Jr., J.D.
Gabriel Simmons

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Significant findings

The independent evaluators at Knight Williams Inc. developed a front-end survey to gather background and baseline information about the 16 partner organizations selected to conduct outreach programs as part of *SciGirls CONNECT*². The goal was for two people from each partner organization to complete the [online survey](#) about their background and prior use of the [SciGirls Seven](#) and related strategies. A total of 30 partner representatives completed the survey by the requested deadline, resulting in a response rate of 94%. The majority identified as program leaders, with smaller groups saying they were educators or describing other roles. They reported varying years of experience at their respective organizations. All but two had previously used the *SciGirls Seven*.

Key findings that emerged from the front-end evaluation are summarized below.

Background of youth participants in STEM programs over the past year

Nearly half of the partner representatives said their STEM programs in the past year included only girls, while smaller groups said their programs had mainly girls with some boys, or similar numbers of girls and boys. Most partner representatives said their STEM programs were for middle school youth and, to a lesser extent, elementary and younger, and they most often noted their youth resided in urban or suburban areas. The majority also reported that their youth were from diverse racial/ethnic backgrounds. All of the partner representatives further reflected that at least some of the youth in these programs had: low exposure to STEM role models/mentors, low-to-moderately-low socioeconomic status, low knowledge of STEM fields, low parental/guardian knowledge of STEM fields, low English proficiency, parents/guardians with low English proficiency, and/or came from non-STEM identifying families.

Though the above estimates were based on the partner representatives' personal recollections and not actual program reporting, their responses indicate a focus on the *SciGirls CONNECT*² project's target demographic of middle school girls from diverse and underserved backgrounds in both all-girls and co-ed informal STEM education programs.

Extent to which recent STEM programs incorporated SciGirls CONNECT² components

When asked to rate the extent to which their STEM programs during the past year included eight components relevant to *SciGirls CONNECT*², the partner representatives indicated that while their programs didn't typically incorporate any one component to *a great extent*, the following four components were incorporated *to a considerable extent*: focusing on enhancing youths' STEM identity, exposing youth to STEM role models, addressing youths' knowledge about STEM fields, and integrating the *SciGirls Seven*. Elsewhere in the survey, when a subgroup of the partner representatives commented on *why* they considered the *SciGirls Seven*, the majority described the strategies as being aligned with their organizational mission and a smaller group explained that their use felt natural or like second nature. Taken together, this feedback indicates the partner organizations are well-positioned to provide iterative feedback throughout *SciGirls CONNECT*², particularly with respect to the goal of revisiting, refining, and expanding the *SciGirls Seven* and related strategies.

The partner representatives generally reported that their programs used three components *to some extent*: showing youth culturally and linguistically relevant STEM media, offering opportunities for family participation, and addressing parents/guardians' knowledge about STEM fields. Meanwhile, they indicated their programs included one component, opportunities for youth-created videos, *to a little extent*. Given the partner organizations' likely (and, in some cases, required) inclusion of these elements in their *SciGirls CONNECT*² programs, this baseline feedback on the program components they that typically included to a lesser extent will be useful to have for comparison with the post-program evaluation surveys.

Perceived value, impacts, and use of the SciGirls Seven strategies

As a whole, the partner representatives rated each of the seven strategies as *very* or *extremely valuable* and reflected that they had observed each strategy result in the key outcome TPT envisioned for that strategy. Specifically, most said they saw strategy #1 energize girls, strategy #2 motivate girls, strategy #3 help girls enjoy participating, strategy #5 improve girls' confidence, and strategy #7 inspire and motivate girls. The majority also saw strategy #4 motivate girls and strategy #6 improve girls' confidence and trust in their own reasoning.

When asked to describe how they considered the *SciGirls Seven* when planning and implementing STEM projects and experiences for girls, the partner representatives who addressed this issue most often said they used them synergistically or as a set, although some explained that they used one or more strategies consistently, and a few described using different strategies in different situations. In terms of actual implementation, the partner representatives reported using some strategies more often than others. They most frequently pointed to using two strategies most often: #3 Having girls participate in hands-on, open-ended projects and investigations and #1 Having girls collaborate/work together, with some partner representatives describing girls' positive responses to these strategies or citing their ease of use. Smaller groups said they used each of the five remaining strategies most often. As for those used least often, the largest group pointed to strategy #7 Having girls develop relationships with role models or mentors, while much smaller groups pointed to each of the six remaining strategies. Notably, some who reported using strategy #7 least often noted that this was because they had trouble finding role models or because their youth didn't have enough time with the role models to develop a relationship.

Beyond observing the individual strategy outcomes that TPT envisioned for each strategy, most partner representatives further reflected that, as a result of using the strategies, they had observed an impact on girls' STEM identity, as defined by the *SciGirls CONNECT²* project. When asked about the impact(s) they observed, the majority said they saw an increase in girls' confidence. Smaller groups saw increased engagement with or interest in STEM, saw increased interest in STEM careers/ professionals, and/or observed girls asking questions and thinking critically. In general, the partner representatives found all of the strategies relatively important in facilitating the impacts they had identified, although their responses suggest that some strategies may impact STEM identity indicators more than others, particularly strategies #3 Having girls participate in hands-on, open-ended projects and investigations and #5 Giving girls specific, positive feedback on their effort, strategies, and/or behaviors.

While most partner representatives said they hadn't used other gender equitable or culturally responsive strategies beyond the *SciGirls Seven* and *Engaging Latino Families* strategies, a few said they had and shared comments about growth mindset recommendations and communication strategies. Their suggested improvements specific to the *SciGirls Seven* referenced cultural responsiveness, communication strategies, *SciGirls* programming, and the need for updated statistics.

The above findings indicate that the partner representatives generally found each of the *SciGirls Seven* strategies to be valuable, successful in meeting key envisioned outcomes, and impactful in facilitating STEM identity. At the same time, their responses also suggest: that they may have somewhat different ways of considering the strategies in planning and implementation, that in practice they have tended to use some strategies more or less often than others, and that they may consider some strategies particularly important for facilitating STEM impacts relevant to *SciGirls CONNECT²*. All of these areas will be important to explore in the post-program surveys and interviews, after the partner representatives have had the opportunity to implement a *SciGirls CONNECT²* program with an eye toward their use of the strategies.

Introduction

The independent evaluators at Knight Williams Inc. (Knight Williams) developed a front-end survey to gather background and baseline information about the 16 partner organizations selected to conduct outreach programs as part of the *SciGirls CONNECT²* project. The survey specifically asked about partner representatives': 1) background and prior STEM programs; 2) program types planned for *SciGirls CONNECT²*; 3) prior use and perceptions of the *SciGirls Seven* strategies; 4) prior use and perceptions of the *Engaging Latino Families* strategies; 5) experience with other gender equitable or culturally responsive strategies; and 6) suggestions for *SciGirls Seven* revisions, additions, and other recommendations.

Method

Early in Year 1, Twin Cities PBS (TPT) sent the primary representatives from each of the 16 partner organizations an invitation to complete the following online survey hosted on Knight Williams' independent server: <http://www.knightwilliams.com/scigc/sgc2presurvey.aspx>. Additionally, each individual was asked to identify another representative involved with their organization who would be implementing the *SciGirls CONNECT²* program, and to ask this person to complete the survey as well. In all, the evaluation aimed for two representatives from each partner organization to complete the survey, for a total of 32.

Response rate

As of the drafting of this report, 94% or 30 of the 32 partner representatives completed the survey. Fourteen (14) partner organizations submitted two surveys each, while the remaining two partner organizations submitted one survey each.

Outline

The *SciGirls CONNECT²* front-end evaluation is presented in six parts, as follows:

- Part 1. Partner representatives' background and prior STEM programs
- Part 2. Types of programs planned for *SciGirls CONNECT²*
- Part 3. Prior use and perceived value of the *SciGirls Seven* strategies
- Part 4. Prior use and perceived value of the *Engaging Latino Families* strategies
- Part 5. Prior experience with other gender equitable or culturally responsive strategies
- Part 6. Suggestions for *SciGirls Seven* revisions, additions, and other recommendations

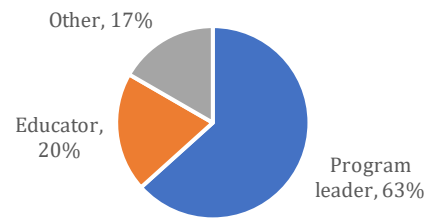
Findings

Part 1. Partner representatives' background and prior STEM programs

1.1 Partner representatives' background

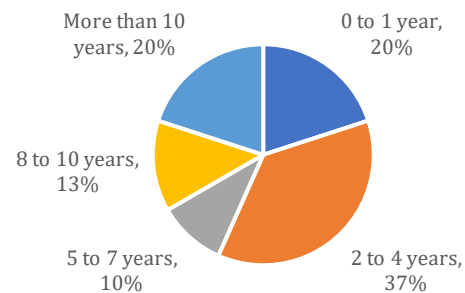
As shown in Figure 1, the majority of partner representatives who completed the survey identified as program leaders (63%), with smaller groups saying they were educators (20%) or describing other roles (17%), such as *Executive Director, Outreach Coordinator, or Program volunteer*. In a few cases, the role of program leader seems to have been shared by two individuals from the same organization.

Figure 1. Partner representatives' roles at their organizations (N=30)



The partner representatives reported varying years of experience at their respective organizations. Figure 2 shows the percentages who indicated they had 0 to 1 year of experience (20%), 2 to 4 years (37%), 5 to 7 years (10%), 8 to 10 years (13%), and more than 10 years of experience at their respective organizations (20%).¹

Figure 2. Partner representatives' experience at their organizations (N=30)



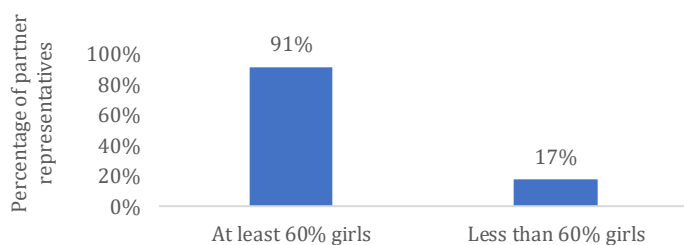
1.2 Gender composition of STEM programs within past three years

Most of the partner representatives reported that their organizations implemented a *SciGirls* program (77%) and/or another type of STEM program (80%) within the past three years.

SciGirls programs

As shown in Figure 3, most of those who held *SciGirls* programs reported that they were attended by at least 60% girls (91%), while a few reported that their *SciGirls* programs were attended by less than 60% girls (17%).

Figure 3. Gender composition of *SciGirls* programs in the past 3 years (n=23)

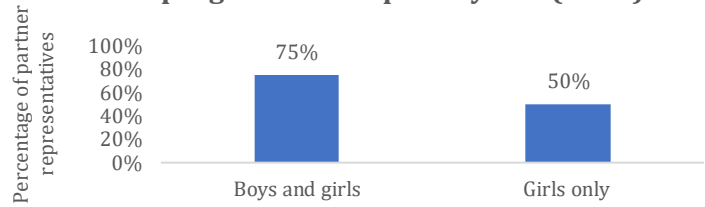


¹ Moving into the Year 1 post-program survey and interview phase of the project, the evaluation team will also gather information regarding the length of time partner representatives have been using the *SciGirls Seven*, to help further contextualize their feedback.

Other STEM programs

As shown in Figure 4, most of those who held other STEM programs reported that they were attended by boys and girls (75%), while half reported that their other STEM programs were attended by girls only (50%).

Figure 4. Gender composition of other STEM programs in the past 3 years (n=24)



1.3 Background of youth participants in STEM programs over the past year

Demographic background

Table 1 shows the gender distribution, grade levels, geographic regions, and racial/ethnic backgrounds represented among the youth in the partner organizations’ STEM programs over the past year, based on the partner representatives’ best estimates.

Gender distribution: Nearly half of the partner representatives said their STEM programs in the past year included only girls (48%), while smaller groups said their programs included mainly girls with some boys (28%) or similar numbers of girls and boys (28%). Relatively few reported that their programs included only boys (7%).

Table 1. Partner representatives’ reports on the background of youth participants in their STEM programs over the past year		
Demographic/ background factors	Categories	Partner representatives who identified youth in this way (n=29)
Gender distribution	All girls	48%
	Majority girls	28%
	Similar numbers	28%
	All boys	7%
Grade level	Elementary & younger	66%
	Middle school	97%
	High school	21%
Geographic region	Urban	66%
	Suburban	45%
	Rural	28%
	Don’t know	3%
Racial/ethnic background	Hispanic	59%
	Other minority groups	72%

Grade level: Most of the partner representatives said their STEM programs were for middle school youth (97%). At the same time, the majority described programs for elementary and younger (66%), and some described programs for high school youth (21%).

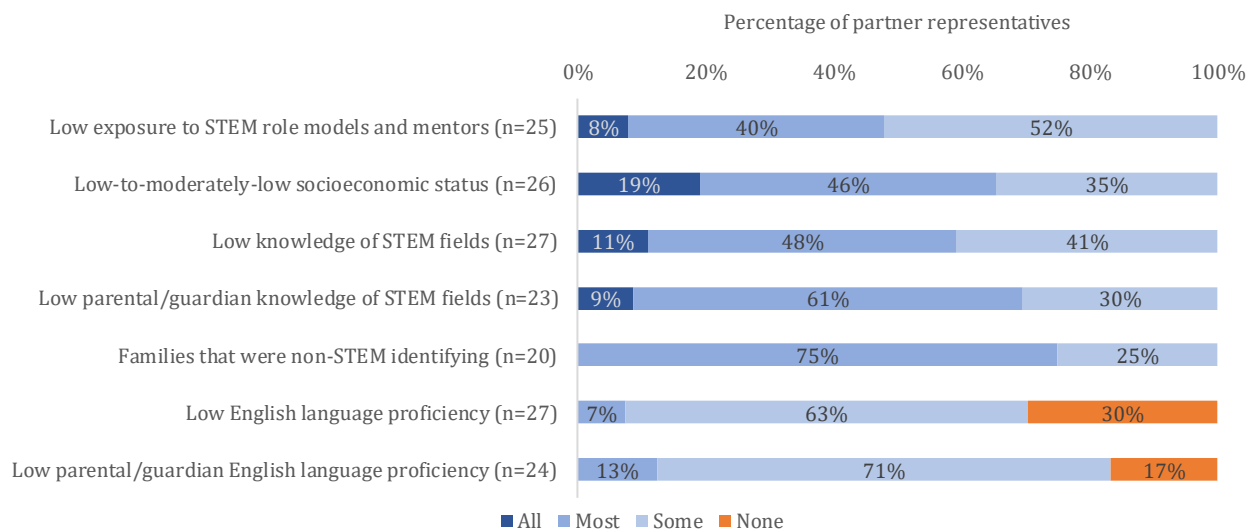
Geographic region: The majority of partner representatives described their youth as coming from urban areas (66%), with smaller groups pointing to suburban (45%) and/or rural areas (28%).

Racial/ethnic background: Finally, the partner representatives were invited to indicate if one racial/ethnic group was primarily served or if the youth came from diverse backgrounds, and to briefly describe the composition of their programs over the past year. Though the types of responses ranged in detail (for example, “70% Latino 20% African American 5% Asian 5% other,” “Diverse backgrounds,” and “Primarily minority- African American & Hispanic”), the majority described working with at least some Hispanic youth (59%), while a larger group described working with other minority youth (72%).

Barriers to STEM engagement

All of the partner representatives who shared an applicable response indicated that at least some of the youth in their STEM programs over the past year had: low exposure to STEM role models/mentors, low-to-moderately-low socioeconomic status, low knowledge of STEM fields, low parental/guardian knowledge of STEM fields, and/or came from non-STEM identifying families. The majority also said at least some of their youth had low English proficiency and/or had parents/guardians with low English proficiency. Figure 5 shows the percentages of partner representatives who said that *all*, *most*, *some*, or *none* of their youth faced these barriers. In each case, responses from partner representatives who said they *did not know* or left the question blank are not considered in Figure 5.

Figure 5. Partner representatives' assessment of youths' barriers to STEM engagement



The partner representatives estimated as follows:

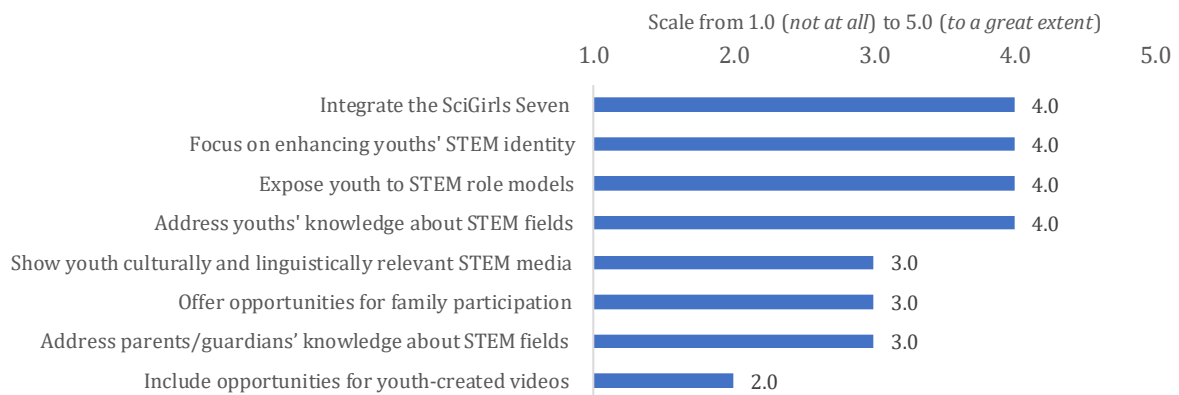
- All of the partner representatives who shared a response thought at least some youth in their STEM programs had **low exposure to STEM role models and mentors** (100%). The largest groups felt this was the case for *some* (52%) or *most* (40%) of their youth. Relatively few reported that *all* of their youth faced this barrier (8%).
- All of the partner representatives who shared a response thought at least some youth in their STEM programs were of **low-to-moderately-low socioeconomic status** (100%). The largest groups felt this was the case for *some* (35%) or *most* (46%) of their youth, while a few reported that *all* of their youth faced this barrier (19%).
- All of the partner representatives who shared a response thought at least some youth in their STEM programs had **low knowledge of STEM fields** (100%). The largest groups felt this was the case for *some* (41%) or *most* (48%) of their youth, while a few reported that *all* of their youth faced this barrier (11%).

- All of the partner representatives who shared a response thought at least some youth in their STEM programs **faced low parental/guardian knowledge of STEM fields** (100%). The largest group felt this was the case for *most* of their youth (61%), while a smaller group said it was true for *some* (30%). Relatively few reported that this was true of *all* of their youth (9%). When invited to elaborate, a few of the partner representatives commented on influencing factors inside and outside the home, such as, “*Many of these students come from underserved families where parents dropped out of high school or do not have confidence in STEM careers*” and “*We live in an area with little interest in college prep. Most jobs were farming or manufacturing and are disappearing.*”
- All of partner representatives who shared a response thought at least some of their youth came from **families that were non-STEM identifying** (100%). Three-quarters felt this was the case for *most* of their youth (75%), while a quarter reported that it was the case for *some* (25%).
- The majority of partner representatives reported that at least some of the youth in their STEM programs **had low English language proficiency** (70%). The largest group indicated that *some* of their youth faced this barrier (63%), while relatively few said this was the case for *most* (7%). Additionally, some of the partner representatives said *none* of their youth faced the barrier of low English proficiency (30%).
- Finally, most of the partner representatives indicated that at least some of their youth **had parents/guardians with low English language proficiency** (84%). The largest group indicated that *some* of their youth faced this barrier (71%), while a few said this was the case for *most* (13%). Additionally, a few of the partner representatives said *none* of their youth had parents/guardians with low English language proficiency (17%).

1.4 Extent to which STEM programs in the past year incorporated components relevant to *SciGirls CONNECT*²

When asked to rate the extent to which their STEM programs over the past year included eight components relevant to *SciGirls CONNECT*², the partner representatives indicated that their programs used some components more than others. Figure 6 shows median ratings of the extent to which partner representatives used each component on a scale from 1.0 (*not at all*) to 5.0 (*to a great extent*).

Figure 6. Median ratings of the extent to which partner representatives' STEM programs used components relevant to *SciGirls CONNECT*² in the past year (N=30)

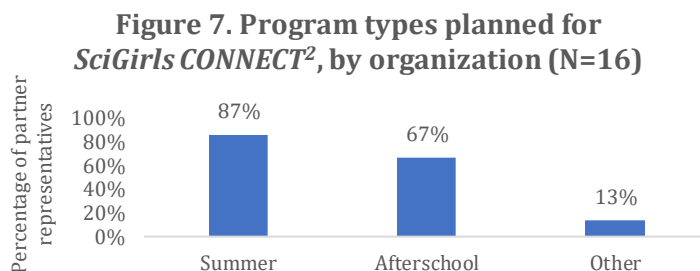


In general, the partner representatives felt their programs in the past year integrated the *SciGirls Seven*², focused on enhancing youths' STEM identity, exposed youth to STEM role models, and addressed youths' knowledge about STEM fields *to a considerable extent* (*Mdn* = 4.0 each). They thought their programs showed youth culturally and linguistically relevant STEM media, offered opportunities for family participation, and addressed parents/guardians' knowledge about STEM fields *to some extent* (*Mdn* = 3.0 each), and that their programs included opportunities for youth-created videos *to a little extent* (*Mdn* = 2.0). Elsewhere in the survey, one of the partner representatives commented on his or her organization's inclusion of youth-created videos, saying, "*We don't use video taping of our experiences enough. I think it's mainly because we don't always have the equipment. Our adults have cell phones, we don't always have the space. Honestly, we really never focused on making video media that often. It just wasn't a priority.*"

² The *SciGirls Seven* two-page reference is shared in Appendix 1.

Part 2. Types of programs planned for *SciGirls CONNECT²*

As shown in Figure 7, of the 16 partner organizations, most planned to implement a summer program as part of *SciGirls CONNECT²* (87%). The majority also planned afterschool programs (67%), and a few planned other types of programs (13%).



As shown in Table 2, half of the partner organizations indicated they were planning multiple kinds of programs (50%). Note, however, that in four instances, two partner representatives from the same organization shared different responses. In each of these cases, responses from the program leaders (or the main contacts provided by TPT, in cases where two individuals self-identified as program leaders) were used in determining the percentages in Figure 7 and are presented in Table 2, rather than the responses from the partners' second representatives.³

Table 2. Types of programs partners planned for <i>SciGirls CONNECT²</i>	
Partner organization	Types of programs planned
Basic Enhancements, Inc.	afterschool, summer, other (i.e., "Winter and Fall workshops")
Cornell Cooperative Extension of Chenango County	afterschool
GEMS	summer
Girls Inc. of Western Connecticut	afterschool, summer
Marion P. Thomas Charter School	afterschool
Mote Marine Laboratory	summer
New Mexico PBS	afterschool, summer
Project Scientist	afterschool, summer
San Antonio PREP	summer, other (i.e., "activities throughout the school year")
Sci-Port: Louisiana's Science Center	summer
SELF International	afterschool
spectrUM Discovery Area	summer
STEMpossible, LLC	afterschool, summer
Texas Girls Collaborative Project	summer
WSKG	afterschool, summer
YMCA of Metropolitan Washington	afterschool, summer

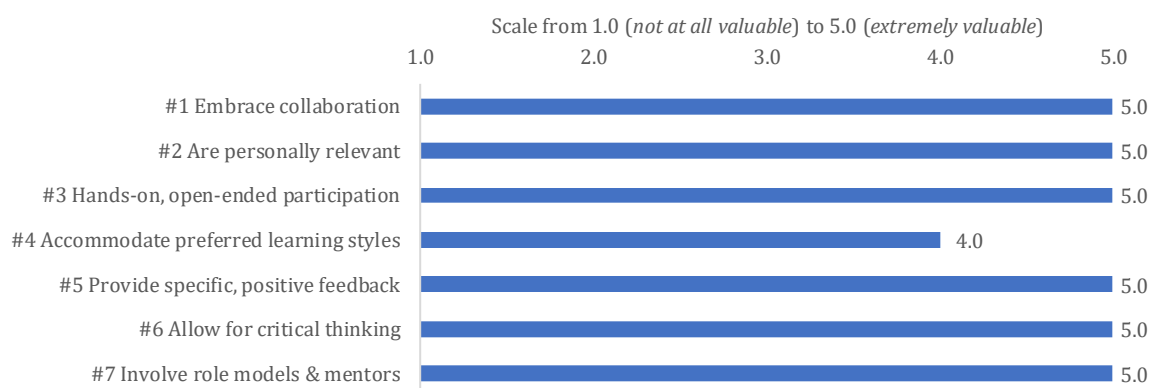
³ The second partner representatives from the following four partners indicated they would complete the following programs as part of *SciGirls CONNECT²*: Project Scientist (summer); San Antonio PREP (other, i.e., "implement as part of the activity period during summer program"); Sci-Port: Louisiana's Science Center (afterschool); and STEMpossible, LLC (afterschool).

Part 3. Prior use and perceived value of the *SciGirls Seven* strategies

3.1 Perceived value of the strategies

All but two of the partner representatives indicated they had prior experience using one or more of the *SciGirls Seven* strategies to engage girls in STEM projects and experiences. As shown in Figure 8, these 28 partner representatives generally found all of the strategies *very* or *extremely valuable*, using a scale from 1.0 (*not at all valuable*) to 5.0 (*extremely valuable*).

Figure 8. Median ratings of how valuable partner representatives found the *SciGirls Seven* (n=28)



Summaries of the *SciGirls Seven* strategies are shared in Image 1. The partner representatives generally found the following six strategies *extremely valuable* (*Mdn* = 5.0 each): #1 Having girls collaborate/work together; #2 Having girls work on a project designed to be personally relevant and meaningful to them; #3 Having girls participate in hands-on, open-ended projects and investigations; #5 Giving girls specific, positive feedback on their effort, strategies, and/or behaviors; #6 Encouraging girls to think critically; and #7 Having girls develop relationships with role models or mentors.

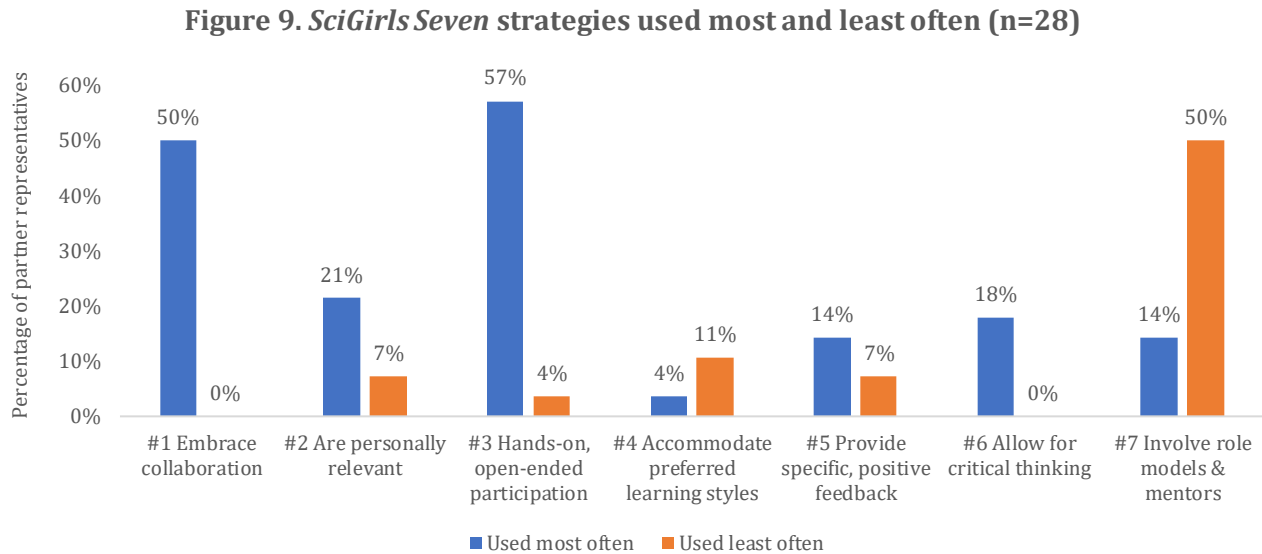
The remaining strategy (#4 Having girls approach projects in their own way) was generally found to be *very valuable* (*Mdn* = 4.0).



Image 1. The *SciGirls Seven* ([courtesy of TPT](#))

3.2 Strategies used most and least often

Figure 9 shows the *SciGirls Seven* strategies the 28 program representatives reported using most and least often in their STEM programs for youth.



Strategies used most often

The largest groups of partner representatives pointed to using two strategies **most often**: #3 Having girls participate in hands-on, open-ended projects and investigations (57%) and #1 Having girls collaborate/work together (50%). Smaller groups (4% - 21%) pointed to each of the five remaining strategies. Though not shown in Figure 9, a few of the partner representatives said all of the strategies were embedded to an equal extent in their programming (7%) and one said s/he *did not know* (4%).

Strategies used least often

When asked which strategies they used **least often**, half of the partner representatives pointed to strategy #7 Having girls develop relationships with role models or mentors (50%). Much smaller groups (0% - 11%) pointed to each of the six remaining strategies. Though not shown in Figure 9, a few of the partner representatives declined to answer the question (14%), one said s/he *did not know* (4%), and one shared a miscellaneous response that did not address the question (4%).

Reasons why strategies were used more or less often

The program representatives were also asked to comment on why they used their selected strategies most and least often. Examples of their responses are shared in Table 3 on the next page.

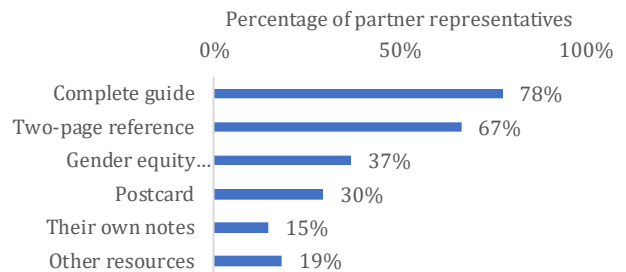
Table 3. Why partner representatives thought they used their selected SciGirls Seven strategies most and least often (n=28)

Strategies used most often	Strategies used least often
<p><u>#1 Embrace collaboration (50%)</u></p> <ul style="list-style-type: none"> This strategy has helped them in working together in small groups and allow them talk about their ideas and knowing that each girl's contribution are valued. <p><u>#2 Are personally relevant (21%)</u></p> <ul style="list-style-type: none"> By providing the ability for them to get their hands dirty and dive into a project and make it their own, you give them the opportunity to engage in their own way/at their own speed. <p><u>#3 Hands-on, open-ended participation (57%)</u></p> <ul style="list-style-type: none"> The girls participating in the programming seem to truly enjoy and remember the investigations. ...easiest to implement <p><u>#4 Accommodate preferred learning styles (4%)</u></p> <ul style="list-style-type: none"> Allow and encourage girls to approach their STEM activities using their own technique (creativity). <p><u>#5 Provide specific, positive feedback (14%)</u></p> <ul style="list-style-type: none"> Often the youth I work with come from fractured families and tough situations. They don't think they can solve problems - so they don't apply themselves. Encouraging ANYONE on behavior they can control is very empowering and enlightening. They can't control their home life, but they can control how they respond and the effort they put forth. By positively reinforcing them, they build confidence and wisdom with science and that is a huge benefit for them. <p><u>#6 Allow for critical thinking (18%)</u></p> <ul style="list-style-type: none"> I also found out that they had more confidence and trust in their own reasoning when we encouraged them to think. ...creating/fostering important lifelong skills <p><u>#7 Involve role models & mentors (14%)</u></p> <ul style="list-style-type: none"> Role Models/Mentors - it's built into our model to expose girls to these women through our STEM [programs] <p><u>All infused/embedded (7%)</u></p> <ul style="list-style-type: none"> All of them are embedded throughout our programming. There isn't one we use more or less. 	<p><u>#2 Are personally relevant (7%)</u></p> <ul style="list-style-type: none"> Personally Relevant - we serve 80 girls a week in the summer and it's hard to identify what is going to be personally relevant to all the girls I think perhaps not all the projects end up being personally relevant and meaningful to every girl. <p><u>#3 Hands-on, open-ended participation (4%)</u></p> <ul style="list-style-type: none"> Open-ended projects are tough too because of time constraint, material constraint and training of teachers to be able to do this successfully. <p><u>#4 Accommodate preferred learning styles (11%)</u></p> <ul style="list-style-type: none"> I feel like this is intuitive. Everyone comes to the table with different knowledge and each person will use this to attach a problem. Is this really a strategy that needs highlighting? All of the SG are good, but I think this one I use least often They can solve the issue in their own way but there is typically a set activity with specific materials so they can do whatever they need to with the materials to accomplish the activity/task. <p><u>#5 Provide specific, positive feedback (7%)</u></p> <ul style="list-style-type: none"> No particular reason except that I wanted students' confidence to be more intrinsic. <p><u>#7 Involve role models & mentors (50%)</u></p> <ul style="list-style-type: none"> Girls benefit from role models-We do not have many role models in the community. We have had more difficulty finding mentors who represent the ethnicity of the groups we work with and who are available at times when we meet with students. When we put out requests for mentors we hear from a mainstream group of individuals...We just would prefer to balance it more ethnically. It's very hard for the settings we work with to incorporate STEM professionals and often times we don't have the technology for digital showings of STEM professionals at work. Students participate in a Career Awareness seminar where they get to ask questions to the presenter, but do not have an opportunity to build a relationship with them.

3.3 Sources consulted when using or planning to use the strategies

As shown in Figure 10, when using or planning to use the *SciGirls Seven*, most of the partner representatives who shared a response reported that they used the *SciGirls Seven* complete guide (78%), while the majority pointed to the *SciGirls Seven* two-page reference shared in Appendix 1 (67%). Smaller groups described using the gender equity training (37%), the *SciGirls Seven* postcard (30%), their own notes (15%), and/or other resources (19%), including *SciGirls* webinars and their own organizations' missions and strategies.

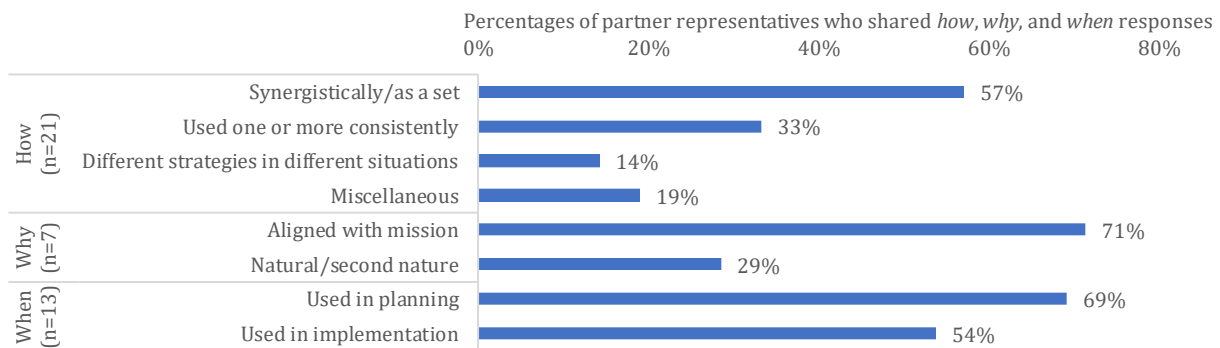
Figure 10. *SciGirls Seven* sources used (n=27)



3.4 How the strategies were considered

Partner representatives were asked to describe how they considered the *SciGirls Seven* when planning and implementing STEM projects and experiences for girls.⁴ As shown in Figure 11, they generally commented on *how*, *why*, and/or *when* they considered the strategies.

Figure 11. How the *SciGirls Seven* are considered in planning and implementation



Specifically:

- Among those who commented on *how* they considered the strategies (n=21), the majority described using them synergistically or as a set (57%). A smaller group explained that they used one or more strategies consistently (33%), and a few each described using different strategies in different situations (14%) or shared miscellaneous comments (19%).

⁴ The full wording of the question follows: Please describe how you **consider** the *SciGirls Seven* strategies when planning and implementing your STEM projects or experiences for girls. For example, do you typically use one or more specific strategies consistently, all 7 strategies synergistically/as a set of strategies, or do you find individual strategies useful in different applications? ***Please realize there is no right or wrong answer here, we are just trying to better understand how educators tend to think about and practically use the strategies. Feel free to describe any other ways that you consider the strategies that we haven't thought of as well!*

- Among those who commented on *why* they considered the strategies (n=7), the majority noted that the strategies were aligned with their organizational mission (71%), while a smaller group described their use as natural or second nature (29%).
- Finally, among those who commented on *when* they considered the strategies (n=13), the majority each described using them in planning (69%) and/or implementation (54%).

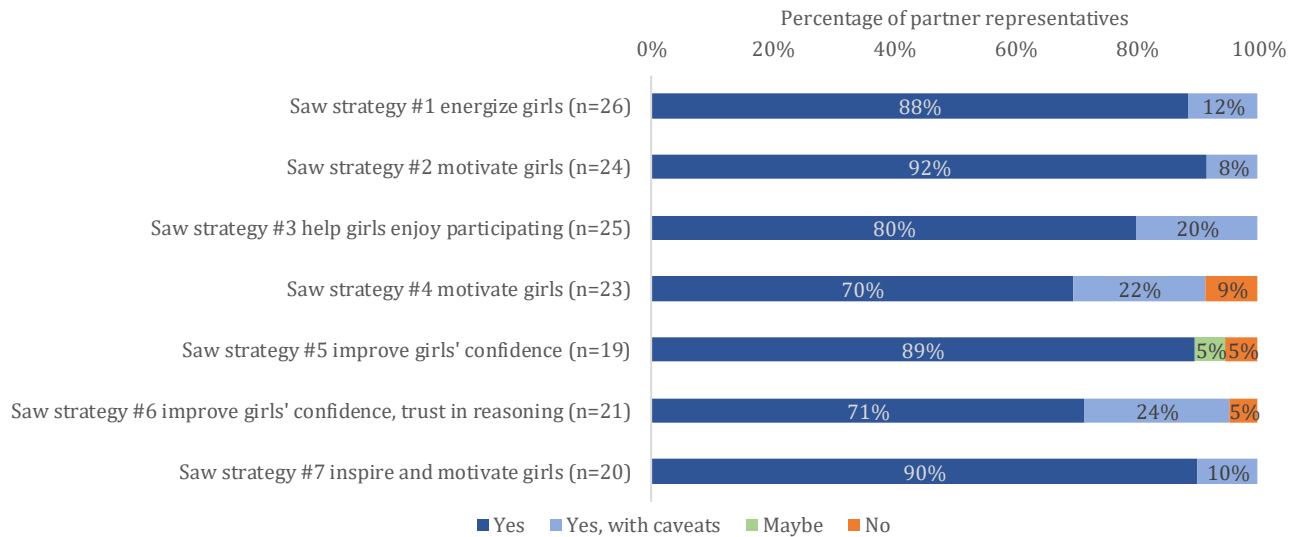
Examples of their responses in each case are shared below in Table 4.

Table 4. How, why, and when partner representatives considered the SciGirls Seven		
How (n=21)	Why (n=7)	When (n=13)
<p><u>Synergistically/as a set (57%)</u></p> <ul style="list-style-type: none"> • I tend to use all 7 as a set of strategies in most of my inquiry-based science education programs. They are researched based and applicable for all learners so keeping the 7 in mind always seems like a good idea. • I tend to think about all of them when creating and planning. I integrate them all throughout. • I use all the 7 strategies synergistically... • All of them are embedded throughout our programming. There isn't one we use more or less. <p><u>Used one or more strategies consistently (33%)</u></p> <ul style="list-style-type: none"> • When planning curriculum though, I try to think about individual strategies (#1 and #7 usually) • I encourage the girls to work together and to express their own ideas. • I usually try to ensure that every activity is collaborative in nature. <p><u>Used different strategies in different situations (14%)</u></p> <ul style="list-style-type: none"> • ...I find different strategies useful in different situations. • Constantly reminding myself about using positive reinforcement throughout the lesson is very different than knowing when I plan an activity that it should include collaboration, it should have a hands-on component and that we should try to incorporate the role model aspect of the program into the schedule ahead of time. <p><u>Miscellaneous (19%)</u></p> <ul style="list-style-type: none"> • We try to incorporate as many activities as possible to support STEM projects. • Try to use most of the strategies, encouraging them to discover and that it is okay to make mistakes. • I don't personally plan anything specific to girls, but I believe that the strategies you promote are fundamental to any successful program. 	<p><u>Described the strategies as aligned with their organization mission (71%)</u></p> <ul style="list-style-type: none"> • These are pretty much embedded into [our] principles and models. All of our work is hands-on and collaborative and non-competitive. We try hard to make it relevant to their life and plans. • It's embedded in the culture of our thinking about our programs, planning and execution of the event, etc. • Because the strategies are so closely aligned with our mission and service to girls for over 153 years, we use them all on a regular, daily basis and as the cornerstone of our programming. <p><u>Use of the strategies felt natural/like second nature (29%)</u></p> <ul style="list-style-type: none"> • I usually don't realize that I am using the SciGirls 7, after the training a few years ago, I just find that I naturally incorporate them! • I integrate them all throughout. I've used them for so long it's second nature at this point and I find that I don't have to even look at them to utilize them. 	<p><u>Used in planning (69%)</u></p> <ul style="list-style-type: none"> • When planning activities or events, we use the strategies to help us plan and organize. • When planning curriculum though, I try to think about individual strategies (#1 and #7 usually) • I consider collaboration first list of the time. I think through how the lesson will be organized and what the structure will look like before I incorporate other strategies • When we lesson plan, we schedule out all 7 Sci Girls Strategies so that we can see how each lesson incorporates all of the strategies. Some are easier to do than others. <p><u>Used in implementation (54%)</u></p> <ul style="list-style-type: none"> • ...we use them all on a regular, daily basis and as the cornerstone of our programming. • Intentionally attempt to implement throughout curriculum • Often our underserved groups have had absolutely no exposure to anything STEM and thus it is difficult for them to conceive of self-motivated projects. The implementation needs to be gradual with them to gradually build some confidence and a base of experience to work from.

3.5 Whether and how the strategies enhanced envisioned STEM outcomes

Partner representatives who had experience with the *SciGirls Seven* were asked whether they saw specific STEM outcomes enhanced in girls as a result of implementing each of the strategies and, if so, to explain how or, if not, to explain why not. As shown in Figure 12, the majority who shared a response in each case indicated that they saw each strategy enhance the STEM outcomes TPT envisioned, as outlined in the *SciGirls Seven* complete guide. In considering each strategy, some shared miscellaneous responses, said they didn't know, wrote in "N/A," or left the question blank; these responses are not included in Figure 12.

Figure 12. Whether partner representatives saw the *SciGirls Seven* enhance STEM outcomes



For reference, the *SciGirls Seven* are summarized in Image 2. When asked about the envisioned impacts of each strategy, partner representatives who gave applicable responses shared the following feedback:

- Most said they saw **strategy #1 energize girls** (88%), while a few said yes, with caveats (12%).
- Most said they saw **strategy #2 motivate girls** (92%), while relatively few said yes, with caveats (8%).
- Most said they saw **strategy #3 help girls enjoy participating** (80%), while a few said yes, with caveats (20%).
- The majority said they saw **strategy #4 motivate girls** (70%), a few said yes, with caveats (22%), and relatively few said no (9%).



Image 2. The *SciGirls Seven* (courtesy of TPT)

- When asked if they saw **strategy #5 improve girls' confidence**, most said yes (89%), one said maybe (5%), and one said no (5%).
- The majority saw **strategy #6 improve girls' confidence and trust in their own reasoning** (71%), a few said yes, with caveats (24%), and one said no (5%).
- Finally, the majority said they saw **strategy #7 inspire and motivate girls** (90%), while a few said yes, with caveats (10%).

Examples of their comments in each case are shared in Table 5 below and on the next page.

Table 5. Whether partner representatives saw the SciGirls Seven enhance STEM outcomes (n=28)

Did they see strategy #1 energize girls? (n=26)

Yes (88%)

- *The girls love to brainstorm together and solve problems as a team. All the girls take on certain roles that help them fit into the group and participate in their own way.*
- *Yes- this strategy helps girls that struggle with collaboration and sharing ideas. For some girls this takes practice - they feel like their voice is not heard and this strategy gives them the opportunity to share their ideas in a fair and non-competitive way.*

Yes, with caveats (12%)

- *When there are groups who come together consistently it is more likely to succeed. When the programs do not have consistency of attendance there is less likelihood that the collaborative work is successful. The girls see their work as theirs alone...*
- *Sometimes, yes- the girls feed off of each other's enthusiasm. Sometimes I've seen more introverted girls who want to work alone and are less interested in any sort of collaboration.*
- *Sometimes; our students at times seem to prefer to work on their own*

Did they see strategy #2 motivate girls? (n=24)

Yes (92%)

- *This is extremely important. Because these girls have not understood science to be relevant for their lives, it is imperative to demonstrate that relevance to them in order to engage them and encourage them to participate. If we do not do this we lose them.*
- *Yes. Especially when you get into the community and connect with the neighborhood. For instance we are hoping to have meetings on our [university] campus to get the girls excited about going to college.*

Yes, with caveats (8%)

- *Sometimes, I have also seen girls get excited about projects they might not have known exist before and...they expand their relevance*
- *More of the girls are willing to participate and have deeper connections to the project because they can relate.*

Did they see strategy #3 help girls enjoy participating? (n=25)

Yes (80%)

- *Yes, yes and yes! I have seen girls want to work all day on one hands on investigation trying to make their design better after each time they test it.*
- *They test their materials, visit the materials table, and continue with the engineering process. They get to be challenged, but comment that it is a good way to be challenged.*

Yes, with caveats (20%)

- *They enjoy participating, however many of them appear to be frustrated by the fact that there is no "right" answer.*
- *Sometimes. Some of the girls like to help the other girls to complete the project but on the other hand some girls don't enjoy this because they are shy and don't want to open up and work with others.*

Did they see strategy #4 motivate girls? (n=23)

Yes (70%)

- *Yes! They are motivated when they feel they have a special piece they can contribute to a project.*
- *Yes - when there is no one "right way" they get excited to try and test and play and create and redesign*
- *Every girl is unique and they also believe they have different learning skills, talents and abilities. After each project, they came up with different creative results*

Table 5 Continued.

Yes, with caveats (22%)

- Yes, I have but mostly with older girls. Sometimes it's hard for girls and teachers to know how to approach a problem that is unique to them, especially when working in a group.
- There's only a few girls that are willing to speak up and share their ideas and yes it does motivate them but some it does not.
- Yes, if you have created a "safe space" where kids know that they are free to make mistakes. If not, freedom to choose their own direction can sometimes be a disincentive.

No (9%)

- We are not seeing the projects motivate girls yet. Often, our girls have not been encouraged to think creatively
- Not really. They seem to approach the task in whatever manner it is presented in.

Did they see strategy #5 improve girls' confidence? (n=19)

Yes (89%)

- YES YES- it improves confidence and focus. Girls like that they can control their effort, for some this is a revelation. They don't hear praise often and don't believe they are good at math and science. they believe you are good at it or you are not. They don't realize that effort will help you get better
- Yes, growth mindset is huge! We encourage all our teachers to learn more about what growth mindset looks like in the classroom and how to give this type of feedback.
- Yes. Many of the girls we work with are from underserved backgrounds and may or [may not] have a strong support network. Providing positive feedback and encouragement not only motivates them to achieve, or gives them confidence to know that they are learning, growing, smart & capable of anything they set their minds to.

Maybe (5%)

- I've seen girls continue when they are struggling, which may be directly related to the feedback

No (5%)

- Not really, which was most surprising because I thought they would be most encouraged but they seem to already have the mindset and confidence that they are doing the right things in the correct manner regardless if they are having a difficult time or not.

Did they see strategy #6 improve girls' confidence and trust in their own reasoning? (n=21)

Yes (71%)

- Yes and they're more likely to verbalize out loud, walking through the STEM activity, without worrying what others may think.
- Yes! It's amazing to watch them go from "I can't" to "I did". They learn that not getting the right answer every time is ok and part of the learning process and that there isn't one way to accomplish things.
- Yes, it almost natural as the girls participate in more activities and are encouraged to think critically.

Yes, with caveats (24%)

- Yes...but doing it in a team fashion and not focusing on one individual is best. You don't want ...girls who are struggling with a concept to feel inferior.
- Sometimes. I find that girls tend to want to find the "right" answer instead of valuing the process to find a solution. However, I also think it empowers girls to think on their own and evaluate/assess problems or questions.
- I don't know if I've seen the long-term effects - I use this strategy, and see them think critically in the moment.

No (5%)

- We are not seeing the confidence in girls yet. Often, our girls have not been encouraged to think critically.

Did they see strategy #7 inspire and motivate girls? (n=20)

Yes (90%)

- Yes - many express that they now consider careers they may not have prior to mentor experience.
- Yes - the girls get excited when they can ask questions of and engage with role models
- Yes, when the girls can see other women that look like them doing the things that they dream of doing, it most definitely inspires them in a way that can't be done through just an activity...it puts a real face to something that they would like to accomplish.

Yes, with caveats (10%)

- We have had limited exposure to mentors in our afterschool programs. Mentors have been involved more in our special events and workshops. I have found that in the underserved communities we serve, the students seem most inspired by the ones who really show they care for them and consistently come to them. Many people come and go, but the students don't develop much identity with them. These young people are often lacking in strong relationships and many have experienced abandonment. When they know you are there to stay and you truly care about them they respect and appreciate what you bring all the more.
- During the Career Awareness seminar, students are able to ask questions to the presenter, but do not have an opportunity to build a relationship with them.

3.6 Whether and how the strategies impacted girls' STEM identity

Partner representatives who had used the *SciGirls Seven* were asked if, as a result of using the strategies, they observed girls' STEM identity impacted in some way.⁵ As shown in Figure 13, most of those who shared an applicable response said *yes* (91%), while few said *no* (9%). Those who said *yes* were then asked two follow-up questions, detailed below.

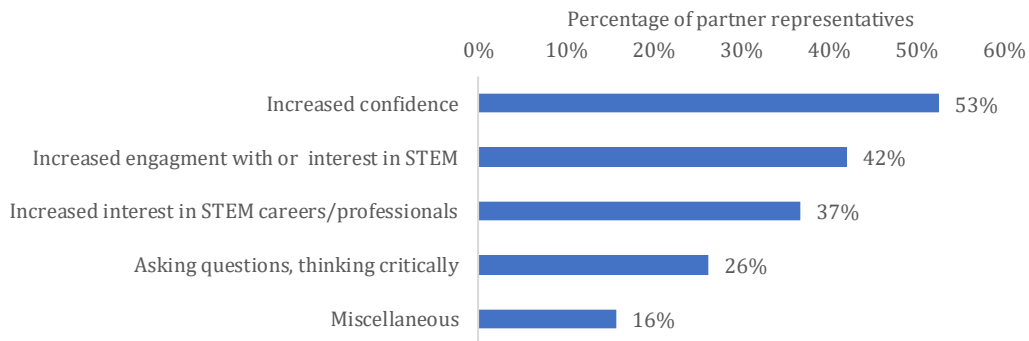
Figure 13. Whether partner representatives observed an impact on girls' STEM identity from use of the *SciGirls Seven* (n=23)



Impacts observed

As shown in Figure 14, the partner representatives who shared additional feedback observed various ways that their use of the strategies impacted girls' STEM identity.

Figure 14. Impacts of using the *SciGirls Seven* on girls' STEM identity observed by partner representatives (n=19)



More than half of the partner representatives who answered this question said they saw an increase in girls' confidence (53%). Somewhat smaller groups saw impacts related to girls' engagement with or interest in STEM (42%), interest in STEM careers/professionals (37%), and/or questions and critical thinking (26%). A few shared miscellaneous responses (16%). Examples of their comments in each case are shared in Table 6 on the following page.

⁵ The full question asked about STEM identity follows to show that the partner representatives were given the definition of STEM identity used by the *SciGirls CONNECT*² project: As a result of using the *SciGirls Seven* strategies, have you observed girls' STEM identity impacted in some way? As noted earlier, STEM identity integrates confidence, interest and motivation around STEM, and ultimately affects choices, behaviors, persistence and perceptions of STEM careers and STEM professionals.

**Table 6. Impacts on girls' STEM identity observed
by partner representatives (n=19)**

Increased confidence (53%)

- *I think that I see more confidence when doing projects and just more comfort in trying new things and participating*
- *Girls now believe in their own reasoning and they've gained a lot of confidence knowing that they can as well do what boys can do.*
- *Confident and secure in their learning; often inspired and empowered to want to learn more; and to connect with real-world mentors in the STEM field.*
- *I have seen girls' confidence go up significantly. Shy girls by the end of 2-6 week programs are vocal and will to take risks in finding a solution to a given problem.*

Increased engagement with or interest in STEM (42%)

- *The girls are excited about STEM...*
- *As stated above, many of our girls have gone from fear or empathy towards science/STEM to excitement and an increased confidence in their abilities.*
- *I have seen them become more interested in STEM activities and become more engaged in the activities.*
- *Girls are more interested in the activities and as a result look forward to working together on projects, trying new things and exploring their own personal creative style and way of thinking*
- *I have witnessed them get more excited about learning and exploring the world of STEM.*

Increased interest in STEM careers/professionals (37%)

- *[The girls] are always asking more about the subject, experiment, jobs, etc.*
- *They begin to see themselves as engineers and scientists and consider ways they can continue to study math and science in school.*
- *The girls have a vision for their future. Some of them are leaning towards STEM careers.*
- *Desire to pursue engineering, cybersecurity, and computer science careers.*
- *They have generated new career and life goals for themselves after realizing what is possible.*
- *They talk about careers in science and are more able to engage in conversations about...future goals...*
- *...often inspired and empowered...to connect with real-world mentors in the STEM field.*

Asking questions and thinking critically (26%)

- *[The girls] are always asking more about the subject, experiment, jobs, etc.*
- *...often inspired and empowered to want to learn more...*
- *...increase in critical thinking versus asking me for answers*
- *[They] think critically about real life issues using the skills they've developed.*

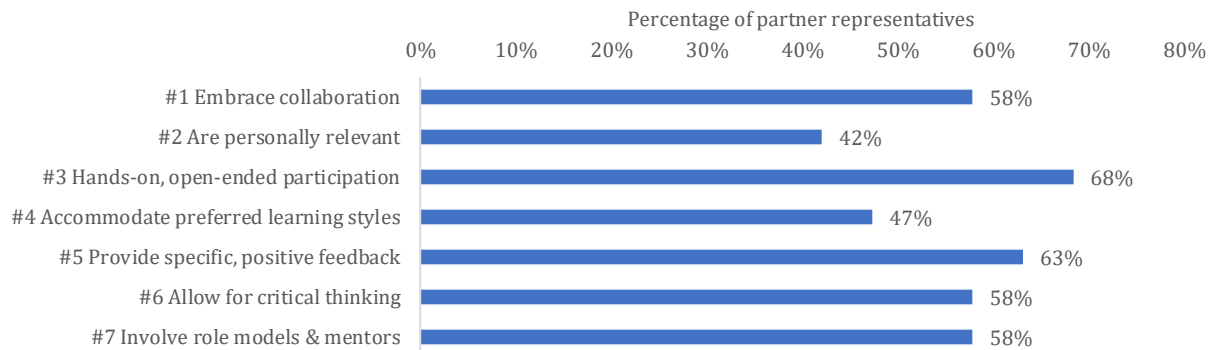
Miscellaneous (16%)

- *On the student feedback from 2015, the students who were on their first year of the program and who might have some exposure with SciGirls, agree that their mathematical skills increased, their percentage was the highest of all the ten locations that a program was conducted.*
- *Self-perception in ability to do math and science improved*
- *A strong increase in STEM identity*

Strategies found most important in facilitating STEM identity impacts

Next, the same partner representatives were asked which strategies, if any, they found most important in facilitating the STEM identity impacts detailed on the previous page. As shown in Figure 15, those who shared a response generally found all of the strategies relatively important in facilitating the impacts they had identified, although they tended to point to some strategies more than others.

Figure 15. *SciGirls* Seven strategies partner representatives found most important in facilitating STEM identity impacts (n=19)



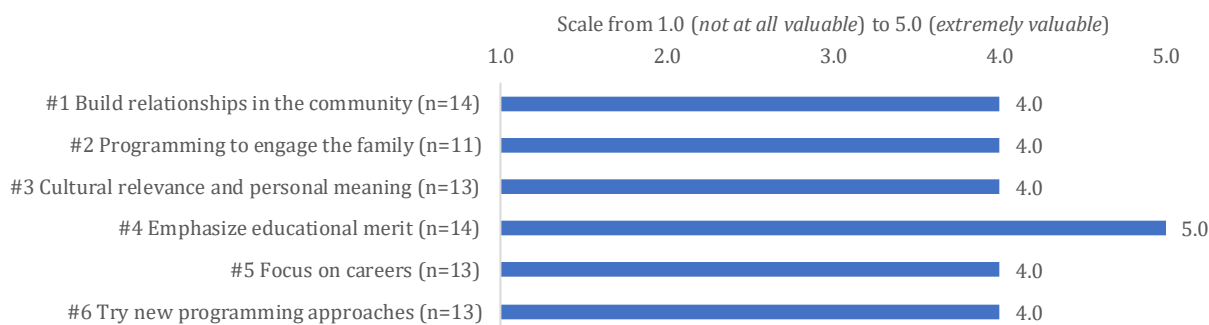
Specifically:

- Around two-thirds of the partner representatives pointed to strategies #3 Having girls participate in hands-on, open-ended projects and investigations (68%) and #5 Giving girls specific, positive feedback on their effort, strategies, and/or behaviors (63%).
- Slightly smaller groups pointed to strategies #1 Having girls collaborate/work together (58%), #6 Encouraging girls to think critically (58%), and #7 Having girls develop relationships with role models or mentors (58%).
- Fewer than half each pointed to strategies #4 Having girls approach projects in their own way (47%) and #2 Having girls work on a project designed to be personally relevant and meaningful to them (42%).
- In addition, some partner representatives went on to explain that they found all seven strategies *most important* in this regard (33%), with a few describing the set of strategies as “*necessary*,” “*intertwined*,” and “*effective*.”

Part 4. Prior use and perceived value of the *Engaging Latino Families* strategies

Between 11 and 14 partner representatives rated the value of the six *Engaging Latino Families* (ELF) strategies on a scale from 1.0 (*not at all valuable*) to 5.0 (*extremely valuable*) each, with remaining partner representatives indicating that they didn't use a strategy in each case. Figure 16 shows partner representatives' median ratings of each of the six ELF strategies.

Figure 16. Median ratings of how valuable partner representatives found the *Engaging Latino Families* strategies



Among those who shared ratings, partner representatives generally found one strategy (#4 Emphasize the program's educational merit) *extremely valuable* (*Mdn* = 5.0), while the remaining five strategies were all generally found to be *very valuable* (*Mdn* = 4.0 each): #1 Build relationships in the community and establish trust; #2 Offer programming that engages the entire family; #3 Integrate experiences that are culturally relevant and personally meaningful; #5 Include a focus on careers; and #6 Willingness to try new approaches for programming.

Part 5. Prior experience with other gender equitable or culturally responsive strategies

Most of the partner representatives said they hadn't used other gender equitable or culturally responsive strategies beyond the *SciGirls Seven* and ELF strategies (80%). Some of those who indicated they used other strategies went on to provide additional information. Two partner representatives said they used (and continue to use) growth mindset recommendations, and one person cited Carol Dweck's work in this area but did not point to a specific publication. As the partner representatives noted, "*This [research] is important because [youth] will need to learn how to adapt to changes in their lives and doing so with a positive 'can do' attitude will make the world of difference to many of the kids I work with*" and "*Girls need to know that the effort they put in will work to their benefit.*" Both partner representatives also thought the topic was included, to some extent, in the research behind the current *SciGirls Seven* but that "*it builds on the foundation of the SG, so maybe just adding or tweaking the wording would incorporate it.*"

One partner representative described using communication strategies from the [National Academy of Engineering's *Changing the Conversation*](#), saying, "*Messaging is critically important - using the word create instead of build, for example, engages girls in a different and more positive way... Would be great to have a SciGirls strategy about avoiding the 'geek and nerd' language too...that sure doesn't excite girls!*" This individual added that s/he thought these examples "*could easily be incorporated*" into the *SciGirls Seven*.

Finally, two partner representatives commented on the structure of their existing programming, with one pointing to the value of afterschool initiatives and the other describing their organization's all-girls environment. In both cases, they noted that these programming decisions fit well with *SciGirls* but didn't fully address if and how they might be incorporated into the *SciGirls Seven*. Their responses are shared below.

- *Create after school opportunities for students to learn important life skills...Students build a relationship with their school after the typical school day ends...[this is based on] own experience and research about the importance of after school programs...Using after school programming with the SciGirls curriculum would be a great benefit to youth since the curriculum is well outlined and easy to learn!*
- *For our organization, the core strategy we have is an all-girl, safe environment. We serve only girls, so we focus on gender specific programming and culturally responsive to all girls. We stand firmly in the proven strategy of gender specific programming, its benefits and impact on the girls' futures... This strategy is researched and proven...I think the strategies are certainly similar, however, SciGirls programming is offered to all children in different environments.*

Part 6. Suggestions for *SciGirls Seven* revisions, additions, and other recommendations

6.1 Proposed revisions

When invited to suggest revisions to the *SciGirls Seven*, one partner representative commented on the importance of cultural responsiveness and "*Awareness that different cultural backgrounds may require variations in approach. E.g. the Latino community seems to be somewhat hesitant to engage easily in community projects. There needs to be development of trust in these communities.*" Though not specific to the strategies, a second partner representative noted that his or her middle school girls thought the characters in the *SciGirls* show and activities seemed a bit young, saying, "*They feel that the characters appeal more to elementary age girls, however, once involved in the activities, [they] feel they're age appropriate.*"

6.2 Proposed additions

When invited to suggest additions, one partner representative commented on the value of incorporating cultural responsiveness, adding, "*but I struggle with how...*" Another pointed to the importance of specific language choices (as in, "*Is there a way to include explicit language and gender equitable teaching strategy language for educators? Like making sure they are clear to all about why we are focusing on girls. I guess more advocacy and updated language and research about women in STEM fields and more historical references available about the history*

of women in STEM”), and a third commented on language choices with girls (repeating an earlier comment shared in Part 5 about messaging, using the word ‘create’ instead of ‘build,’ and avoiding “geek and nerd language”).

6.3 Other proposed recommendations

The opportunity for partner representatives to “think outside the box” and share additional recommendations was included in the front-end evaluation survey in an effort to leave open the possibility of changes to the *SciGirls Seven* beyond updates or modifications. When asked if they had other recommendations to share, two of the partner representatives suggested TPT create and offer programming for younger youth (as in, “*We find that by working with girls in pre-school, we can set the path for them to explore as they grow. By exposing girls to STEM programming at these very young ages (safely of course), we believe it opens their minds to options, promotes critical thinking and inspires them to grow with STEM as a core component of learning*”) and one suggested TPT share updated statistics/national numbers (as in, “*Has the needle moved at all in the past seven years?*”).

Discussion

The overarching goal of *SciGirls CONNECT*² is to “investigate the hypothesis that STEM programs that use gender equitable and culturally responsive strategies contribute to girls’ positive STEM identity development, including their sense of self-efficacy, persistence and aspirations around future STEM careers” (NSF proposal, project description). As detailed elsewhere in the project description, the evaluation team’s role in *SciGirls CONNECT*² is “to gather, analyze and summarize data that can facilitate the project’s effort to revisit, refine and expand the *SciGirls Seven* and related strategies...[prioritizing] methods that are interactive and iterative in nature over the grant period.”

To that end, this front-end evaluation of *SciGirls CONNECT*² presents background and baseline information about 30 partner representatives from 16 partner organizations. Their feedback is shared in three main areas: 1) background, prior STEM programs, and plans for *SciGirls CONNECT*²; 2) use and perceptions of the *SciGirls Seven*; and 3) use and perceptions of the *Engaging Latino Families* (ELF) strategies and other gender equitable and culturally responsive strategies.

Below, we look across the findings to briefly summarize a few issues in these areas that might help inform the project’s effort to “revisit, refine, and expand the *SciGirls Seven* and related strategies.” With that being said, caution should be taken in drawing broad implications from the findings given the inherent goals and limitations of front-end evaluations, with the evaluation design in this case relying on a sample of 30 educators to provide feedback, 28 of whom had used the *SciGirls Seven* to varying degrees.

Partner background, prior STEM programs, and plans for *SciGirls CONNECT*²

Partner representative background

Role at organization

The majority of partner representatives identified as program leaders (63%), with smaller groups saying they were educators (20%) or describing other roles (17%). In a few cases, the role of program leader seems to have been shared by two individuals, perhaps indicating a greater-than-anticipated involvement in their respective *SciGirls CONNECT*² projects.

Years at organization

The partner representatives also reported varying years of experience at their respective organizations, with more than half having between 0 and 4 years of experience (57%) and nearly half having 5 or more years of experience (43%). Moving into the Year 1 post-program survey and interview phase of the project, the evaluation team will also gather information regarding the length of time partner representatives have been using the *SciGirls Seven* as well as their experience in the field more generally, to help further contextualize their feedback.

Partner organization programming

Prior STEM programs implemented at organization

Considering their STEM programs for youth within the past three years, most of those who held *SciGirls* programs indicated that they were attended by at least 60% girls (91%), while most of those who held other STEM programs indicated they were attended by boys and girls (75%).

Reflecting on their STEM programs for youth in the past year, the largest groups of partner representatives reported that they held programs that were all-girls or majority girls (76%). The largest groups further reported that their programs were attended by middle school youth (97%) or elementary and younger (66%), residing in urban (66%) or suburban areas (45%). In each case, the majority of partner representatives also described working with at least some Hispanic youth (59%) and/or working with youth of other minorities in the past year (72%). Though these estimates were based on the partner representatives' personal recollections, and not on any form of program reporting, their responses indicate a focus on the project's target demographic of middle school girls from diverse backgrounds in both all-girls and co-ed informal STEM education programs.

Barriers to STEM engagement experienced by participants in prior STEM programs

All of the partner representatives indicated that at least some of the youth in their STEM programs over the past year had: low exposure to STEM role models/mentors, low-to-moderately-low socioeconomic status, low knowledge of STEM fields, low parental/guardian

knowledge of STEM fields, and/or came from non-STEM identifying families. The majority in each case also said at least some of their youth had low English proficiency and/or had parents/guardians with low English proficiency. As in the previous section, although these estimates did not come from any form of program reporting, they generally fit TPT's expectations of the types of audiences served by *SciGirls* programs.

Extent to which prior STEM programs incorporated components relevant to SciGirls CONNECT²

When asked to rate the extent to which their STEM programs over the past year included eight components relevant to *SciGirls CONNECT²*, the partner representatives' ratings indicated that their programs used some components more than others. While the group as a whole didn't use any one component to *a great extent*, there were four components they thought their programs incorporated *to a considerable extent*: focusing on enhancing youths' STEM identity, exposing youth to STEM role models, addressing youths' knowledge about STEM fields, and integrating the *SciGirls Seven*. Elsewhere in the survey, when a subgroup of the partner representatives commented on *why* they considered the *SciGirls Seven*, the majority described the strategies as being aligned with their organizational mission (71%) and a smaller group explained that their use felt natural or like second nature (21%). Taken together, this feedback indicates the partner organizations are well-positioned to provide iterative feedback throughout *SciGirls CONNECT²*, particularly with respect to the goal of revisiting, refining, and expanding the *SciGirls Seven* and related strategies.

Program components that the partner representatives reported they used *to some extent* included showing youth culturally and linguistically relevant STEM media, offering opportunities for family participation, and addressing parents/guardians' knowledge about STEM fields. Meanwhile, they indicated their programs included opportunities for youth-created videos *to a little extent*. As explained by one of the partner representatives, "*We don't use video taping of our experiences enough. I think it's mainly because we don't always have the equipment. Our adults have cell phones, we don't always have the space. Honestly, we really never focused on making video media that often. It just wasn't a priority.*" Given the partner organizations' likely (and, in some cases, required) inclusion of these elements in their *SciGirls CONNECT²* programs, this feedback will be particularly useful to have for comparison with the post-program evaluation surveys.

Program types planned for SciGirls CONNECT²

Half of the partner organizations indicated that they were planning more than one type of program as part of *SciGirls CONNECT²* (50%). Of the 16 partner organizations, most planned to implement a summer program (87%). The majority also planned afterschool programs (67%), and a few planned other types of programs (13%). This diversity of program types is likely expected by TPT, particularly given the range of partner organizations, including science centers, universities, afterschool programs, PBS stations, and community-based organizations. Additionally, it is possible that some selected multiple types of programs in their surveys because they weren't sure what they would be planning for Year 1 of *SciGirls CONNECT²*.

Partner use and perceptions of the *SciGirls Seven*

Individual *SciGirls Seven* strategies

The evaluation sought partner representatives' feedback on each of the *SciGirls Seven* strategies at various points in the survey, which – when combined and looked at by individual strategy – amount to considerable feedback on each strategy's value, use relative to other *SciGirls Seven* strategies, and impact on both specific key outcomes envisioned by TPT and girls' STEM identity more broadly.

Perceived value and outcomes of individual strategies

The partner representatives' feedback on the perceived value and impact of each of the seven strategies is summarized below.

#1 Having girls collaborate/work together: Overall, partner representatives found strategy #1 *extremely valuable* and most confirmed that they saw it result in a key outcome TPT envisioned for the strategy, namely *energizing girls* (88%), as in, “*The girls love to brainstorm together and solve problems as a team. All the girls take on certain roles that help them fit into the group and participate in their own way.*” A somewhat smaller group, but still a majority, also pointed to this strategy being among the most important *SciGirls Seven* strategies for facilitating the STEM identity impacts they observed among girls (58%).

#2 Having girls work on a project designed to be personally relevant and meaningful: Overall, partner representatives found strategy #2 *extremely valuable* and most confirmed that they saw it result in a key outcome TPT envisioned for the strategy, namely *motivating girls* (92%), as in, “*This is extremely important. Because these girls have not understood science to be relevant for their lives, it is imperative to demonstrate that relevance to them in order to engage them and encourage them to participate. If we do not do this we lose them.*” A somewhat smaller group, about two-fifths of the partner representatives, also pointed to this strategy being among the most important *SciGirls Seven* strategies for facilitating the STEM identity impacts they observed among girls (42%).

#3 Having girls participate in hands-on, open-ended projects and investigations: Overall, partner representatives found strategy #3 *extremely valuable* and most confirmed that they saw it result in a key outcome TPT envisioned for the strategy, namely *helping girls enjoy participating* (80%), as in, “*They test their materials, visit the materials table, and continue with the engineering process. They get to be challenged, but comment that it is a good way to be challenged.*” A slightly smaller group, about two-thirds of the partner representatives, also pointed to this strategy being among the most important *SciGirls Seven* strategies for facilitating the STEM identity impacts they observed among girls (68%).

#4 Having girls approach projects in their own way: Overall, partner representatives found strategy #4 *very valuable* and the majority confirmed that they saw it result in a key outcome TPT envisioned for the strategy, namely *motivating girls* (70%), as in, “*Yes - when there is no one ‘right way’ they get excited to try and test and play and create and redesign.*” Just under half also pointed to this strategy being among the most important *SciGirls Seven* strategies for facilitating the STEM identity impacts they observed among girls (47%).

#5 Giving girls specific, positive feedback on their efforts, strategies, and/or behaviors: Overall, partner representatives found strategy #5 *extremely valuable* and most confirmed that they saw it result in a key outcome TPT envisioned for the strategy, namely *improving girls’ confidence* (89%), as in, “*Yes. Many of the girls we work with are from underserved backgrounds and may or [may not] have a strong support network. Providing positive feedback and encouragement not only motivates them to achieve, or gives them confidence to know that they are learning, growing, smart & capable of anything they set their minds to.*” A group of about the same size also pointed to this strategy being among the most important *SciGirls Seven* strategies for facilitating the STEM identity impacts they observed among girls (63%).

#6 Encouraging girls to think critically: Overall, partner representatives found strategy #6 *extremely valuable* and the majority confirmed that they saw it result in a key outcome TPT envisioned for the strategy, namely *improving girls’ confidence and trust in their own reasoning* (71%), as in, “*It’s amazing to watch them go from ‘I can’t’ to ‘I did’. They learn that not getting the right answer every time is ok and part of the learning process and that there isn’t one way to accomplish things.*” More than half also pointed to this strategy being among the most important *SciGirls Seven* strategies for facilitating the STEM identity impacts they observed among girls (58%), and one elaborated that s/he thought this strategy was best used in a group setting, as in, “*Yes....but doing it in a team fashion and not focusing on one individual is best. You don’t want...girls who are struggling with a concept to feel inferior.*”

#7 Having girls develop relationships with role models or mentors: Overall, partner representatives found strategy #7 *extremely valuable* and most said they saw it result in a key outcome TPT envisioned for the strategy, namely *inspiring and motivating girls* (90%), as in, “*it puts a real face to something that they would like to accomplish,*” although some explained elsewhere in their surveys that they had trouble locating role models and others noted that their youth “*get to ask questions to the presenter, but do not have an opportunity to build a relationship with them.*” A smaller group, but still a majority, also pointed to this strategy being among the most important *SciGirls Seven* strategies for facilitating the STEM identity impacts they observed among girls (58%).

Looking across the partner representatives’ individual strategy responses, the findings indicate that the group generally found each of the seven strategies *very* or *extremely valuable* and the majority reported that they had observed each strategy result in a key outcome that TPT envisioned for that strategy.

Many partner representatives further reflected that they had seen each strategy facilitate STEM identity impacts among girls, although the groups’ responses suggest that they

observed some strategies impact STEM identity more than others, particularly strategies #3 Having girls participate in hands-on, open-ended projects and investigations (68%) and #5 Giving girls specific, positive feedback on their effort, strategies, and/or behaviors (63%), as detailed above. Given that the front-end survey asked which strategies, if any, the partners found most important in facilitating the impacts they observed, most of the partners pointed to a strategy or strategies but did not elaborate on their selections. This may be a useful area for further follow-up in the post-program surveys and interviews.

Similarly, although the front-end survey invited partner representatives who did *not* observe the envisioned impacts to explain *why not*, the feedback provided was somewhat limited. One of the partner representatives mentioned that their girls hadn't received this kind of encouragement before, another said their girls were already confident in their abilities, and a third said their girls tended to approach projects "*in whatever manner*" they were presented. Here again, probing the *no* responses more deeply could be an important priority for the post program surveys and interviews.

Strategies used most and least often

The above findings indicate that the partner representatives generally found each of the seven strategies valuable, successful in meeting key envisioned outcomes, and impactful in facilitating STEM identity. When asked about their relative use, however, the partner representatives indicated that they tended to use some strategies more or less often than others.

Most frequently the partner representatives pointed to using two strategies the **most**: #3 Having girls participate in hands-on, open-ended projects and investigations (57%) and #1 Having girls collaborate/work together (50%), with some partner representatives describing girls' positive responses to these strategies (as in, "*[Strategy #1] has helped them in working together in small groups and allow them talk about their ideas and knowing that each girl's contribution are valued. [Strategy #3] was very beneficial as well. They were able to ask questions, explore issues, topics, use their imagination and invention*") or citing their ease of use (as in, "*easiest to implement*"). Smaller groups (4% - 21%) said they used each of the five remaining strategies most often.

As for those strategies used **least**, half of the partner representatives pointed to strategy #7 Having girls develop relationships with role models or mentors (50%), while much smaller groups (0% - 11%) pointed to each of the six remaining strategies. As mentioned above, some of those who reported using strategy #7 least often noted that this was because they had trouble finding role models (including "*mentors who represent the ethnicity of the groups we work with and who are available at times when we meet with students*") or that their youth didn't have enough time with the role models to develop a relationship.

While the partner representatives' feedback on their most and least used strategies offers some insight into their practical value, it is also important to note that the question posed to the group was open ended, not tied to any specific context, and exploratory, which led to some strategies receiving little or no mention in the survey format. Moving into the Year 1 post-program phase of the project, the evaluation team will have an opportunity to gather more

information about the partners' use of the strategies through both surveys and interviews. Factoring in the above question limitations, the evaluation team will seek a more nuanced way to assess the relative frequency with which the partner representatives use the strategies, to the extent that frequency of use is still deemed a relevant way of looking at the strategies.

SciGirls Seven strategies overall

In addition to eliciting partner representatives' feedback on each of the individual *SciGirls Seven* strategies, the evaluation also sought their perspectives on the strategies in a broader sense, both in terms of how they considered the strategies in planning and implementing their programs and the types of STEM identity impacts, if any, they observed among girls as a result of using the strategies. Their responses to these broader questions are summarized below.

How the SciGirls Seven were considered

When asked to describe *how* they considered the *SciGirls Seven* when planning and implementing STEM projects and experiences for girls, the partner representatives generally commented on *how*, *why*, and/or *when* they considered the strategies. Among those who addressed *how*, the majority described using them synergistically or as a set (57%). Similarly, elsewhere in the survey, some of the partner representatives explained that they found all seven strategies *most important* in facilitating an impact on girls' STEM identity (33%), with some describing the set of strategies as "*necessary*," "*intertwined*," and "*effective*." In yet another section of the survey, when asked which strategies they used most often, a few of the partner representatives said all of the strategies were embedded to an equal extent in their programming (7%). With all of this in mind, moving into the Year 1 post-program surveys and interview, the evaluation team intends to further gather program representatives' feedback on how they see the strategies work in relationship to one another.

While the majority of the partner representatives addressed *how* they considered the *SciGirls Seven* (70%), many instead or also addressed *why* or *when* they used the strategies. The full wording of the question is shared below to show the examples and additional guidelines provided, which may have influenced partner representatives' responses:

Please describe how you consider the *SciGirls Seven* strategies when planning and implementing your STEM projects or experiences for girls. For example, do you typically use one or more specific strategies consistently, all 7 strategies synergistically/as a set of strategies, or do you find individual strategies useful in different applications? ***Please realize there is no right or wrong answer here, we are just trying to better understand how educators tend to think about and practically use the strategies. Feel free to describe any other ways that you consider the strategies that we haven't thought of as well!*

It is possible that the additional probes confused some partner representatives, resulting in nearly a third of the group giving responses that didn't reflect the intended question. Additionally, it is possible the question guidelines provided language references the partner representatives might not have otherwise used, such as "synergistically/as a set," a concept that more than half of the group referenced in response to this question, although the idea was also mentioned elsewhere in some of their surveys, as noted above. While the probes

were added to help clarify the inquiry, this question would probably be better asked in an interview format.

Moving into the Year 1 post-program phase of the project and the development of the post program surveys and interviews, it will be important to build in questions that explore partners' views of the relationships between the strategies, while also ensuring the questions are clear and carefully worded so as not to lead the partners into specific response options.

Impact of the SciGirls Seven on girls' STEM identity

Recalling the background section of the report, it is noteworthy that, as a group, the partner representatives reported that their programs within the past year focused on enhancing youths' STEM identity *to a considerable extent*, suggesting that their organizations' recent programming efforts were already aligned with this goal. As a result, the partner representatives will likely be well-positioned to observe STEM identity impacts throughout their *SciGirls CONNECT*² programs, just as they were able to reflect on this issue for their previous year of programming.

To help frame the partner representatives' front-end responses relating to STEM identity, the survey gave them the definition of STEM identity used by the *SciGirls CONNECT*² research team in their correspondence with TPT and the partner organizations:

"STEM identity integrates confidence, interest and motivation around STEM, and ultimately affects choices, behaviors, persistence and perceptions of STEM careers and STEM professionals."

In response, most of the partner representatives indicated that they observed an impact on girls' STEM identity as a result of using the strategies (91%). Notably, their responses also pointed to confidence, interest in and engagement with STEM, behavior (particularly in asking questions), and interest in and perceptions of STEM careers and professionals. Specifically, the majority said they saw an increase in girls' confidence (53%), as in, *"I have seen girls' confidence go up significantly. Shy girls by the end of 2-6 week programs are vocal and will to take risks in finding a solution to a given problem."* Others observed an impact on girls': engagement with or interest in STEM (42%), interest in STEM careers/professionals (37%), and/or asking questions and thinking critically (26%).

While most partner representatives reported that their use of the *SciGirls Seven* impacted girls' STEM identity in some way, one-tenth (9%) indicated they did not observe these impacts. Due to length, the survey did not probe *why not* in these cases, but this could be an area for follow-up in the post-program reflections. Another area of potential follow-up is the nature of the relationships partner representatives see between the individual strategies and observed STEM impacts, and, in particular, whether they feel some strategies are more or less facilitative of STEM identity than others, and why.

Suggestions relating to the SciGirls Seven

Between two and five partner representatives answered each of the three questions about proposed revisions, additions, or other recommendations for the *SciGirls Seven*. Though most declined to suggest revisions or additions, a few commented on the importance of cultural responsiveness, the development of trust in partners' communities, and the best communication strategies to use with educators and youth. At the same time, the opportunity for partner representatives to "think outside the box" and share additional recommendations was included in the survey in an effort to leave open the possibility of changes to the *SciGirls Seven* beyond updates or modifications. Though relatively few shared additional feedback in this area, one expressed a desire for materials for younger girls and another cited the need for updated statistics (as in, "*Has the needle moved at all in the past seven years?*").

Given that these three questions were asked at the end of the pre-program survey, it is possible that some of the partner representatives declined to respond as a result of survey fatigue given the number of in-depth questions they had already answered about the strategies. It is also possible that some may not have had an opportunity to reflect closely on the *SciGirls Seven* prior to completing the front-end survey, and that they will be better-equipped to share suggested revisions, additions, and other recommendations after conducting their Year 1 *SciGirls CONNECT*² programs with an eye toward their use of the strategies. To that end, the evaluation team intends to explore this topic in the post-program surveys and interviews, and will continue to share pertinent feedback with TPT as partners complete their Year 1 programs and evaluation requirements.

Partner use and perceptions of the ELF strategies and other gender equitable and culturally responsive strategies

Engaging Latino Families (ELF) strategies

Partner representatives generally found one strategy (#4 Emphasize the program's educational merit) *extremely valuable*. The remaining five strategies were all generally found to be *very valuable*: #1 Build relationships in the community and establish trust; #2 Offer programming that engages the entire family; #3 Integrate experiences that are culturally relevant and personally meaningful; #5 Include a focus on careers; and #6 Willingness to try new approaches for programming. However, in each case fewer than half of the 30 partner representatives reported using each strategy. Further evaluation would be needed to determine why and when educators use – or do not use – the ELF strategies, although the partner representatives' limited responses on this topic point to some possible explanations. For example, some indicated that they have not used the ELF strategies because they aren't applicable to the girls and families they work with (as in, "*We don't have a large Latino population and have not taken advantage of these resources. I have shared with teachers/families that they are available*"). At the same time, it is possible that others have declined to use the strategies because they are already familiar with these techniques. As noted by an educator coordinating *Latina SciGirls* programs, in explaining why their organization doesn't use the ELF strategies (Knight Williams evaluation forthcoming), "*We are content with our*

current family involvement strategies, and felt that the guide provides basic recommendations. Our program is at a stage where we need more than basic strategy integration.”

Other gender equitable or culturally responsive strategies

Though most of the partner representatives said they hadn't used other gender equitable or culturally responsive strategies beyond the *SciGirls Seven* and ELF strategies (80%), a few commented on the value of growth mindset recommendations, and one person cited Carol Dweck's work in this area but did not point to a specific publication. Among the many promising resources available on this topic are "[Mindsets that promote resilience: When students believe that personal characteristics can be developed](#)" (Yeager and Dweck) or "[Mindset and math/science achievement](#)" (Dweck). Both partner representatives thought the topic was included, to some extent, in the research behind the current *SciGirls Seven* but that it could be included more explicitly.

One representative described using communication strategies from the [National Academy of Engineering's Changing the Conversation](#), saying, "*Messaging is critically important - using the word create instead of build, for example, engages girls in a different and more positive way...Would be great to have a SciGirls strategy about avoiding the 'geek and nerd' language too...that sure doesn't excite girls!*" This individual added that s/he thought these examples "*could easily be incorporated*" into the *SciGirls Seven*.

Although relatively few partner representatives provided feedback about other gender equitable or culturally responsive strategies, the evaluation team intends to probe this topic in the post-program surveys and interviews. As expressed by a partner representative who has already provided feedback about his or her Year 1 *SciGirls CONNECT*² program, an educator who relies on summarizing resources like the *SciGirls Seven* postcard, and who may not read (or fully recall) more in-depth resources like the complete guide, could benefit from having supporting ideas included more explicitly in the strategies (with this person specifically referencing the topic of growth mindset). Among the partner representatives, most reported that they used the *SciGirls Seven* complete guide (78%), and a majority pointed to using the *SciGirls Seven* two-page reference (67%). Smaller groups described using the gender equity training (37%) and the *SciGirls Seven* postcard (30%), among other responses. Further evaluation efforts would be needed to determine how often other educators (that is, other than the partner representatives, whose organizations were selected for *SciGirls CONNECT*² in part because of their familiarity with *SciGirls* and the strategies) use the same *SciGirls Seven* resources, and if the more in-depth resources are used as frequently among this group.

Appendix 1:

SciGirls Seven two-page reference



The SciGirls Seven

Proven Strategies for Engaging Girls in STEM

The **SciGirls** approach—for the TV show, website, and educational materials—is rooted in research about how to engage girls in STEM. A quarter of a century of studies have converged on a set of common strategies that work, and these have become **SciGirls**' foundation. We call these strategies the **SciGirls Seven**.

- 1. Girls benefit from collaboration, especially when they can participate and communicate fairly.** (Parker & Rennie, 2002; Scantlebury & Baker, 2007; Werner & Denner, 2009)

Girls are energized by the social part of science—working and learning together. Provide opportunities for small group work, and encourage girls to talk about their ideas and consider all possibilities before digging in. Make sure discussions remain respectful and inclusive, and that each girl's contributions are valued. Girls are likely to remember not only what they learned, but also how they felt when they learned it.

“Whenever you come together with a team, you can find the answer to any question.”

Josie, age 12
- 2. Girls are motivated by projects they find personally relevant and meaningful.** (Liston, Peterson & Ragan, 2008, Lyon & Jafri, 2010; Mosatche, Matloff-Nieves, Kekelis, & Lawner, 2013; Patrick, Mantzicopoulos, & Samarapungavan, 2009; Thompson & Windschitl, 2005)

Girls become motivated when they feel their project or task is important and can make a difference. Support them using STEM as a tool to explore issues or topics they care about. If they see how STEM is relevant to their own lives and interests, their attraction to these subjects is likely to increase.
- 3. Girls enjoy hands-on, open-ended projects and investigations.** (Chatman, Nielsen, Strauss & Tanner, 2008; Denner & Werner, 2007)

SciGirls promotes exploration, imagination, and invention. Encourage your girls to ask questions and find their own paths for investigation.

For more information, go to scigirlsconnect.org



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4. Girls are motivated when they can approach projects in their own way, applying their creativity, unique talents, and preferred learning styles. (Calabrese Barton et al., 2013; Calabrese Barton, Tan, & Rivet, 2008; Eisenhart & Finkel, 1998; Lyon & Jafri, 2010)

Encourage girls to develop their own ways of exploring and sharing knowledge, paying attention to the unique learning styles that motivate your group. You may be surprised by what creative, exciting approaches girls come up with when designing investigations, collecting data, and communicating results.

5. Girls' confidence and performance improves in response to specific, positive feedback on things they can control—such as effort, strategies, and behaviors. (Blackwell, Trzesniewski, & Dweck, 2007; Dweck, 2000; Halpern et al., 2007; Kim et al., 2007; Mueller & Dweck, 1998)

Self-confidence can make or break girls' interest in STEM. Foster their efforts, compliment their strategies for problem solving, and let them know their skills can be improved through practice. Celebrate the struggle. Wrestling with problems and having experiments fail is a normal part of the scientific process!

6. Girls gain confidence and trust in their own reasoning when encouraged to think critically. (Chatman, Nielsen, Strauss & Tanner, 2008; Eisenhart & Finkel, 1998; Kim et al., 2007)

Cultivate an environment in which asking questions and creative thinking are a must. Throughout the centuries, this same trust in logic and re-examination of ideas made advances in science, technology, and engineering possible.

7. Girls benefit from relationships with role models and mentors. (Holmes, Redmond, Thomas, & High, 2012; Liston, Peterson & Ragan, 2008; Lyon & Jafri, 2010; Mosatche et al., 2013; Weber, 2011)

Seeing women who have succeeded in STEM helps inspire and motivate girls, especially when they can relate to these role models as people with lives outside of the lab. Role models and mentors not only broaden girls' views of who does science, but expand girls' vision of what's possible in their own lives.

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