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Click2SciencePD: Triangulated Evaluation

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Executive Summary

Click2SciencePD (C2S) offers "an interactive, professional development site for trainers, coaches, site directors and frontline staff/volunteers working in out-of-school time STEM programs, serving children and youth" (Click2SciencePD, n.d.). Although previous evaluation reports have documented positive experiences with C2S, there was a need for a purposeful, comprehensive evaluation of participants' long-term experiences with C2S training. To meet this need, the goal of the current project was to conduct a triangulated evaluation of participants' experiences with C2S.

Representatives of C2S collaborated with the Y-USA to recruit participants from four locations (Fort Worth, Memphis, San Antonio, and St. Louis). A small group of leaders from each location participated in C2S training put on by C2S staff in the fall of 2016. These leaders were then responsible for training 10 frontline staff at their respective locations between fall 2016 and spring 2017. The triangulated, comprehensive evaluation included interview/focus groups with site leaders and frontline staff following training, pre- and post-training observations of frontline staff using the Dimensions of Success (DoS) protocol, and collection of youth data.

Results from the interview/focus group revealed both site leaders and frontline staff had positive perceptions of their experiences with C2S training. Although each of the locations had similar and different challenges for conducting quality STEM programming, participants generally agreed that the training they received with C2S was eye opening, valuable, and helped spark youth engagement. Data from the pre- and post-training observations supported frontline staff reflections of their positive experiences. Staff selected for observations improved over time on 11 out of the 12 DoS dimensions. The last source of evidence, youth data, was not able to evaluate change in perceptions over time but did provide a snapshot of youths' perceptions of STEM. Youth in grades 3 and higher consistently indicated they had positive perceptions of broad science-related areas and were curious about science

and technology. There was inconsistency in youths' responses to questions concerning their desire for a job in science and curiosity in math and engineering.

Overall, the different sources of evidence point to the ability of C2S training to make a positive impact on frontline staff practice. Both the positive reflections expressed by frontline staff, their leaders, and the empirical evidence from the DoS showing improvement over time, support the role of C2S in helping frontline staff. Youth data demonstrates participants in programs taught by frontline staff trained in C2S have positive perceptions of broad science-related aspects. Although the results of this study are promising, they are limited due to the small, select sample. The next step in the research process is to replicate the current findings with a larger, more diverse sample of participants. This next phase will also need to consider additional means for collecting fidelity information to monitor the quality of training across different locations.

Introduction

Project Overview

Click2SciencePD (C2S) offers "an interactive, professional development site for trainers, coaches, site directors and frontline staff/volunteers working in out-of-school time STEM programs, serving children and youth" (Click2SciencePD, n.d.). To date, several evaluation reports have documented frontline staff and coach/trainer experiences with C2S (see Hawley, 2017). Overall, these reports have found participants expressed positive perceptions of their experiences with C2S materials and training. A missing element in these reports has been a purposeful, comprehensive evaluation of participants' long-term experiences with C2S training. To meet this need, the goal of the current project was to conduct a triangulated evaluation of participants' experiences with C2S.

Representatives from C2S collaborated with the Y-USA (YMCA, n.d.) to conduct C2S training with a select group of collaborating branches. As part of the agreement between C2S and Y-USA, at least two staff at either the association level and/or director level participated in 40 hours of C2S professional training (PD), ongoing calls, virtual learning opportunities, observations, trainings, and staff coaching during the school year. The two leaders selected from each location participated in a two and one-half day in-person training put on by C2S representatives. The goal of this training was to equip site leaders with the tools necessary for them to train a select group of frontline staff at their respective locations. A total of 10 frontline staff were selected to participate in C2S trainings at each site location. Leaders trained in C2S were responsible for delivering a minimum of 5 hours of training that included two 90-minute face-to-face trainings, two 30-minute coaching sessions, and two 30-minute meetings. In addition to the training requirements, each association was charged with reaching a minimum of 75 youth.

The triangulated, comprehensive evaluation used for the current project included pre- and post-training observations of frontline staff, interview/focus groups with site leaders and frontline staff following training, and collection of youth data. Each section of the report outlines the methodology used to collect the different sources of evidence and findings from each source of evidence. The report also includes a summary of the triangulated information, limitations, and next steps.

Prior to our discussion of the methodology and results, it is important to provide a contextual picture of the locations included in our sample. The contextual characteristics of the locations allow for a more comprehensive understanding of the results and potential limitations.

Site Descriptions

Although all of the locations are part of the Y-USA, it is important to acknowledge the unique context of each of the four locations when reviewing the results of the evaluation. Please note that contextual summaries are based on interviews with a small number of representatives from each location and the evaluators own experiences at sites selected for direct observation, so summaries may not be fully representative of the contextual setting of each location.

Fort Worth

Participants represented two Y-USA branches within the larger Forth Worth association. Across these two branches, participants from two schools and one YMCA branch location were sampled for the frontline staff observations. Although the two branches shared the common goal of increasing staff awareness of STEM, the context and challenges faced by the each of the branch sites differed. For instance, one location was a small branch with only three full time individuals. Due to the small size, the director at this branch reported coordinating afterschool, summer camp, food grant programs, a teen tech club and a teen leadership group as well as other duties such as payroll and staffing. In addition to the challenges of coordinating several components with a small staff, the director noted that the majority of

youth served at the branch location qualify for free and reduced lunch and a larger number of youth have risk factors related to mental and behavioral disorders. An additional factor that makes this site unique compared other afterschool settings is that youth are collected from individual schools each day via bus and brought back to the YMCA branch location for programming. According to the branch director, age groups served at this location included youth in PK-5th grade, with the large majority of youth in second grade or lower.

The director from the other branch location had more staff (about 12) with an additional designated coordinator to support afterschool and summer camp activities. This larger branch location serves about 600 youth in their combined afterschool programs and about 500 for summer programs. Youth served from this Y-USA location participated in programming at their physical school. School sites served by this branch vary in terms of qualifications for Title I funding as deemed by the percentage of youth who qualify for free and reduced price lunch. Additionally, the site director noted variability in the degree to which school administrators support their afterschool programming efforts. The director pointed out that one of the afterschool programs with stronger principal support has almost doubled enrollment in the last year from about 30-40 youth to 60-70. One of the challenges faced by this branch is staff turnover. The site director mentioned that one school in particular was able to retain their most experienced staff member but this staff member had changes to about 50% of the staff who worked under her. According to the branch director, age groups served at this location included youth in K-6th grade, with the large majority of youth in 4th grade or lower.

Memphis

One main Y-USA association serving multiple schools in the greater Memphis area was included in the sample of participants. According to the regional coordinator, age groups served across the schools included in the main sample included youth 5-12 years of age, with the majority of youth in

second grade or lower. Participants from three elementary schools were sampled for frontline staff observations. Of the three schools included in our observation sample, only one qualified for Title I status as designated by their percentage of youth eligible for free and reduced price lunch. Youth who participated in Y-USA programming at one of these three schools participated at the same school they attend during the normal school day.

One of the unique aspects of this location is the degree to which the association has been working to invest more in STEM. The regional coordinator noted the association had tried to bring in more STEM opportunities in the past year but individuals were not latching on to the idea of STEM. To address this challenge, the association collaborated with C2S and another STEM learning community called Techbridge (http://www.techbridgegirls.org/) to provide STEM related PD for staff. Staff who participated in the Techbridge training had about 25 hours of STEM PD training in Houston and formed a STEM learning community with additional staff once they returned to Memphis.

San Antonio

One main Y-USA association serving multiple schools/locations in the San Antonio area was included in our sample. Participants from one school and two community center locations were sampled for the frontline staff observations. One of the locations selected for inclusion in the observation sample was an advanced learning academy serving youth from 4^{th} – 12^{th} grade. According to the academy's website, youth served through this academy should be open to academic challenges and accelerated learning. Youth have to apply for inclusion in this academy but they do not have to pass any one test to be admitted. The other two locations selected for inclusion were community centers located within public housing communities overseen by the San Antonio housing authority. According to one of the program directors, age groups served across the three locations sampled included youth from 4^{th}-8^{th} grade, with the large majority (94%) of youth in fifth grade or higher.

A unique aspect of the locations selected for observations from the sample from San Antonio was the educational level of the youth served. As mentioned by one of the program directors, a challenge of their program is finding material to meet the advanced curiosity of some of their youth while also finding ways to spark STEM interest from youth who have less opportunity or exposure to some educational material. Another challenge mentioned by the program directors was the structure of the community center programming. At the learning academy, the Y-USA programming is offered directly at school so youth are already on location. In contrast, youth who attend the Y-USA programming at the community centers chose whether or not to show up to the community centers. There are added challenges of turnover within the youth who attend the community centers. One director noted that there is a constant rotation of youth and very few youth have attended Y-USA programming for more than a year. Directors from this location also commented on challenges related to staff retention and turnover across the association as a whole.

Another unique aspect about San Antonio was the method for delivering STEM content. San Antonio relies primarily on Tinker Crates (Kiwi Crate Inc., n.d.) as the vehicle for STEM instruction and experiences. Tinker Crates include a readymade STEM project with all of the materials, a detailed step-by-step blueprint of instructions, and additional reading materials highlighting other science experiments/activities. Some of the example crates highlighted on the company's website include building a functioning trebuchet that can launch a ping-pong ball up to 10 feet, a hydraulic claw that can lift materials, and fiber optic star constellations (Kiwi Crate Inc., n.d.). Frontline staff in San Antonio generally do not have to collect or buy materials prior to conducting a STEM activity and little to no time is need for set up because the Tinker Crate boxes include everything in a pre-packaged format.

St. Louis

One main Y-USA branch serving multiple schools within the St. Louis association was included in our main sample. According to the program director we interviewed, the program serves almost 500 youth in both before and afterschool programs across 11 elementary schools. Age groups served across the three schools sampled included youth from 5-12 years, with the large majority (57%) of youth in second grade or lower. Youth served from this Y-USA branch location participated in programming at their physical school. Participants from three schools were sampled for the frontline staff observations. Of the three schools included in our observation sample, only one school had about 50% of youth who were eligible for free and reduced price lunch rate. The other two schools had less than 20% of youth who were eligible for this program.

According to the director we interviewed, the St. Louis association began their STEM initiative about two years ago. A unique aspect of the St. Louis location was the presence of a single individual responsible for STEM related activities. Compared to the other locations included in the sample, a member of the St. Louis team has the sole responsibility of enhancing STEM opportunities across the association as a whole. This individual is responsible for aspects such as developing collaborations between schools and community partners, delivering STEM related PD opportunities and developing STEM related curriculum.

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Section I: Interview and Focus Group Feedback

The first component of the triangulated evaluation of C2S includes interviews with site or program directors/coordinators and frontline staff. The sections below provide a brief description of the overall methodology and summarize the crosscutting themes discussed by participants.

Methodology

Participants

A total of 6 interviews/focus groups were conducted with 34 individuals (5 site directors; 29 frontline staff) involved in out-of-school time (OST) Y-USA programs at four locations (Fort Worth, Memphis, San Antonio, and St. Louis). Multiple Y-USA sites were included from each of the geographic locations. Participants included site or program directors/coordinators who were responsible for C2S trainings and frontline staff who received training in C2S. Frontline staff described their professional experience in OST education as ranging from a minimum of 6 months to more than 10 years.

Procedures

Site or program directors/coordinators who were responsible for C2S trainings participated in small interview sessions. Frontline staff trained in C2S participated in larger focus group discussions. Interviews and focus group sessions lasted from 50-70 minutes and discussions were recorded for later analysis.

Interview/Focus Group Goals

The goals for this portion of the evaluation were to: (a) collect descriptive information about the OST context and use of C2S resources across the four locations and (b) identify the crosscutting themes that emerged from individuals experiences using C2S resources.

Results

This section provides the crosscutting themes that emerged across interviews with Site or program directors/coordinators and frontline staff. Across interviews/focus groups participants mentioned common challenges, positive perceptions of C2S, and critical feedback for improving C2S.

Common Challenges

In each of the interviews and focus groups, participants were asked to reflect on the common challenges they face with providing and/or participating in STEM related PD opportunities. Similar to previous findings (e.g., Hawley, 2017; Hawley and Stevens, 2016) the most commonly mentioned challenges included staff turnover and time for PD. Additional STEM related challenges mentioned by several participated included time for STEM activities and STEM buy-in.

Staff Turnover

Site or program directors/coordinators commented on the challenge of staff turnover as it relates to providing quality PD opportunities. Several individuals mentioned that their locations had recently had turnover. One individual was involved with several of the leadership discussions on this topic at her location and explained there were discussion across the association "trying to figure out what is going on." In particular, these discussions were focused on "what we need to do and what we are missing as an organization to keep people." She further commented that the association is exploring different options to help with retention because "consistency with our staff" is key and "we want to make sure we have consistent…faces every day that they [youth and parents] can rely and trust."

When asked how the challenge of turnover influences the ability to provide quality PD, site or program directors/coordinators mentioned that turnover influences their ability to build on staff skill sets and support activities like STEM programming.

"It does effect training because when you have so many new people you have to get through the basics first…emergency procedures…checking in and out…CPR and first aid….so Click2Science and all of that fun curriculum stuff gets pushed to the backburner until they [staff] have basic things covered."

This individual further commented that turnover changes the focus of PD to getting new staff members qualified to work at the sites, because without these basic aspects the new staff cannot interact with the youth. In this type of situation, the priority becomes getting staff in front of youth and then figuring out how to facilitate learning for additional curricular aspects such as STEM.

Although staff turnover is a challenge across locations, site or program directors/coordinators mentioned several methods they use to combat this challenge. The primary method mentioned by some of our leaders included shuffling frontline staff members so experienced staff pair with newer staff. Leaders from one location mentioned they use this reorganization as a chance to model their expectations for STEM practices with youth. Since locations "can't stop everything just to train that new staff, it's making sure that this is everyday an experience."

"Naturally when you have someone else starting with you, you are going to show them these things…this is where we need to stand, these are the questions we need to ask. And they [new staff] are just observing at looking at this person asking these questions and thinking maybe I should ask questions like this too."

This leader further expanded on this idea by mentioning their overall goal for addressing turnover was to change the culture of their site so "as we bring in new people our existing people are filtering how they do things down." Leaders at this particular location hope that this form of modeling will soon become the norm for their site regardless of turnover rates.

Time for PD

Another challenge discussed by several participants across multiple locations was the struggle to find time to provide and/or participate in quality PD experiences. Several frontline staff and site/program directors commented on the difficulty working around multiple schedules to either schedule PD sessions or squeeze PD into their already packed schedules. "I have a lot of programs so trying to coordinate my schedule and orchestrate their schedules for trainings and meetings is very difficult." Although most PD opportunities discussed by participants were available online, which offers the flexibility of working around their schedules, not all participants were excited about online PD opportunities. Several of the frontline staff commented that some of the online PD activities they participate in were "just more work" that they "wanted to get over with." "We do so many online modules I can't remember, we do an online module here and another one there….there's always one to do." Several participants highlighted the benefit of the face-to-face trainings they participated in for the C2S training (see below for more detail), but felt it was difficult to coordinate schedules and often expensive to pay for the training time. Even smaller, one-on-one meetings were challenging to coordinate around busy schedules often done via email.

In terms of providing PD, one site mentioned they have plans to use C2S to train additional staff but struggle to find the time or financial means to conduct extensive training. The leaders from this site noted they are wrestling with questions such as "how can we break it [the training] down?" and "since we cannot afford the entire two day training, what does an hour and a half training look like?"

Time for STEM Activities

All of the Y-USA participants commented on the difficulty of juggling the goal of providing quality STEM experiences and fulfilling the many services they have to provide for youth involved in

their programming. Everyone noted that once you cover the basics of afterschool such as homework time and snack, sometimes there was little time to pursue STEM activities.

"If we spend the whole hour on homework then we don't really get to do the STEM project."

For those trying to conduct activities before school, "youth are often coming in fresh but at different times and may be going to other activities as well." Other curricular priorities such as literacy squeeze out time for STEM curriculum by limiting activities to a single day during the week. If youth do not show up to before/afterschool care on that day then they miss STEM for an entire week. "STEM activities often are a second priority" compared to other programming areas and/or the basic aspects of afterschool that parents expect (e.g., homework time). In addition, if youth are just "rowdy" or in a bad mood that day, getting them outside or in the gym to move around can cut into STEM activity time. Several participants mentioned they often do not have time to finish some of their STEM activities because they run out of time or had to abandon the activity altogether if other factors get in the way. The shared school spaces most of the programs work in also limits the ability to provide STEM activities because the set up and/or clean-up are time consuming and "sometimes you don't have enough manpower." Conducting more extensive multiple day projects when you have shared space and/or limited time for STEM is also not an option as well because there are few places to store the materials and you only have one day of STEM a week.

Frontline staff participants also noted that preparing for lessons, even with specialized PD training, is time consuming. Some individuals shared they often collaborate on projects or common curriculum, others mentioned that they often "just do their own activities" because either things are not clear in the curriculum or a curriculum does not exist. Multiple individuals felt that even though they "spend a lot of free time" looking for additional activities and things to do, the extra preparation helped make their job much easier.

Program directors and frontline staff commented on the time and planning needed to order materials for STEM activities. "Science is my thing, but it can be hard to gather the materials for experiments you want to do. Several wished they had a set of pre-made kits available that could be shared across sites. "I feel like especially if we had ones [kits] that are simple with all of the materials listed I think more stuff could be done with STEM." "We are supposed to plan our stuff a month ahead of time, so supply wise it would be nice to have things that would help you prepare better." "Reusable experiments would be very helpful." A toolkit with a "one page explanation that tells us what we need and how to do the activity…that would be fantastic" "But make sure it [the directions] are not longer than one page because we don't have time for more than that." One of the program directors also talked about creating ready-made kits for their location.

> *"If we train them [staff] …give them tools and resources…and say 'here's a box with everything you need in it,' then it may make individuals more likely to want to implement things at their site."*

Staff from the San Antonio site noted that the ready-made Tinker Crates helped address some of the issues with preparation time because crates are "really convenient," "all the materials are inside," and you know that "95% of the time the project is going to be successful compared to other things you find on the internet." One staff member pointed out that the detailed materials help with facilitating activities because even if they do not know all of the steps for completing the project, youth are often able to reason things out by looking at pictures of the final product.

STEM Buy-in

The discussion related to STEM buy-in had multiple levels—frontline staff, youth, and parents. In terms of staff, several of the frontline staff shared they were apprehensive when they found out they would be leading STEM activities. "I am not a science person...it's hard for me to get excited about it."

Some staff felt frustrated because they "were not a science teacher." Others were more apprehensive because they had tried some STEM activities in the past and "struggled to engage kids with STEM."

> *"I wasn't very educated on it [STEM], how to implement it, how to get new ideas…so for me it was kinda a struggle since I didn't really have a lot of background on it."*

Site or program directors/coordinators were aware of the level of apprehension in their staff and acknowledged, "some were a little scared by it [STEM]."

When discussing STEM, staff mentioned their level of buy-in as well as the youth themselves. "Some kids are excited by STEM and some of them just don't want it." "Younger kids are up for anything but the older kids are bored and harder to engage, especially the older boys." Older youth are often complain and say, "why do we have to do this, this a daycare—I don't want to come here and do science stuff because I do enough in school." To address some of these challenges with youth buy-in, staff referenced some of the general techniques they learned both on the job and through C2S trainings. For instance, many staff struggle with buy-in when dealing with a group of youth with diverse ages. "We have ages from 5 to 12 so if get a kindergartener and a 4th grader, the activity can vary. The little guys lose interest and the older kids don't want to focus, also the little ones just want to go play." One solution mentioned by several participants was to pair older youth with younger. "In the videos I've seen volunteers helping, so I was like ok well I don't have extra volunteers, but let me help the kids volunteer."

> *"I have so many youth at my site I can't get the one on one time if kids have questions so I have a chain of command down—me and the group leaders and then the older kids. I often send the older kids to help with the little ones."*

"It works out great because the older kids are great with the younger kids, they want to be a helper and like one of us; it show their responsibility and how they can lead by example."

Other solutions staff members mentioned to address youth buy-in was changing the way they present the STEM projects. "One thing I learned from C2S was how I presented STEM projects, so instead of saying 'Hey guys time for STEM,' I now say 'Hey guys I have a challenge for you' and take it from there." Another staff member pointed out that "if you have materials that are already made so you can show them this is what you are going to make, then they can see what it does and they are more interested and willing to try." Staff from the San Antonio site noted that the variety of activities provided with the Tinker Crates help with youth buy-in because "it makes it really fun and interesting for the students." "They get excited to see the boxes."

Staff members shared that parent buy-in another challenge of delivering STEM programming. "According to some of our parents…STEM activities are secondary...as long as homework is done and they're picked up from school they don't care." "A lot of times parents think kids are coming just to play…they don't realize we do different things with the kids so when a kid goes home and tells the parent 'we didn't play today'…parents can get upset." Some staff members had strategies for addressing parent buy-in because they felt that interested parents could lead to youth that are more interested as well. Suggestions mentioned by staff included having someone at the door explaining to parents what youth were working on, sending pictures and projects home with youth to share with their parents, and sending follow up questions for parents to discuss with their child. For some staff members, they found that parents did not realize that they offer STEM programming so it was their job to inform them that they do more than homework.

Although some programs struggle to engage parents, staff did have positive stories to share regarding the level of parental buy-in. One participant shared that parents have watched STEM activities and say, "this is great, we love to see that our kids are doing more than just sitting at the computer lab." Others have sat down to watch their child finish activities and told the facilitator, "this is so cool….that looks like fun!"

Positive Perceptions of C2S

Participants consistently highlighted their positive experiences of C2S resources and materials. Across interviews and focus groups, there were three main themes that emerged when participants conveyed their perceptions of C2S—eye opening, utility and youth engagement.

Eye Opening

Both frontline staff and site or program directors/coordinators consistently referenced that C2S materials opened their eyes to new ways of thinking and approaching STEM concepts.

> *"I didn't really know what STEM was until a few months ago…it kind of opened my eyes and I didn't realize how much was STEM."*

C2S "opened my eyes, gave me more of an insight to what I am giving the kids can be STEM." "It [C2S] gives you a different outlook…taught me to present things more like solving a problem. It was much different, the approach was much different." C2S "helped me with my approach and how I approach the little ones….keeping them involved…asking questions…listening." Even participants with STEM backgrounds commented on the benefits of the C2S training. "I have a background in STEM and was talking to kids like 'this is the biology part of this'….since these trainings I have shifted to focus on the problem solving. I think for the most part it keeps them better engaged."

Participants admitted to being surprised by how much they enjoyed the trainings and the things they learned. “I thought it was going to be a boring day, just another training” “It [training] was fun and we learned a lot [about STEM].”

“I felt that it [Click2Science training] helped make me stronger in a lot of places I didn’t realized I was weak in.”

Both the frontline staff and site or program directors/coordinators felt that the in-person training was especially beneficial for growth. Getting to work together during the training activities and talk in groups allowed the frontline staff to reflect on “what you’ve been kinda doing wrong per se and how you can improve on it.” C2S training will “really change your perspective.” “You think it is really simple asking questions but then you realize that it’s not…so it’s really eye opening and a new perspective that helps a lot.”

“[C2S] opened the staff’s eyes to see what they were doing and how they were interacting with kids.”

“To be honest I did not know what STEM was and we’ve done these activities in the past and it was like ‘I don’t know’…but after the training and the group meetings it definitely gave me a different insight with questions and how to approach them [youth] and how to get them excited for these activities. But really I learned was STEM was and I was able to teach that to kids.”

Participants highlighted that the videos helped model several of the skills they were trying to learn. “[Video examples] helped me realized that there is a better way of asking questions.” Videos helped with modeling because “just reading it sometimes you still don’t get the concept” “We had a lot of videos so we were able to see examples of other people asking questions…I don’t know how to ask

these questions to get them [youth] thinking so I learned a lot from that." Another respondent shared that she "learned it was ok if you don't know the answer…instead of trying to ignore the question you can say I don't know but we can look it up together." Of the several modules completed by staff, most mentioned purposeful questions as the training module that they found the most eye opening and helpful.

Utility

Site or program directors/coordinators and frontline staff highlighted several aspects of C2S they found to be helpful for meeting their professional development needs. Since needs vary at different levels of training, we first highlight the trainer (those conducting training sessions) and then the trainee (those receiving training).

Site or program directors/coordinators shared several positive observations about their experiences training staff in C2S. "For me as a facilitator, it [C2S] gave me the tools to correctly facilitate STEM." "Our staff really enjoyed the videos. It really helps to have that visual."

> *"Videos were helpful especially for the training meetings…when talking to them they absorb the material but actually watching it you know they understand more because it is more realistic...they could see themselves in the videos."*

> *"So many times staff take a training and it's the theory of STEM…I felt Click2Science provided them [staff] with the actual skills of this is how you ask purposeful questions or this is an example of someone in a tinker room asking purposeful questions."*

In addition, the video resources and general content, trainers highlighted that training materials were easy to use across multiple settings. "I think it's [the training materials] beneficial in training because you already have the template you can run through really quickly before you have a meeting." "I think

it [training materials] makes someone who is maybe not so comfortable training, feel more comfortable."

Frontline staff trained in C2S also had several positive comments on their experiences. "Click2Science has been really cool, I like the activities and they are more hands-on and engaging." "The training was fun...I found out that I'm still like a kid." C2S training is "more interactive."

> *"In the Click2Science training I've been able to take back things like purposeful questions, making sure I'm hands on with a group, and also allowing the kids to feel like they know how to be in certain roles, like they can be in leadership roles."*

"Click2Science has been pretty good, they have a lot of good hands-on activities and I really think that have built some nice career pieces into it and reflections in there are really nice."

Several participants highlighted the utility of the videos for providing a deeper learning opportunity. "The videos got me excited…finding different ways and thinking about what way would work best for us and how to interest the kids." "I liked the videos, they were really cool. When we were watching the videos, we were like 'oh we can do this…or this and tweak that to make it our own'. So that was really good." "Videos, even though they were short, made good examples and I liked how they had several different age groups." In terms of usability, several staff mentioned the training modules were "pretty simple" and "straight to the point." Both trainers and trainees felt training materials were "very user-friendly", "convenient, and straightforward."

Overall, participants had positive experiences with the training process and C2S materials. "Training was great because we had a chance to practice what we learned, got feedback, and suggestions instead of 'ok that is the training, good luck,' which is what we usually get." "Our training was in a group setting with a simulation so I liked the feedback time because we were able to learn and bounce

ideas off each other. I think that is very important because you know we all got each other's perspective and were able to help each other out."

"I feel like Click2Science has really helped provide ways to get them [youth] engaged with purposeful questions and to get them doing more hands-on stuff."

Youth Engagement

Several of the frontline staff participants commented on the link between the skills they learned in their C2S trainings and youths' engagement.

"Click2Science has helped me get them [youth] more engaged…not excited yet, just interested and more curious about it [STEM]."

Multiple staff members felt the tools they picked up in training would help them "take a lot of the fear out of science and engineering and math and technology." "They [youth] don't know sometimes how much they are learning but they are because they are doing all these hands-on things [from C2S] that are actually science and math…it takes the fear out of those words." Additionally, staff felt the trainings helped with youth engagement by demonstrating alternative ways to spark curiosity in a project. "One thing I learned from Click2Science was how I presented STEM projects, so instead of saying Hey guys time for STEM, I now say 'Hey guys I have a challenge for you,' when I first present things." "If you present the activity to them [youth] like, 'Look this is what we have, do you think you can do this?…do you think you can help me do this or could you help me do this?'…it puts them [youth] in charge and they feel like they are teaching you something." "It's really easy if a kid asks you a bunch of questions to just give them the answer but it's a lot harder to get them to think for themselves or how they would solve a problem their own way."

Staff mentioned the activities introduced through the C2S trainings were generally well received by youth. "The kids really got behind them [C2S activities] more than some of the other STEM

activities we have done in the past…they dug the sandwich one we did." "It [C2S] is going to challenge the kids in areas that they have never thought of before." A program coordinator also felt that C2S was making a positive impact on youth in ways that their program had not yet been able to achieve.

> *"Knowing that they [staff] are touching lives in STEM is something we haven't done before –Click2Science helped bridge that gap and made it possible."*

Critical Feedback

In addition to the positive perceptions individuals had about their experiences with C2S, they also shared critical feedback for improvements to C2S. Participants commented on aspects related to the website and material organization as well as the C2S materials themselves.

Website and Material Organization

Similar to previous findings (e.g., Hawley, 2017; Hawley and Stevens, 2016), participants shared some frustrations with the website. "Some of the website was frustrating, especially trying to figure out the registration for the Better Kid Care." In addition to registration difficulties, other participants struggled locating the videos. "Finding the videos was a little difficult at times." One participant felt that "different things were linked so many times the material got very repetitive." A site director noted that she wished "there was a tab that had STEM activities that were already set aside and easily accessed so you don't have to dig through the website to look for things."

> *"The Click2Science website has a lot of info and a lot of wording on the page, they should clear that up and simply things so it would be easier for staff to access things quickly."*

Another aspect mentioned by participants related to the website and general organization of materials. Several individuals commented that it would be helpful if the website content were organized by age level. "Sometimes the materials were either too geared towards the older kids or too geared

towards the younger and you have to figure out how to modify it for the different age groups. Not that it has been a huge deal but it's something we have had to face." Participants requested that materials be grouped on the website so they could more easily identify and access what they need for their specific context.

> *"I would really like to see more material that is based on education levels, so that we don't have to go the extra mile figuring out how to choose what to do with youth at different age levels…I would like the materials to be based on grades and ages."*

C2S Materials

Although participants had positive comments about the training material and many wished there were more videos, not everyone was impressed and several wanted mentioned the lack of applicability to their programs. "As far as the video training- I was not super impressed. It wasn't horrible but I wasn't super interested." "I read it [training material] but it wasn't presented well and I wasn't excited about it." In terms of applicability, participants mentioned that some of the videos were hard to relate to.

> *"They had it so easy in the videos because they had staff that were engaged and knew what they were supposed to do. At my site, I have staff coming and quitting soon after so I don't have staff that are super consistent and they don't seem to care sometimes. So when watching the videos I'm like 'yeah that's great' but I can't imagine doing any of that stuff because my staff would just sit there or they wouldn't engage the kids."*

"All the children looked like they were in the same age groups…made it look easier for them to pay attention rather than having the mixed ages that I struggle with." "Most of them [videos] were in a classroom setting, so they are in a nice room…and we are in a cafeteria without a place to sit or write."

"I am in a gym cafeteria with only a chalkboard on wheels so it's hard to relate with some of the [video] settings that seem perfect."

Participants offered suggestions for improvements for the next series of videos, noting, "the videos should show how to be successful in other spaces…with distractions." "More videos of realistic situations would be helpful….like where not just one child is misbehaving but multiple children and groups not allowing you to move further." "It would be helpful if there was a video that showed techniques for how to engage the 5th grader with the kindergartener or how to utilize the older kids as mentors."

Summary: Interview and Focus Group Feedback

Summary

As demonstrated by the comments from the site or program directors/coordinators responsible for C2S trainings and frontline staff trained in C2S, there are several challenges to implementing quality STEM programming in afterschool. Leaders and frontline staff are faced with staff turnover, juggling schedules to make time for PD, balancing STEM activities with other responsibilities such as homework time, and getting STEM buy-in. Even though staff face these challenges on a daily basis, there were several success stories for how they balance these challenges with the goal of delivering quality programming to youth. In terms of C2S, both the leadership who trained staff and the frontline staff trained in C2S praised their experiences with the training. Across all participants, words such as "eye opening," "engaging," "insight," "fun," and "beneficial," were used to describe their experiences with C2S training and materials. Participants were excited to share success stories for how they used skills learned via C2S in practice and how it changed their outlook on some of the things they had been doing with their programming.

Although participants enjoyed their experiences with C2S training and the materials, there were also points of critical feedback for improvement. Some of the most salient comments had to do with the organization of the website and the materials. Several individuals mentioned the information could be overwhelming which made it difficult to find the right materials to meet their needs in a short amount of time. Suggestions for improvement in these areas include organization of materials by age-levels, ability to bookmark information, and pairing down some of the text on the pages to simply the process.

Overall, participants enjoyed their training experience with CS2 and expressed they would continue to use the skills learned in training for future programming. At least two individuals who trained staff in C2S commented on their plans to continue to use certain C2S models (e.g., purposeful questions) in future trainings with a variety of staff members involved in STEM and other programming areas.

Suggestions for new C2S users

When asked to provide suggestions for other individuals starting with C2S, participants had several words of wisdom to share based on their experiences over the last school year. Leaders who trained staff in C2S had observations about who they trained and how they would divide the training sessions.

> *"Don't just train a few site that you want to do it [STEM], train everybody because you never know what is going to happen."*

> *"We did two trainings first and then the meeting and coaching sessions...if I did it again I think we would do a first training and then meeting/coaching session and then the other training."*

In terms of staff perceptions of training, frontline staff noted how much they learned from face-to-face training session as opposed to on-line only experiences.

> *"Being able to do it [training] in person was a lot more worth it than just doing it on the computer, especially if you are brand new to STEM and haven't done it cause then you get that first experience in front of you of what kinds of things you need to know rather than going straight in with the kids. If it is your first time teaching STEM you need to get a feel for the waters and test it and your nerves with your peers."*

When it came to using the materials to apply the skills with youth and getting past some of the initial nerves with STEM, frontline staff encouraged others to dive right in.

> *"Don't be afraid to make mistakes and try new things."*

> *"Take the material and just run with it, don't be afraid to modify it because it's probably not gonna look like the classes on camera so modify it to fit your program and what you need."*

Section II: Dimensions of Success Observations

The second component of the triangulated evaluation of C2S includes pre- and post-training observations utilizing the Dimensions of Success (DoS; Dimensions of Success, n.d.) observation protocol. The sections below provide a brief description of the overall methodology, outline the observation protocol, and present the mean DoS ratings over time.

Methodology

Participants and Procedures

Participants included 12 frontline staff (three at each location) involved in OST Y-USA programs at four locations (Fort Worth, Memphis, San Antonio, and St. Louis). Staff observations occurred across two time points. The first observation occurred in the fall of 2016 prior to C2S training and the second occurred in the spring 2017 after participants had concluded the majority of their training activities. For each observation, a certified DoS observer watched STEM program activities lasting from 30-60 minutes.

Although ten frontline staff participated in C2S trainings at each location, it was not feasible to watch all ten participants because most programs delivered content on the same day/time. Instead of watching all participants, three frontline staff from each locations were randomly selected by the evaluator for pre- and post-training observations. Observations were video recorded and back up video observations of frontline staff outside the selected participants were also recorded. One of the original participants dropped out between the pre- and post-training observations, but there was a backup observation video available from the location. This one frontline staff member was rated using video for the pre-training rating and a live observation for the post.

Observation Protocol

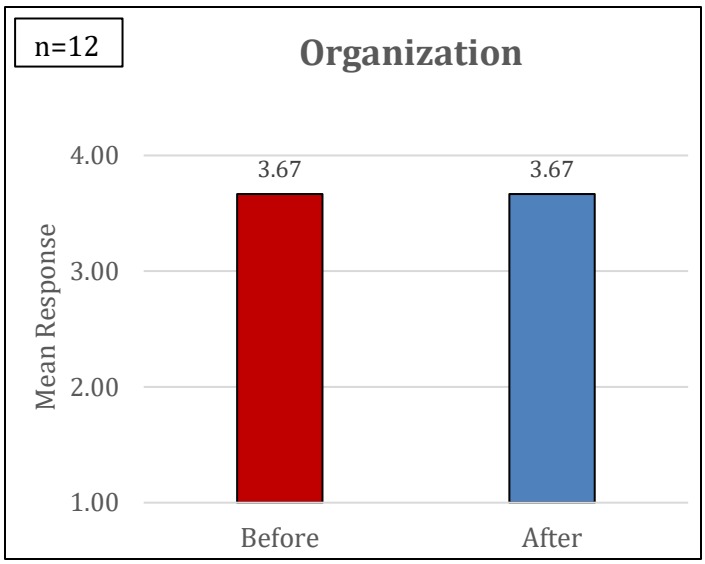
Observations were conducted using the DoS observation protocol (PEAR Institute, 2009-2016). There are a total of 12 dimensions in the DoS rubric organized within four broad domains: Features of the Learning Environment, Activity Engagement, STEM Knowledge and Practices and Youth Development in STEM. Each dimension was rated on a 4-point scale and points of evidence were provided to support each rating.

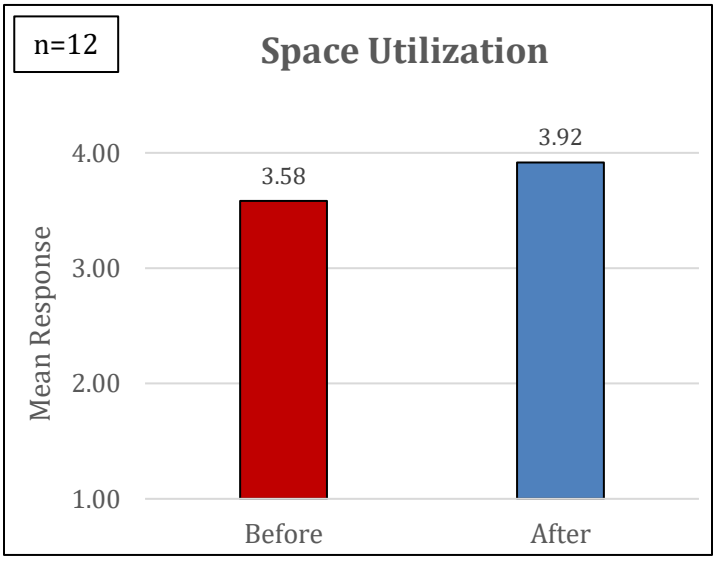
Results

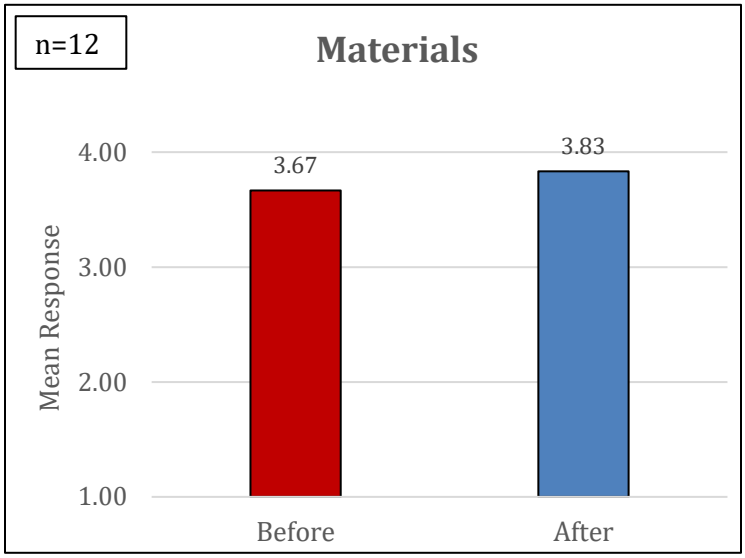
Graphs for the mean observation ratings before training in C2S (indicated by the red bars) and after training in C2S (indicated by the blue bars) are provided below. Due to the small sample size of participants (three from each location), data have been aggregated to protect participants' identities.

Features of the Learning Environment

The first three dimensions of the DoS rubric examine the STEM learning environment. For instance, the organization dimension focuses on aspects related to the availability of materials, appropriate planning and preparation. The materials dimension evaluates the degree to which materials are age appropriate and appealing for youth. Space utilization focuses on the degree to which the learning space is conducive to information STEM activities and the level of distractions present.

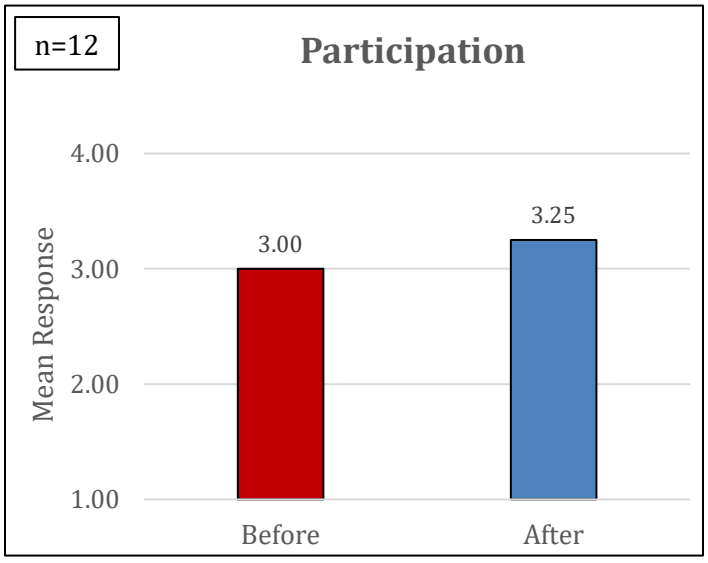


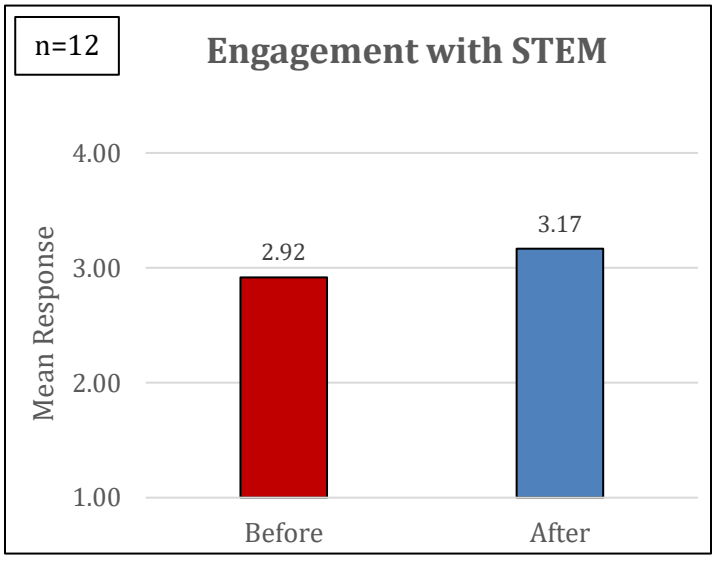


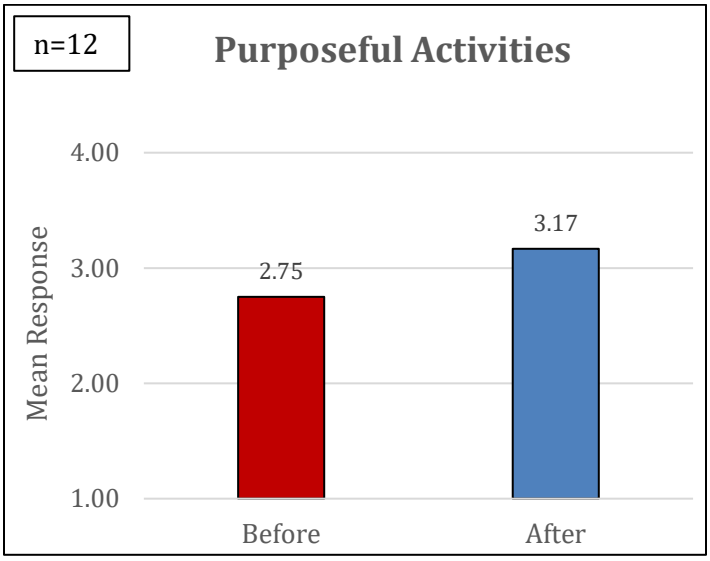


Activity Engagement

The second set of dimensions measures the degree to which the STEM activity engages youth. Participation measures the extent to which youth participate in activities, follow directions, and complete activities provided by the facilitator. The purposeful activities dimension evaluates the structure of the activities and the degree to which youth understand the goals and connections between the activities. The engagement with STEM dimension evaluates youths' opportunities for hands on activities and the degree to which they are cognitively engaged in the activities.

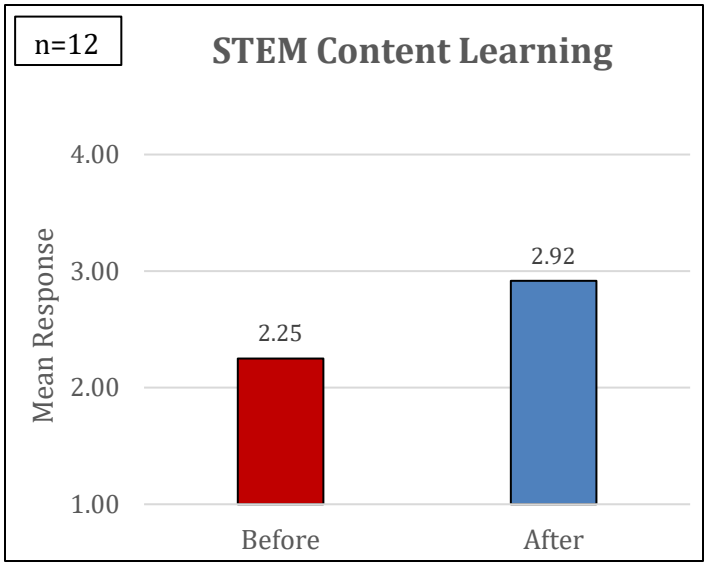


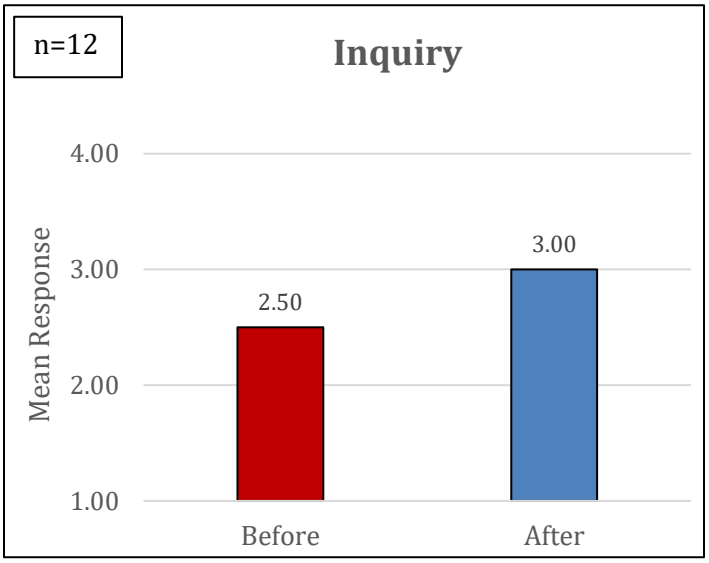




STEM Knowledge and Practices

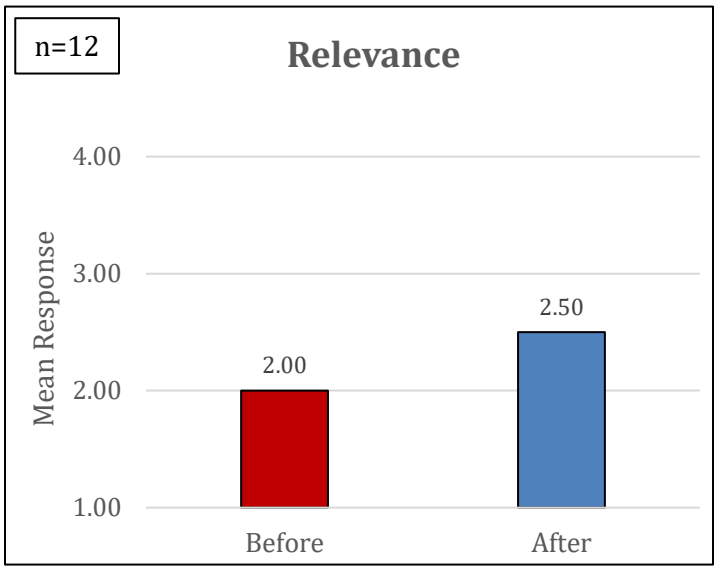
The next set of DoS dimensions evaluate the extent to which youth understand STEM concepts, make connections, and engage in inquiry practices. The STEM content learning dimension examines the accuracy of the content and evidence of youth learning. The inquiry dimension evaluates the degree to which youth are engaged in activities that STEM professionals use in their daily activities. The reflection dimension rates the extent to which youth have opportunities to reflect on their STEM activities and the level of meaningful reflection.

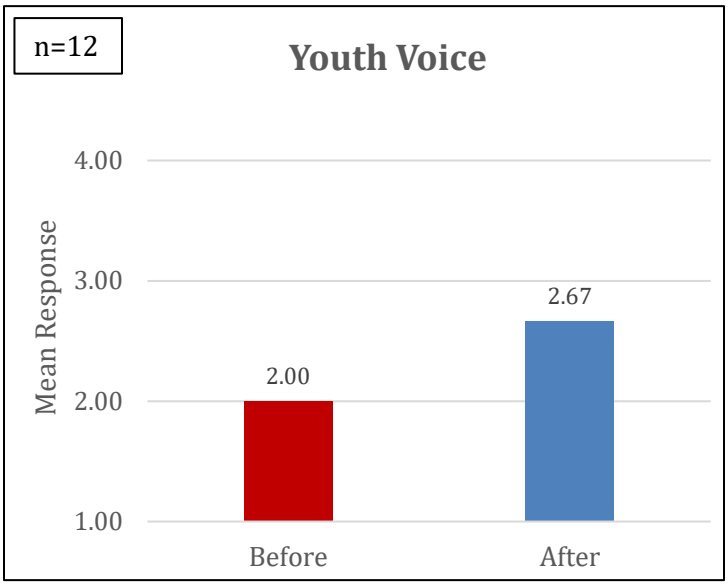




Youth Development in STEM

The final series of DoS dimensions evaluates the relationship between the facilitator and youth, the degree to which discussions highlight relevance to youths' daily lives, and youths' opportunities for discussion. The relationships dimension specifically evaluates the degree of positive interactions amongst youth and facilitator(s). The relevance rating reflects the extent to which youth and facilitators connect activities to their daily lives, other subjects, and careers. Youth voice evaluates of the degree to which youths' opinions and ideas are encouraged during the activities.





Summary: Dimensions of Success Observations

As demonstrated by the data, there were improvements between pre/post observations in 11 out of the 12 DoS dimensions. Some of the highest gains (greater than or equal to .50) were found on the inquiry, reflection, relevance, STEM content learning and youth voice dimensions. Several dimensions did not see these same large gains because frontline staff started with higher averages at the initial observation and remained consistent over time. Examples of these instances included the dimensions of organization (which stayed the same), materials, space utilization and relationships. Larger gains were possible on the dimensions within the youth development in STEM and STEM knowledge and practices because frontline staff began lower on these dimensions as a whole.

It is important to remember that staff who completed both pre-and post-training observations may not be representative of the sample as a whole and/or frontline staff in general because these participants remained in the evaluation across multiple time points. As mentioned by participants in the interviews/focus groups, several locations struggled with staff turnover. Given the general rate of staff turnover, the longevity of participants in this evaluation indicates a greater level of investment in their positions (and perhaps their professional development) than other frontline staff in similar positons at other locations.

Section III: Youth Survey Feedback

The third component of the triangulated evaluation of C2S includes post-training youth survey data from youth participating in programs taught by frontline staff trained in C2S. The sections below provide a brief description of the overall methodology, outline the survey protocol and describe mean ratings across the different programs.

Methodology

Participants and Procedures

Participants included 239 youth in grades 3-8 involved in OST Y-USA programs at four locations (Fort Worth, Memphis, San Antonio, and St. Louis). Youth data were collected in the spring 2017 after frontline staff had concluded the majority of their training activities. About two weeks prior to data collection, site or program directors/coordinators were emailed a packet that included directions to be read aloud for youth prior to the survey, youth surveys, and parental notification forms so parents could opt youth out of data collection if desired.

The initial goal was to conduct pre- and post-training data from youth, yet it was determined that a retrospective post-then-pre evaluation format would be a more efficient design to capture changes in youths' perceptions over time. Given that retrospective questions may be difficult for younger participants, it was determined that only youth in grades 5 and higher would receive these types of questions. The rationale for this decision was based on literature on how cognitive development affects survey research with children and youth (e.g., Borgers, de Leeuw, and Hox 2000). Although retrospective questions were administered to a small sub-group of youth participants, several inconsistencies were found in the data. The type of inconsistencies found in the data suggest youth did not interpret some of the retrospective questions in the same manner. Because there is evidence to suggest the questions did not accurately measure the construct of interest, we do not have confidence in the reliability and validity of the data. Bases on our concerns regarding the quality of the information, it was determined these data would not be reported.

Measures: Common Instrument

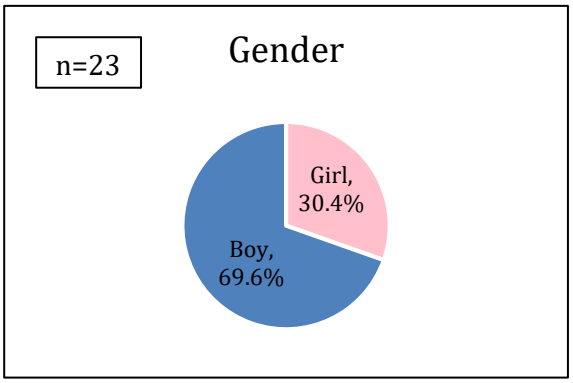
The Common Instrument (CI; Common Instrument Suite, n.d.), a self-report survey, was used to measure youths' attitudes, interest, engagement, and career interest in STEM. First, youth were asked to rate how much they agree or disagree with several science-related items. Next, they were asked to indicate their curiosity level regarding various STEM concepts.

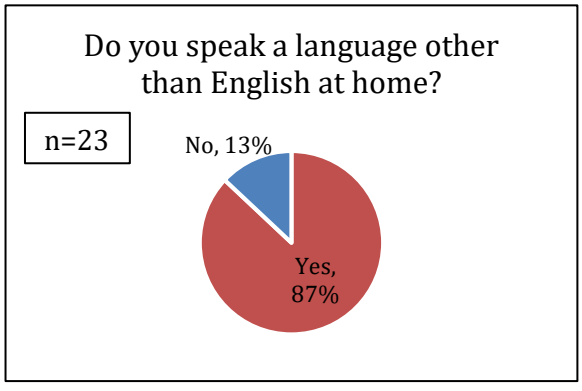
In the sections that follow, results are provided for each of the specific locations included in the sample of participants. Youth had to be at least in 3rd grade to be included in the data reported below. Please note that samples are not fully representative of participants from each location because several locations had large populations younger than 3rd grade.

Results: Fort Worth

Demographics

A total of 23 respondents in in grades 3rd and above completed the CI in Fort Worth. Across participants, seven youths indicated they are a girl (30.4%), and 16 indicated they are a boy (69.6%). Additionally, one youth left the option blank.



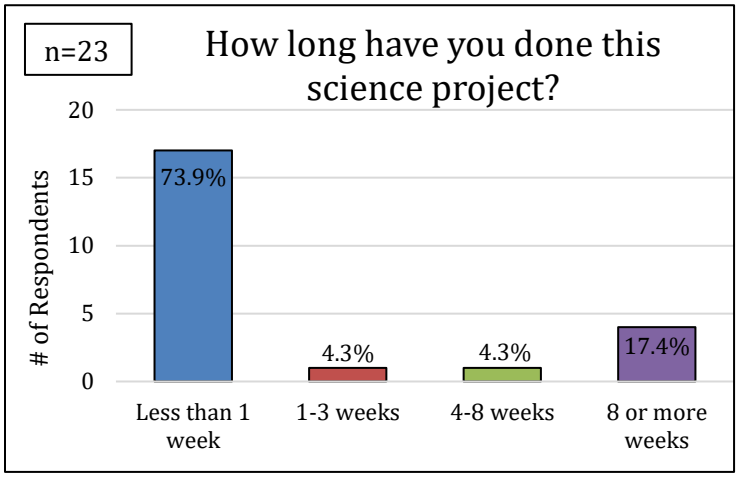


Youth were also asked whether they spoke a language other than English at home. A majority of participants (87.0%) indicated they do not speak a language other than English at home, while three youth (13.0%) indicated they do speak a language other than English at home. One youth left the question blank.

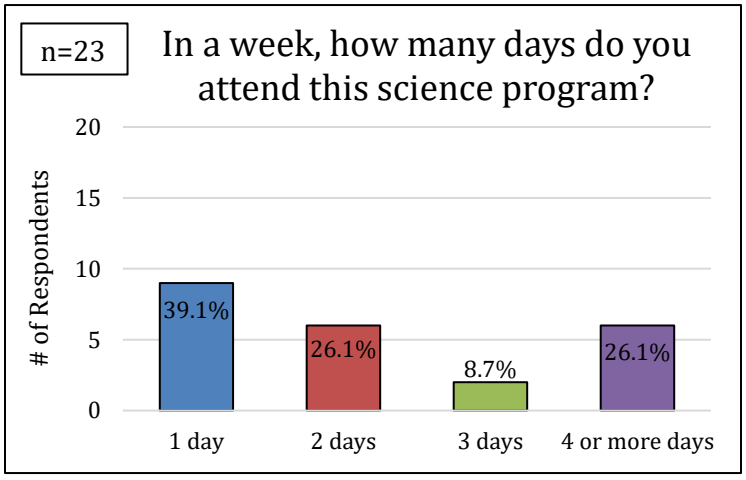
Next, youth were asked to indicate how long they had participated in their science program. A majority of youths (N=17; 73.9%) indicated they have participated in their science program for less than a week, while

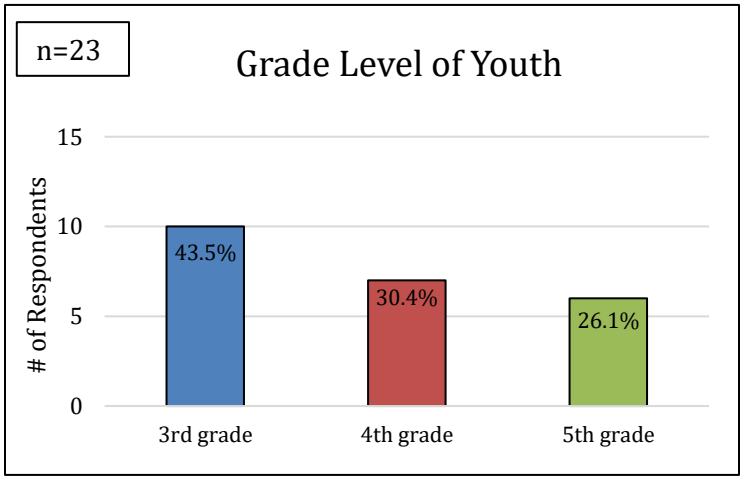
one youth (4.3%) indicated they have participated in their science program for 1 to 3 weeks. Furthermore, one youth (4.3%) indicated they have participated their science program for 4 to 8 weeks, while four youths (17.4%) indicated they have participated their science program for 8 or more weeks.

Youth were also asked to indicate how many days they attended their science program in a week. A total of nine respondents (39.1%) indicated they attended the science program 1 day a week, while six youths (26.1%) indicated they attend the science program 2 days a week. Only two participants (8.7%) indicated they attend the science program 3 days a week, while six youths (26.1%) indicated they attended the science program 4 or more days a week.



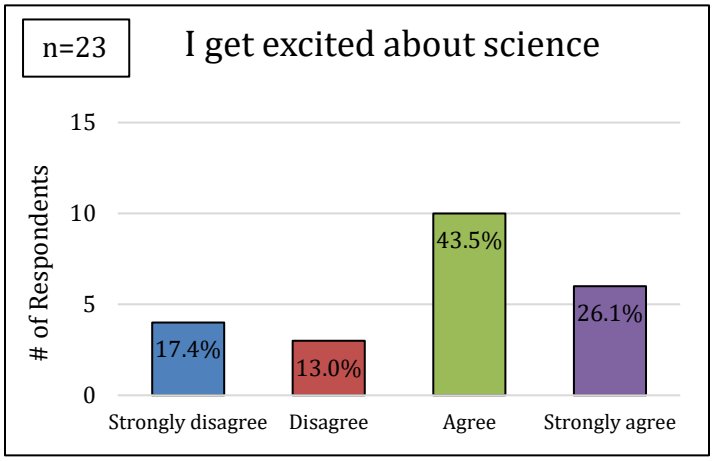
Finally, youth were asked which grade they are currently in. Only youths who indicated they were in the 3rd grade or above were included in this report. Of the 23 youth who fit this requirement, 10 participants (43.5%) indicated they are in the 3rd grade, seven youths (30.4%) indicated they are in the 4th grade, and six youths (26.1%) indicated they are in the 5th grade.

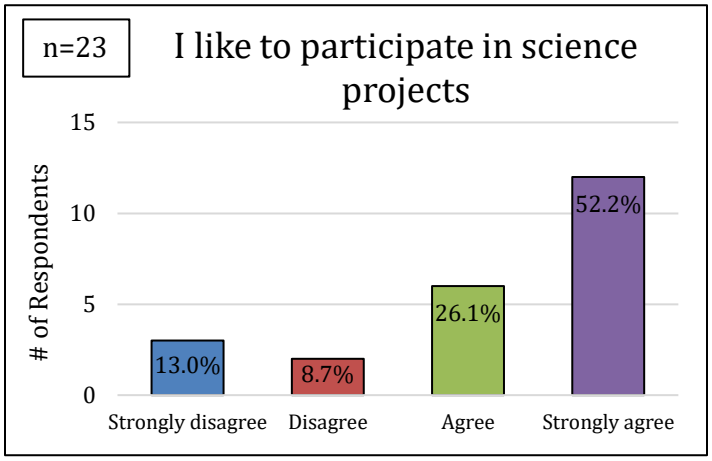


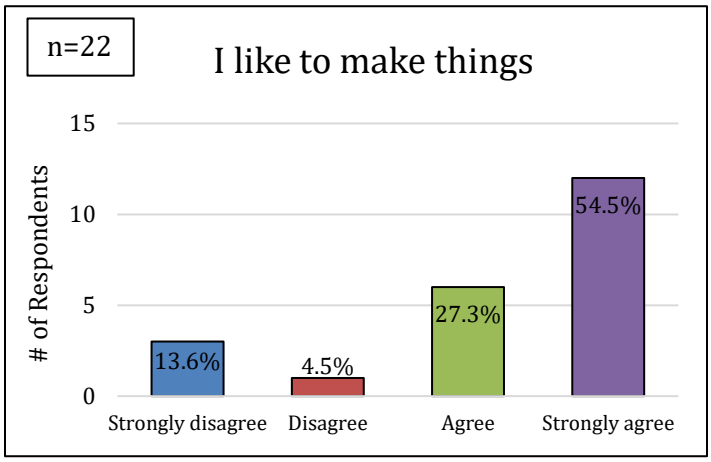


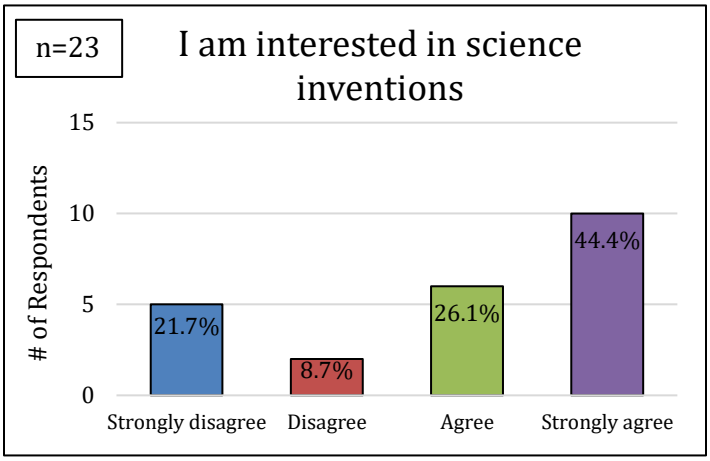
Section I: What do you think about science?

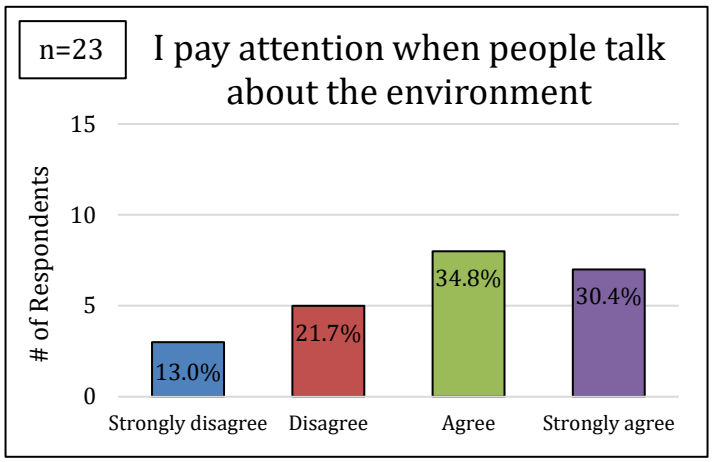
In the first section of the CI, youth were asked 10 questions on how they feel about science. The frequency distributions for each of the items are provided below, with the percentage of youth for each response (Strongly Disagree – Strongly Agree) located on each bar.

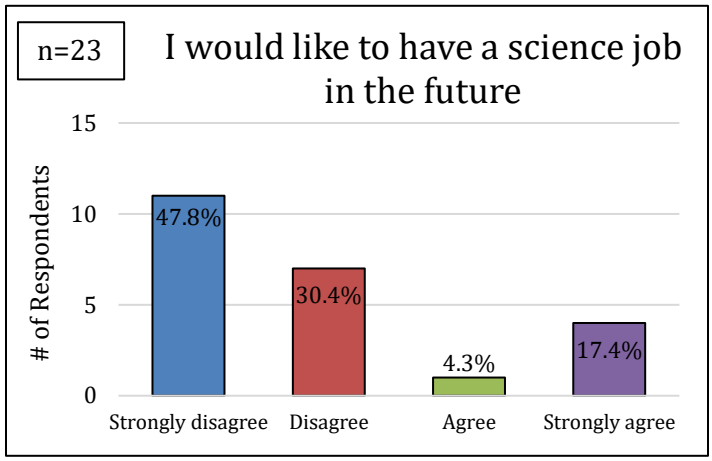


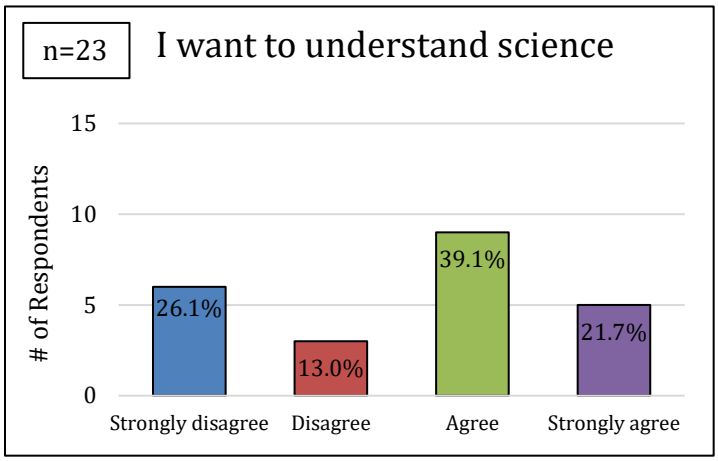


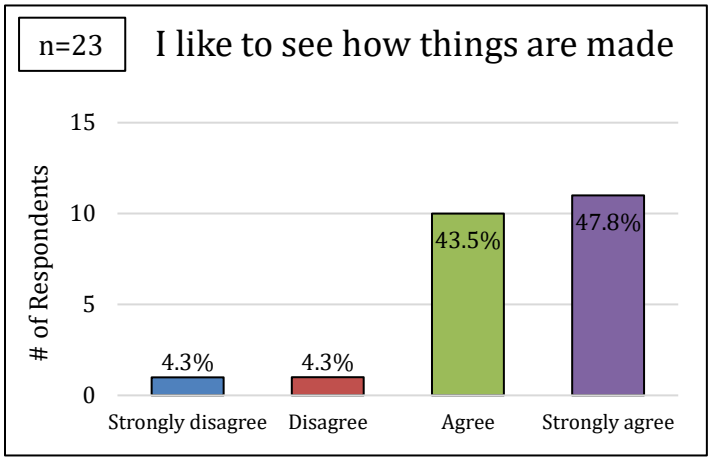


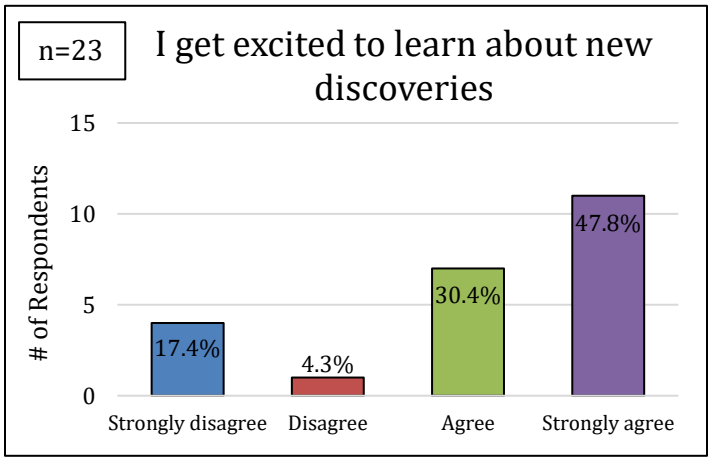


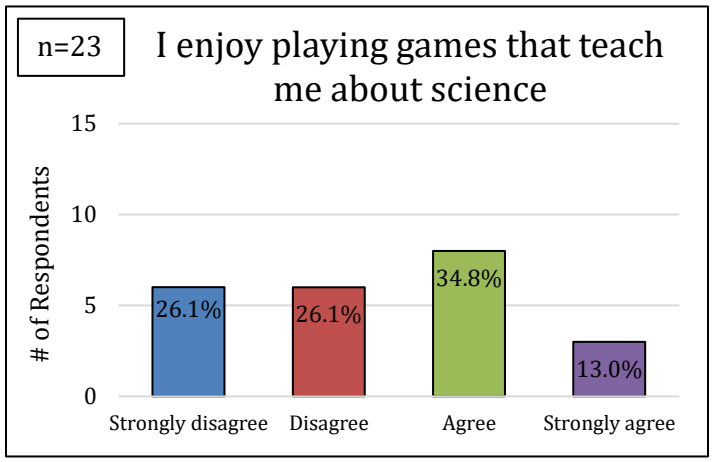

n=23
I pay attention when people talk about the environment
# of Respondents
15
10
5
0
13.0%
21.7%
34.8%
30.4%
Strongly disagree
Disagree
Agree
Strongly agree


n=23
I would like to have a science job in the future
# of Respondents
15
10
5
0
47.8%
30.4%
4.3%
17.4%
Strongly disagree
Disagree
Agree
Strongly agree


n=23
I want to understand science
# of Respondents
15
10
5
0
26.1%
13.0%
39.1%
21.7%
Strongly disagree
Disagree
Agree
Strongly agree

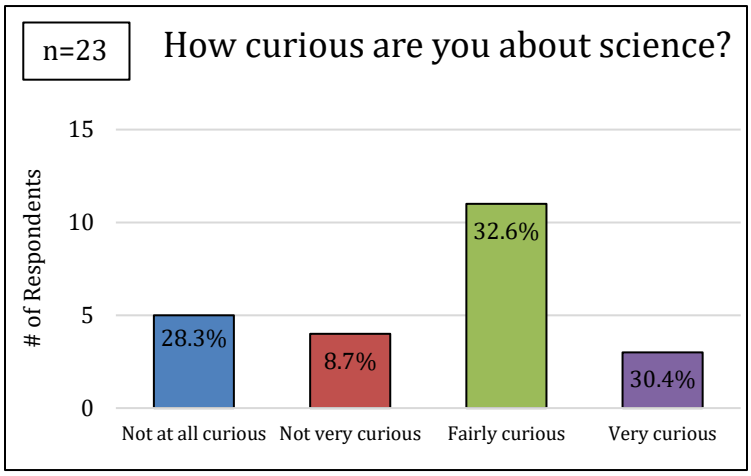

n=23
I like to see how things are made
# of Respondents
15
10
5
0
4.3%
4.3%
43.5%
47.8%
Strongly disagree
Disagree
Agree
Strongly agree

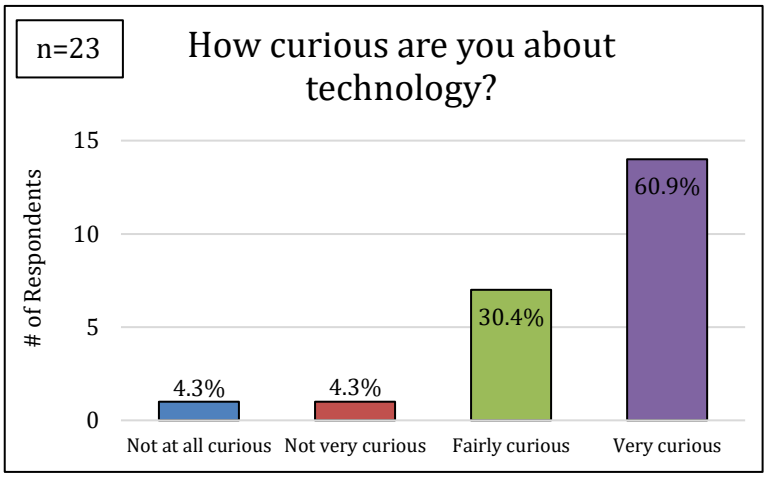

n=23
I get excited to learn about new discoveries
# of Respondents
15
10
5
0
17.4%
4.3%
30.4%
47.8%
Strongly disagree
Disagree
Agree
Strongly agree

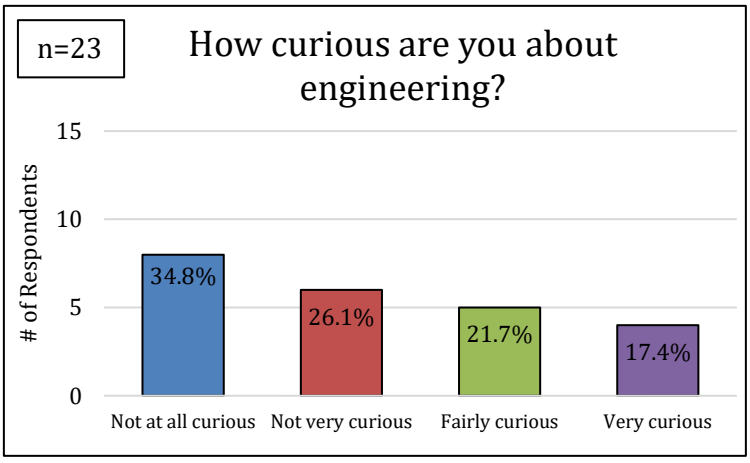

n=23
I enjoy playing games that teach me about science
# of Respondents
15
10
5
0
26.1%
26.1%
34.8%
13.0%
Strongly disagree
Disagree
Agree
Strongly agree

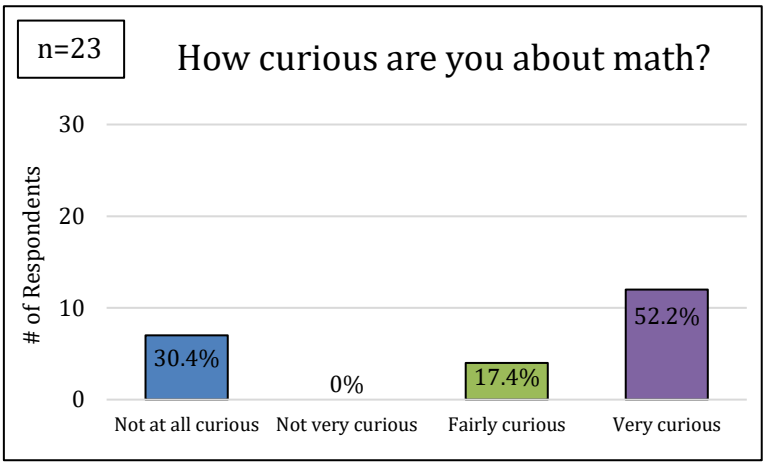
Section II: How curious are you about STEM topics?

In the second section of the CI, youth were 4 questions on their curiosity level of various STEM topics, including science, technology, engineering, and math. The frequency distributions for each of the items are provided below, with the percentage of youth for each response (Not at all curious – Very curious) located on each bar.





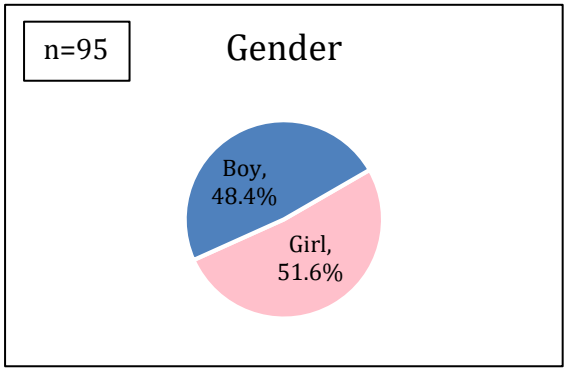


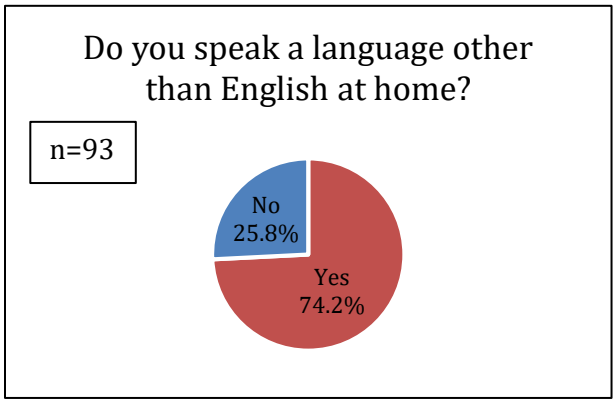


Results: Memphis

Demographics

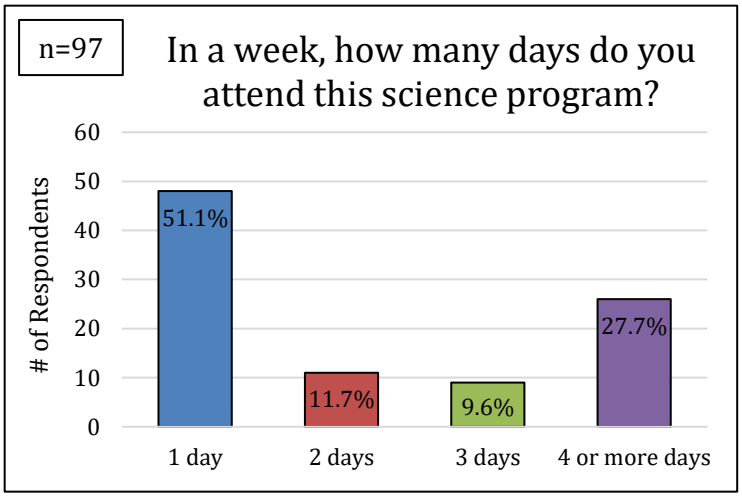
A total of 97 youth in grade 3 and above were included in the sample of participants from Memphis. Of those 97 respondents, 49 youths indicated they are a girl (51.6%), and 46 youths indicated they are a boy (48.4%). Two youths left the gender option blank.



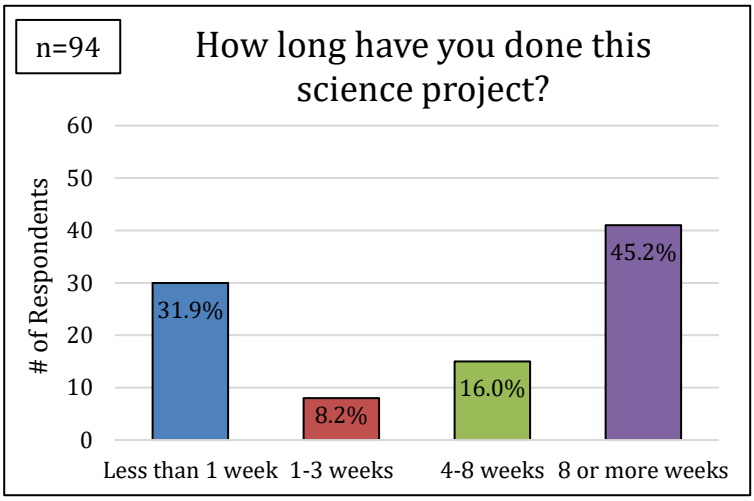


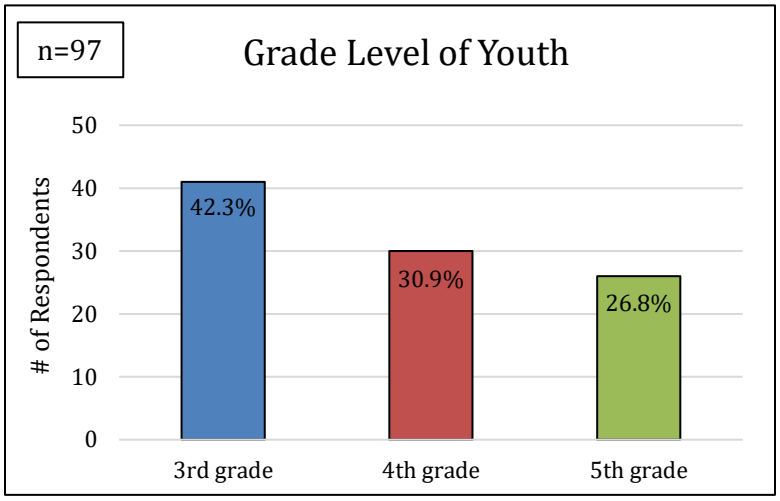
Youth were also asked whether they spoke a language other than English at home. A majority of participants (74.2%) indicated they do not speak a language other than English at home, while 24 youths (25.8%) indicated they do speak a language other than English at home. Four youths left the question blank.

Next, youth were asked to indicate how long they have participated in their science program. Of the 94 youths who completed this question, 30 (31.9%) indicated they have participated their science program for less than a week, while eight youths (8.5%) indicated they have participated their science program for 1 to 3 weeks. Furthermore, 15 youths (16.0%) indicated they have participated their science program for 4 to 8 weeks, while 41 youths (43.6%) indicated they had participated in their science program for 8 or more weeks. Additionally, three youths left the question blank.



Youth were asked to indicate how many days they attended their science program in a week. A majority of youths (N= 48; 51.1%) indicated they attended the science program just 1 day a week, while 11 youths (11.7%) indicated they attend the science program 2 days a week. A total of nine respondents (9.6%) indicated they attend the science program 3 days a week, while 26 youths (27.7%) indicated they attended the science program 4 or more days a week. Please note that three youths left this question blank.

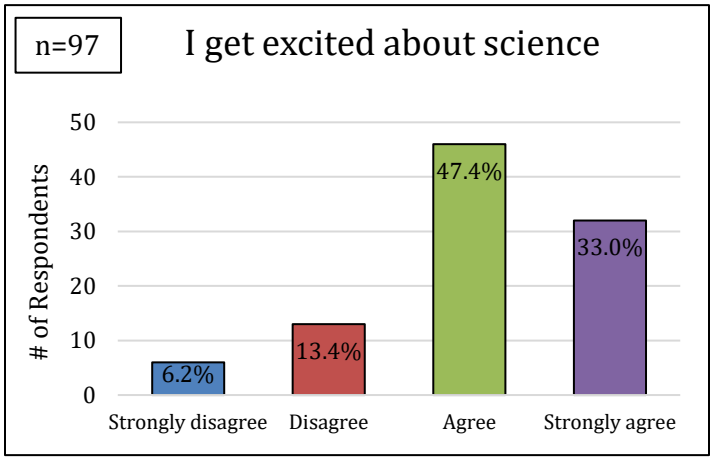


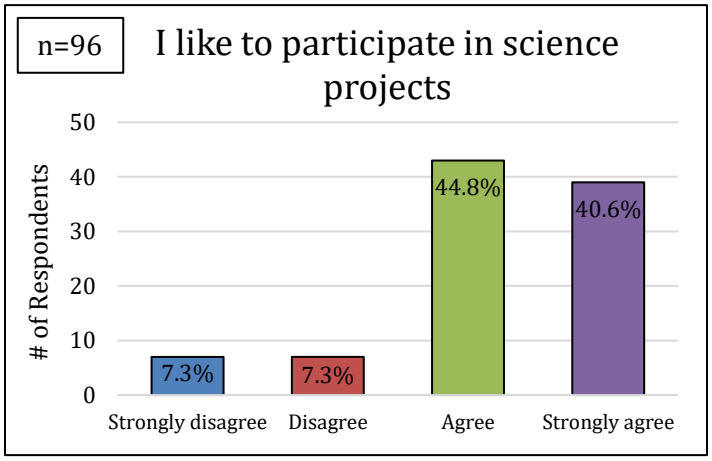


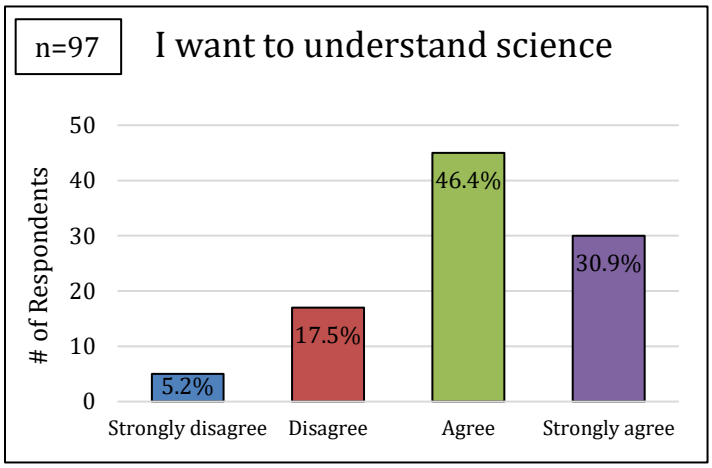
Finally, youths in St. Louis were asked which grade they are currently in. Of the 97 participants, 41 of them (42.3%) at this location were in the 3rd grade, 30 youth (30.9%) indicated they are in the 4th grade, and 26 youth (26.8%) indicated they are in the 5th grade.

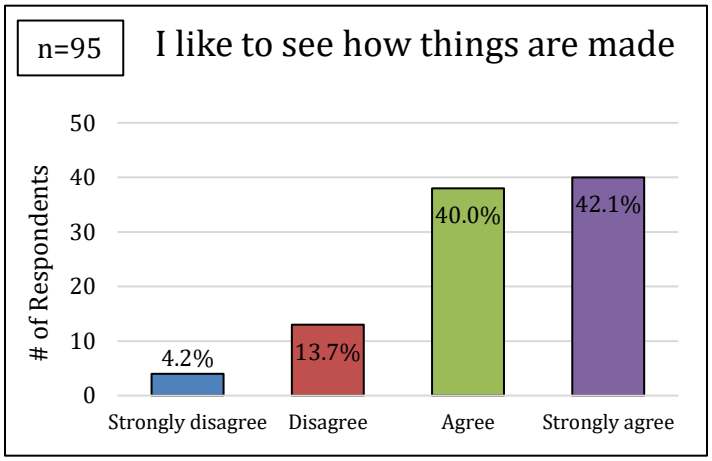
Section I: What do you think about science?

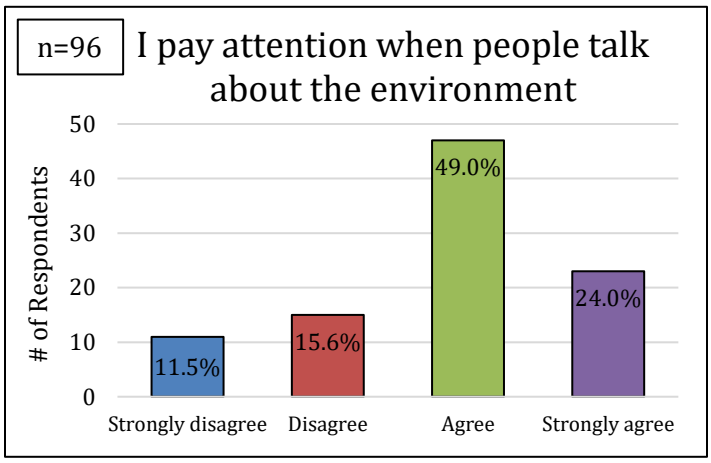
In the first section of the CI, youth were asked 10 questions on how they feel about science. The frequency distributions for each of the items are provided below, with the percentage of youth for each response (Strongly Disagree – Strongly Agree) located on each bar.

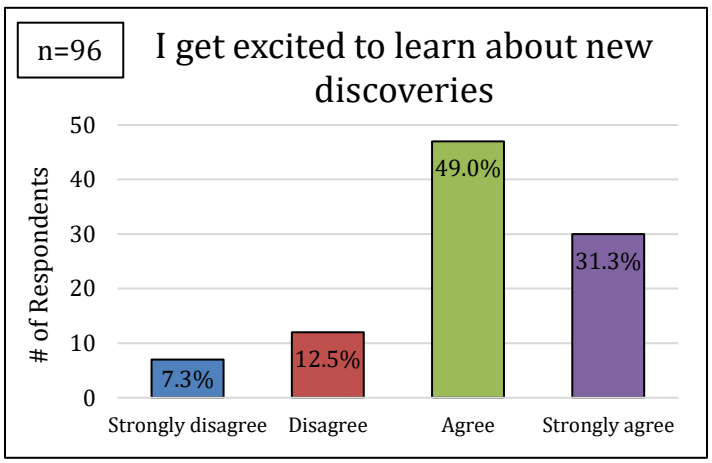

n=97
I get excited about science
# of Respondents
50
40
30
20
10
0
6.2%
13.4%
47.4%
33.0%
Strongly disagree
Disagree
Agree
Strongly agree

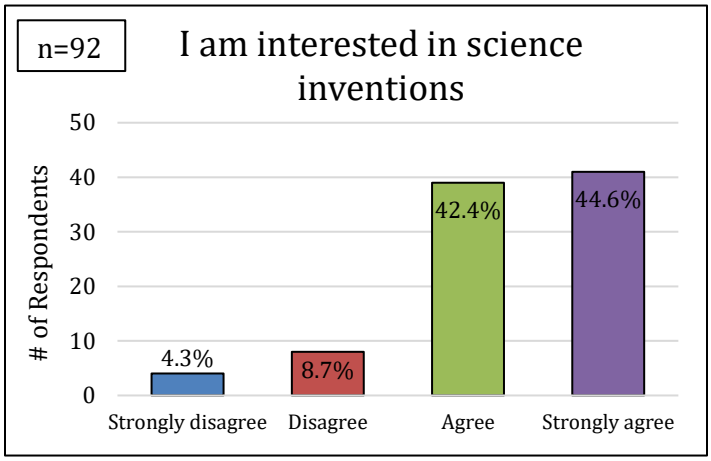

n=96
I like to participate in science projects
# of Respondents
50
40
30
20
10
0
7.3%
7.3%
44.8%
40.6%
Strongly disagree
Disagree
Agree
Strongly agree

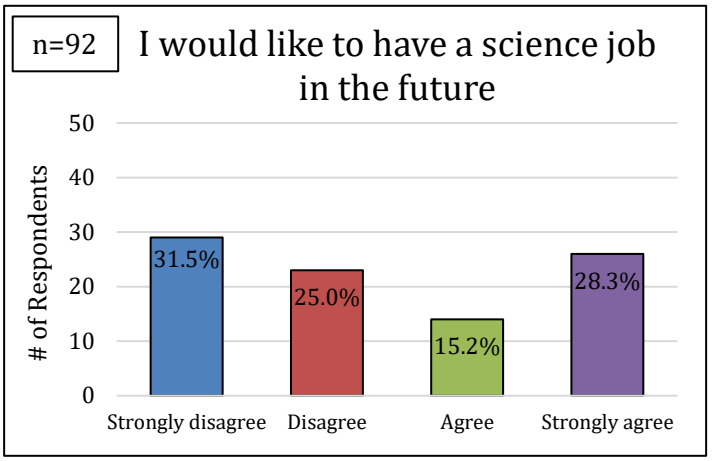

n=97
I want to understand science
# of Respondents
50
40
30
20
10
0
5.2%
17.5%
46.4%
30.9%
Strongly disagree
Disagree
Agree
Strongly agree

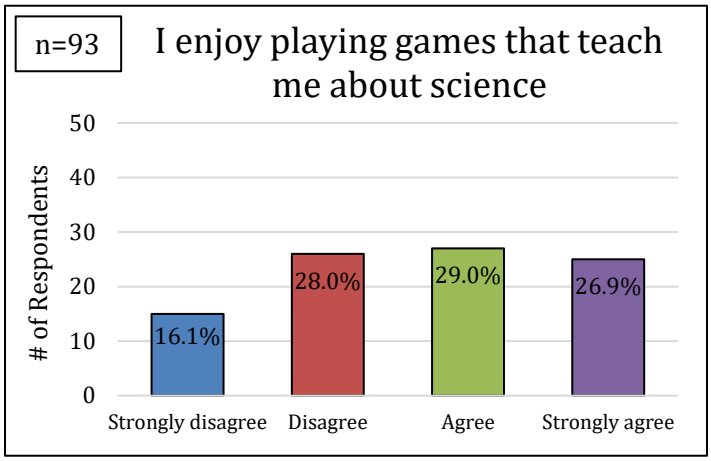

n=95
I like to see how things are made
# of Respondents
50
40
30
20
10
0
4.2%
13.7%
40.0%
42.1%
Strongly disagree
Disagree
Agree
Strongly agree

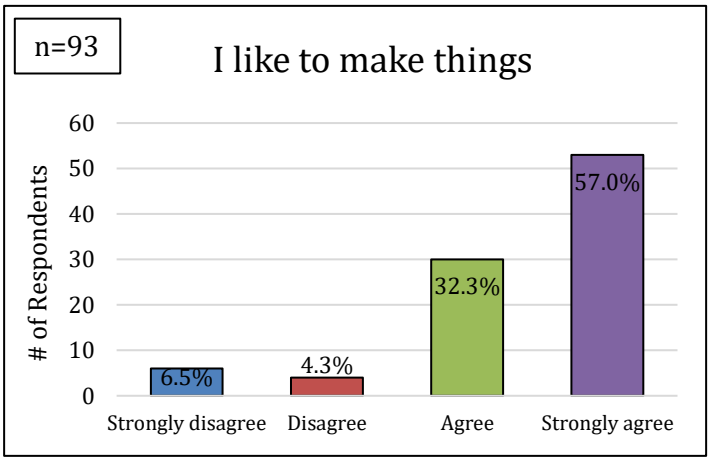

n=96
I pay attention when people talk about the environment
# of Respondents
50
40
30
20
10
0
11.5%
15.6%
49.0%
24.0%
Strongly disagree
Disagree
Agree
Strongly agree


n=96
I get excited to learn about new discoveries
# of Respondents
50
40
30
20
10
0
7.3%
12.5%
49.0%
31.3%
Strongly disagree
Disagree
Agree
Strongly agree



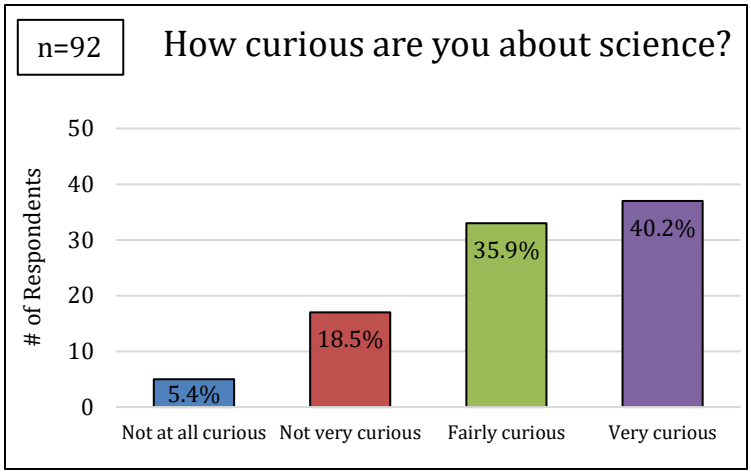


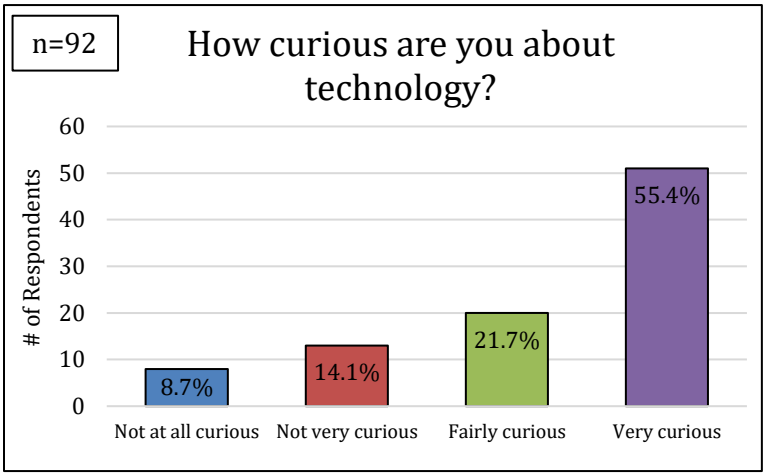


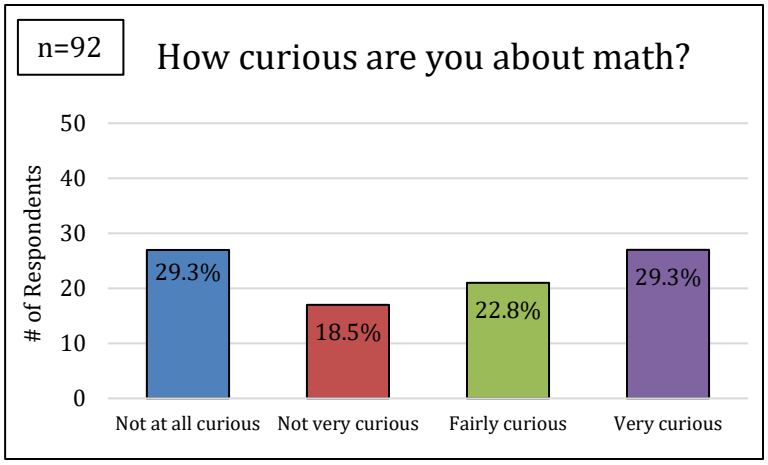


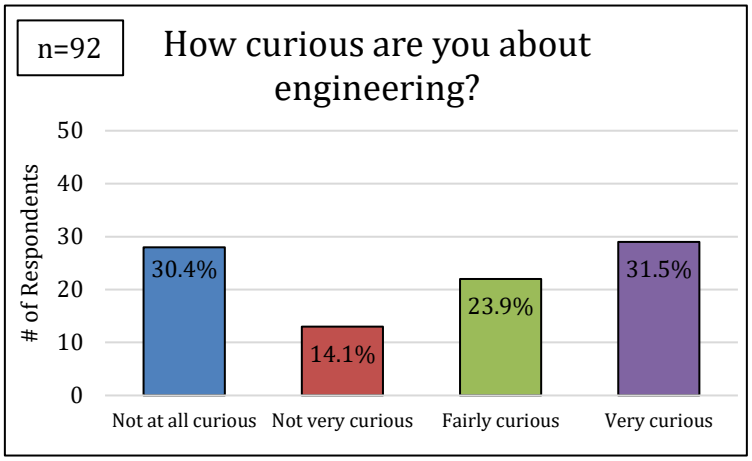
Section II: How curious are you about STEM topics?

In the second section of the CI, youth were asked 4 questions on their curiosity level of various STEM topics, including science, technology, engineering, and math. The frequency distributions for each of the items are provided below, with the percentage of youth for each response (Not at all curious – Very curious) located on each bar.


n=92
How curious are you about science?
# of Respondents
50
40
30
20
10
0
5.4%
18.5%
35.9%
40.2%
Not at all curious
Not very curious
Fairly curious
Very curious


n=92
How curious are you about technology?
# of Respondents
60
50
40
30
20
10
0
8.7%
14.1%
21.7%
55.4%
Not at all curious
Not very curious
Fairly curious
Very curious


n=92
How curious are you about math?
# of Respondents
50
40
30
20
10
0
29.3%
18.5%
22.8%
29.3%
Not at all curious
Not very curious
Fairly curious
Very curious

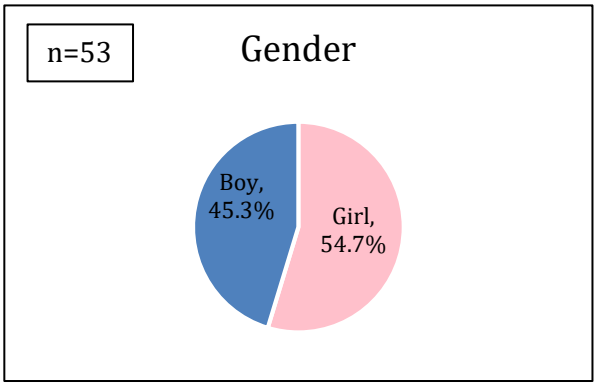

n=92
How curious are you about engineering?
# of Respondents
50
40
30
20
10
0
30.4%
14.1%
23.9%
31.5%
Not at all curious
Not very curious
Fairly curious
Very curious

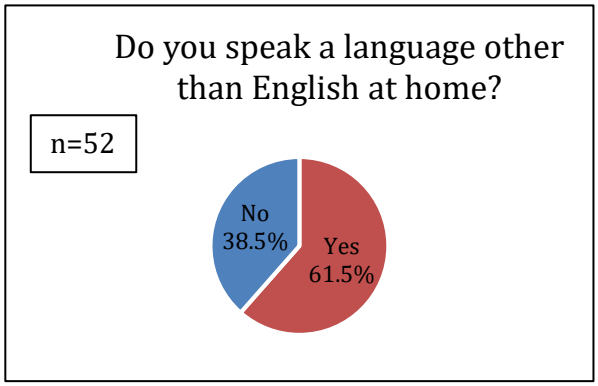
Results: San Antonio

Demographics

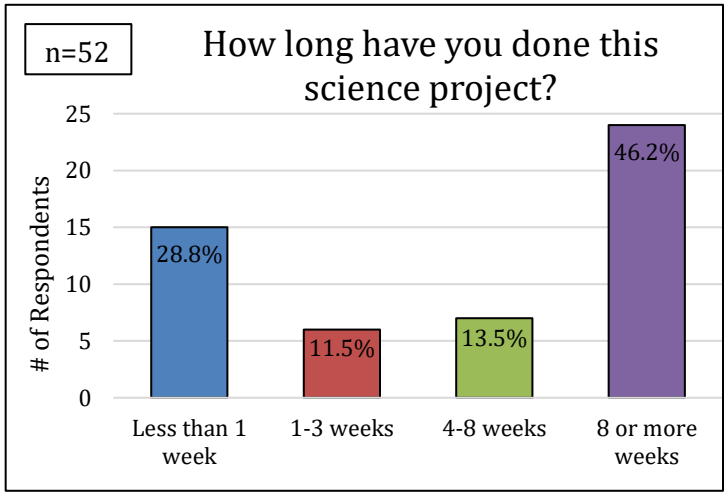
A total of 53 youth completed the survey from the Fort Worth sites. Of those 53 respondents, 29 indicated they are a girl (54.7%), and 24 indicated they are a boy (45.3%).

Youth were also asked whether they spoke a language other than English at home. A majority of participants (61.5%) indicated they speak a language other than English at home, while 20 youths (38.5%) indicated they do not speak a language other than English at home. A single youth left this question blank.

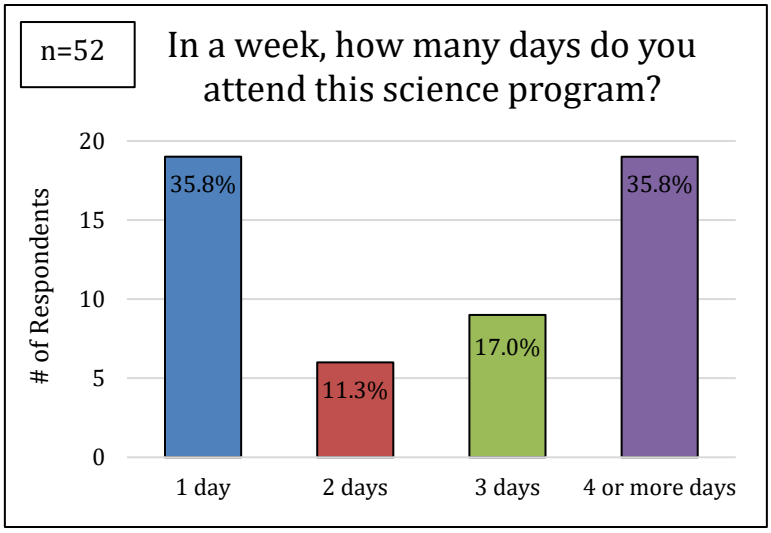


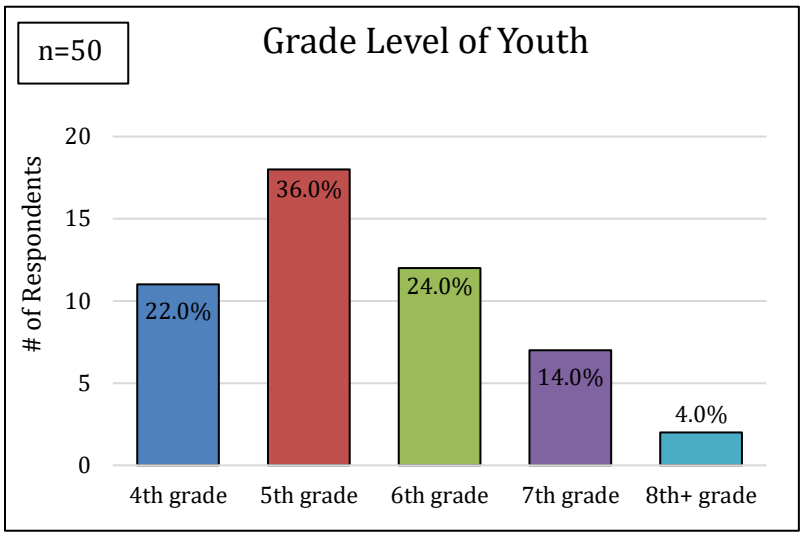


Youth were asked to indicate how long they have participated their science program. A total of 15 youths (28.8%) indicated they had participated their science program for less than a week, while six youths (11.5%) indicated they had participated in their science program for 1 to 3 weeks. Furthermore, seven youths (13.5%) indicated they had participated in their science program for 4 to 8 weeks, while 24 youths (46.2%) indicated they had participated in their science program for 8 or more weeks. Additionally, one youth left the option blank.



Next, youth were asked to indicate how many days they attended their science program in a week. A total of 19 respondents (35.8%) indicated they attended the science program 1 day a week, while six youths (11.3%) indicated they attend the science program 2 days a week. nine youths (17.0%) indicated they attend the science program 3 days a week, while 29 youth (35.8%) indicated they attended the science program 4 or more days a week. One youth left this question blank.

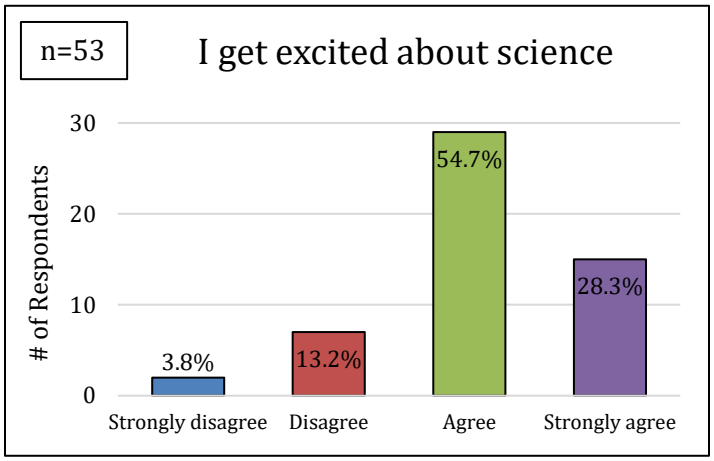


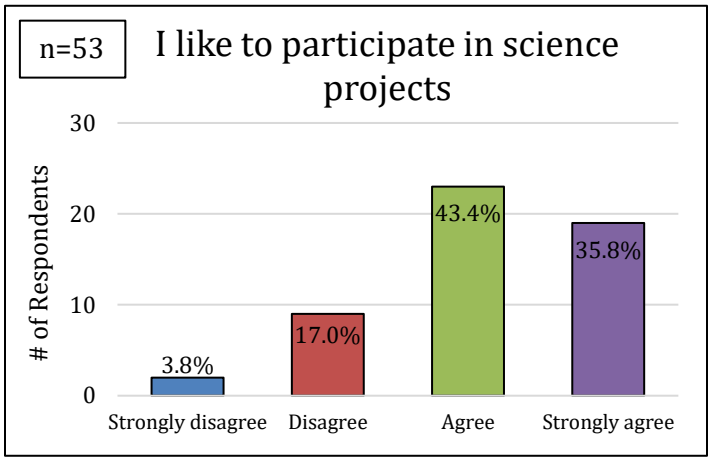


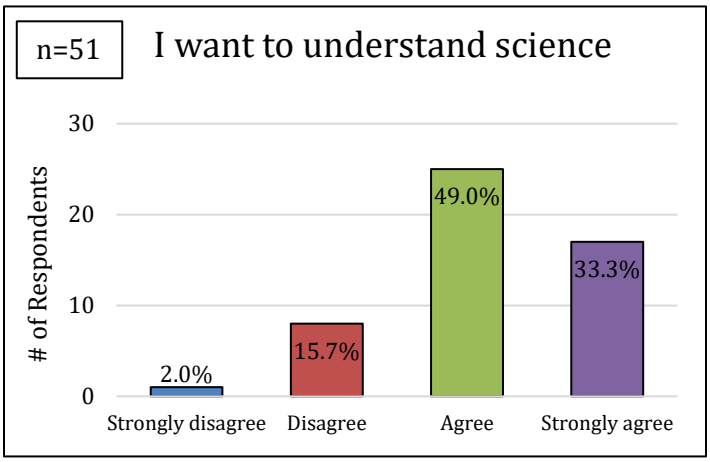
Finally, youth were asked which grade they are currently in. This site had a wide variety of different grades represented. 11 youths (22.0%) at this location were in the 4th grade, 18 youths (36.0%) indicated they are in the 5th grade, while 12 youths (24.0%) indicated they are in the 6th grade. Furthermore, seven youths (14.0%) indicated they are in the 7th grade, and 2 youth (4.0%) indicated they are in 8th grade or higher. Additionally, three youths left the question blank.

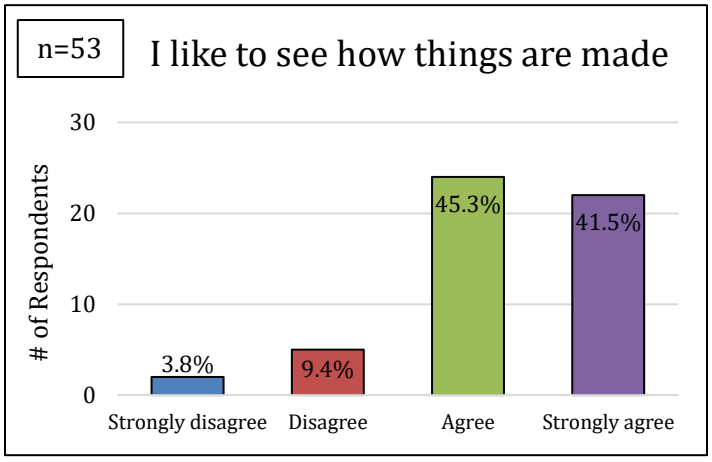
Section I: What do you think about science?

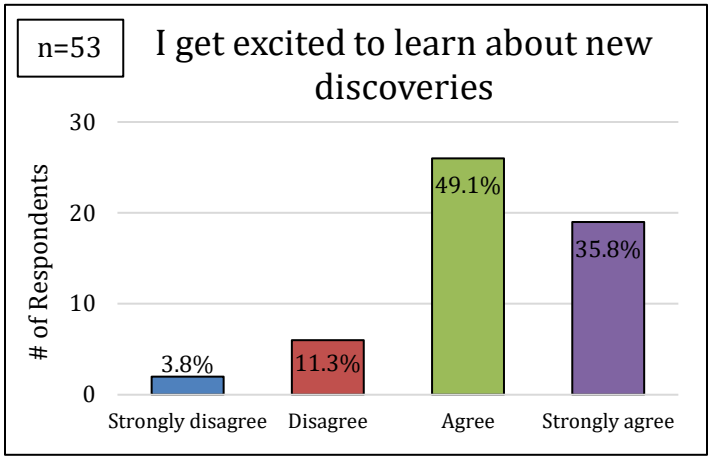
In the first section of the CI, youth were asked 10 questions on how they feel about science. The frequency distributions for each of the items are provided below, with the percentage of youth for each response (Strongly Disagree – Strongly Agree) located on each bar.

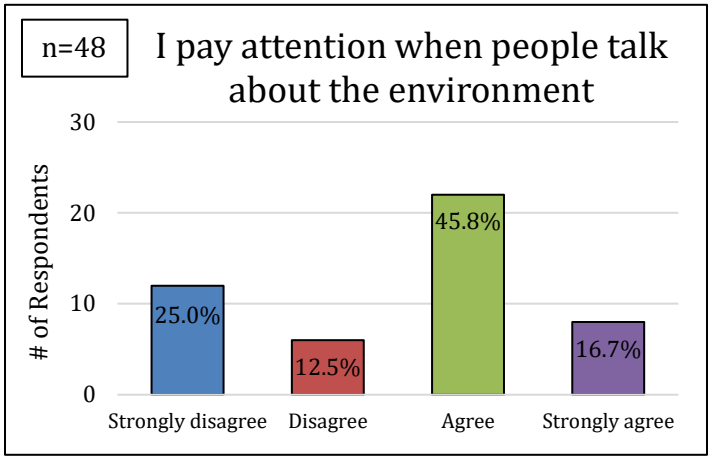


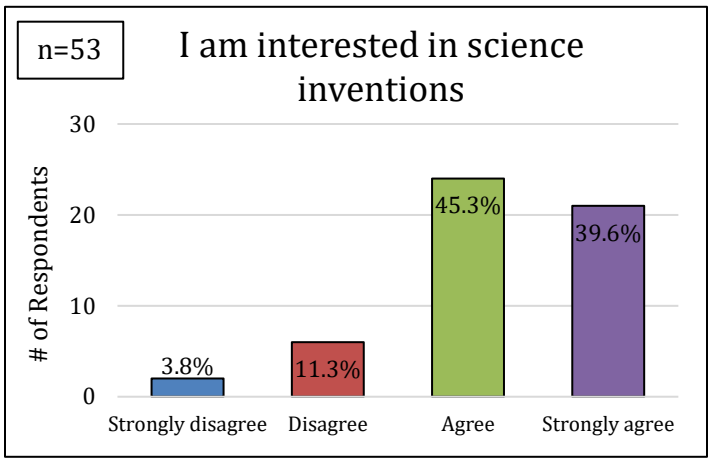


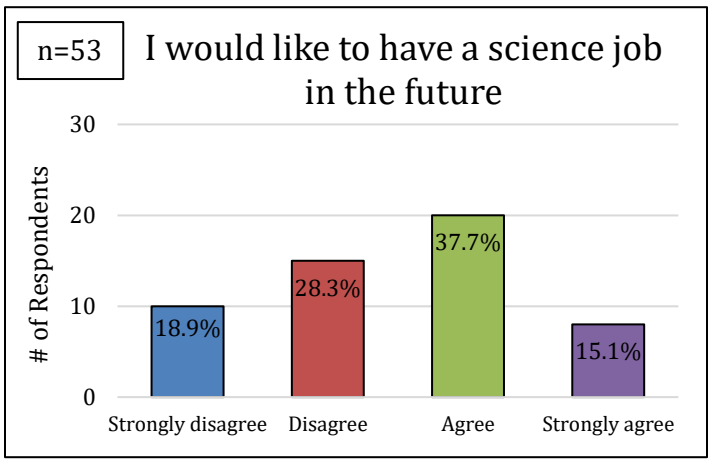


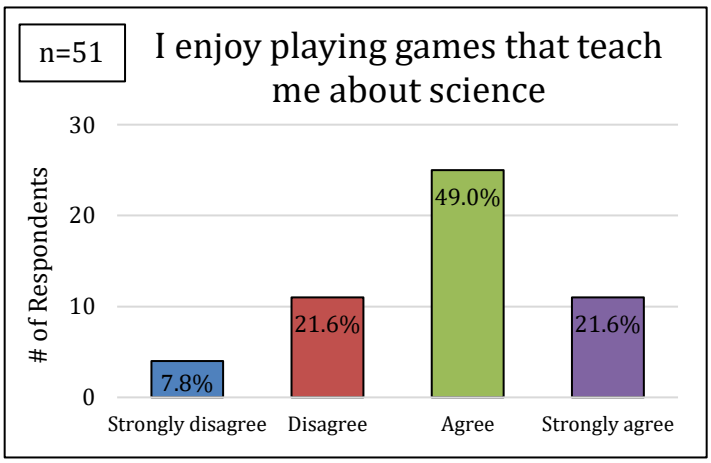


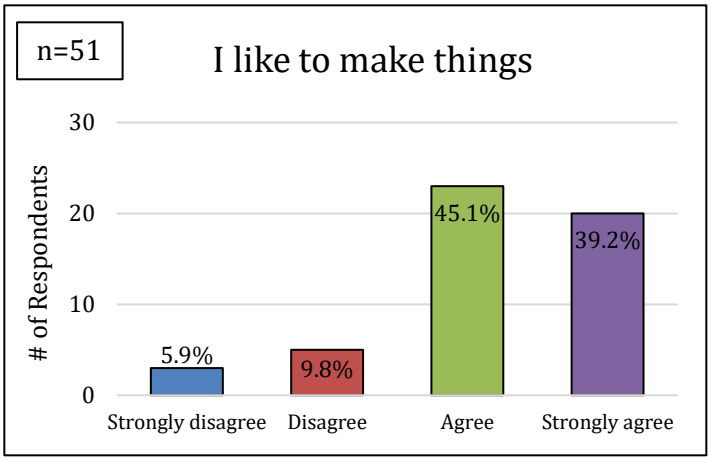

n=53
I get excited to learn about new discoveries
# of Respondents
30
20
10
0
3.8%
11.3%
49.1%
35.8%
Strongly disagree
Disagree
Agree
Strongly agree


n=48
I pay attention when people talk about the environment
# of Respondents
30
20
10
0
25.0%
12.5%
45.8%
16.7%
Strongly disagree
Disagree
Agree
Strongly agree


n=53
I am interested in science inventions
# of Respondents
30
20
10
0
3.8%
11.3%
45.3%
39.6%
Strongly disagree
Disagree
Agree
Strongly agree

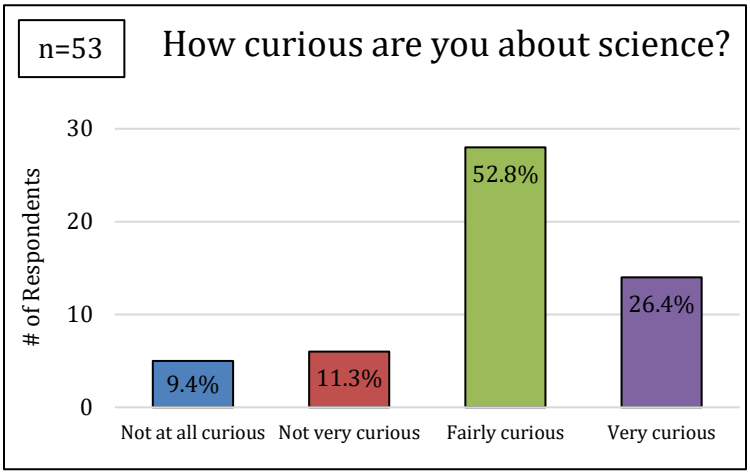

n=53
I would like to have a science job in the future
# of Respondents
30
20
10
0
18.9%
28.3%
37.7%
15.1%
Strongly disagree
Disagree
Agree
Strongly agree

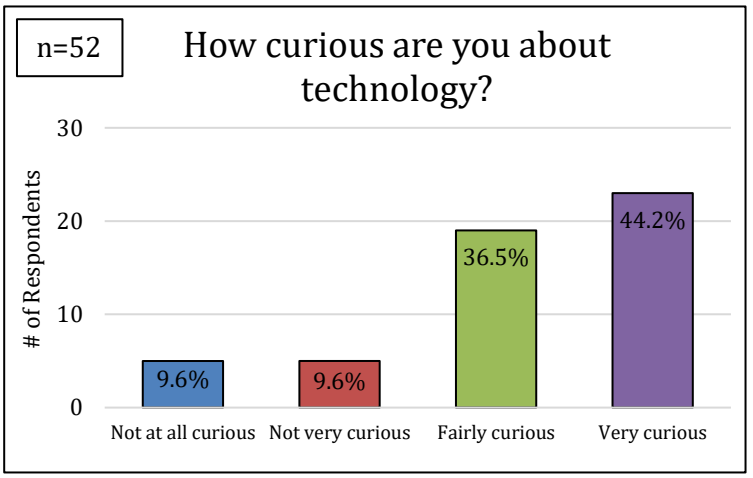

n=51
I enjoy playing games that teach me about science
# of Respondents
30
20
10
0
7.8%
21.6%
49.0%
21.6%
Strongly disagree
Disagree
Agree
Strongly agree

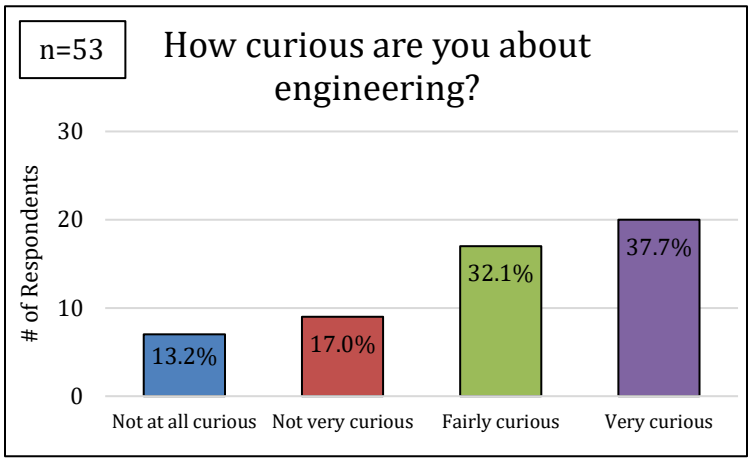

n=51
I like to make things
# of Respondents
30
20
10
0
5.9%
9.8%
45.1%
39.2%
Strongly disagree
Disagree
Agree
Strongly agree

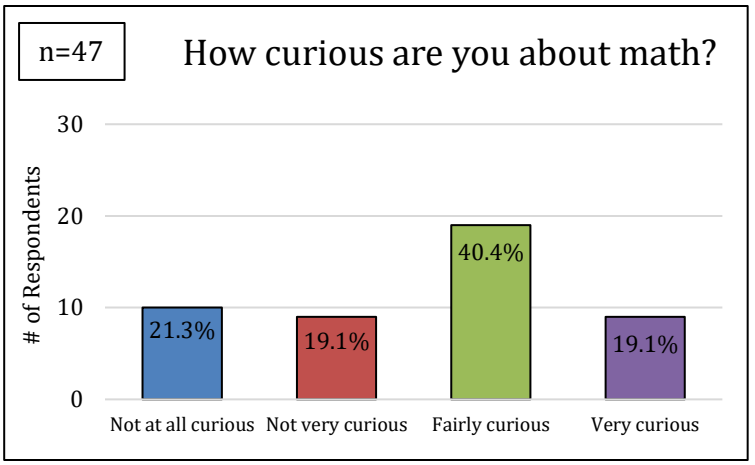
Section II: How curious are you about STEM topics?

In the second section of the CI, youth were asked 4 questions on their curiosity level of various STEM topics, including science, technology, engineering, and math. The frequency distributions for each of the items are provided below, with the percentage of youth for each response (Not at all curious – Very curious) located on each bar.





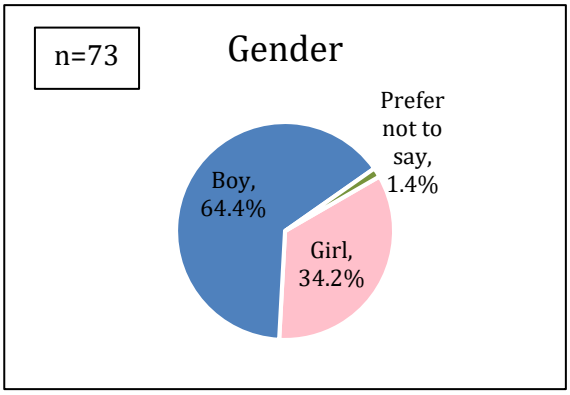


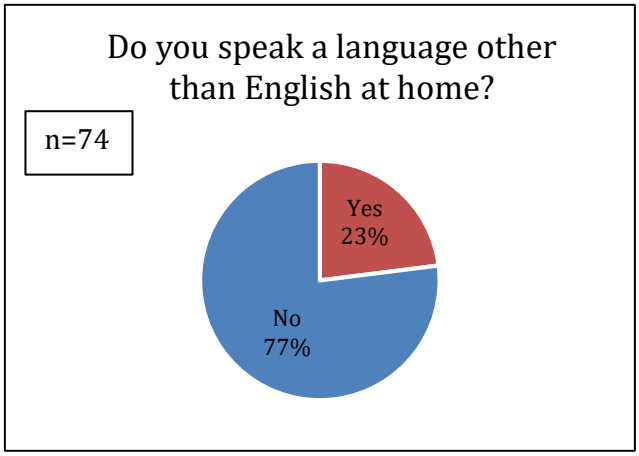


Results: St. Louis

Demographics

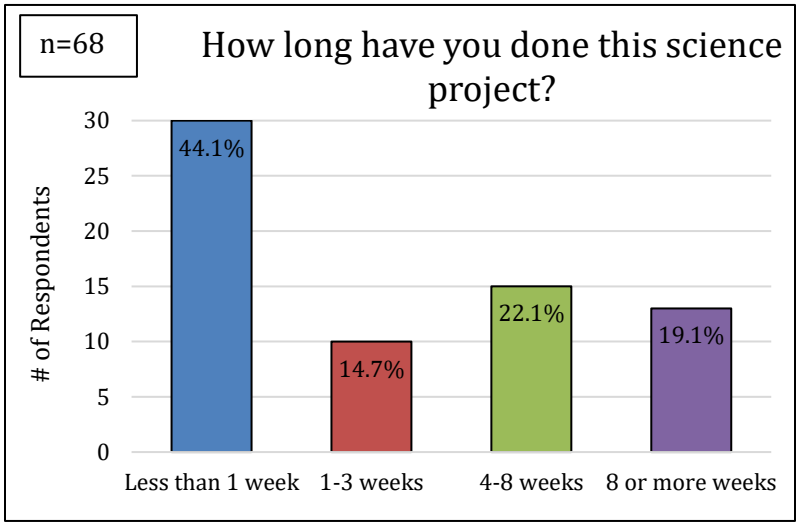
A total of 76 youth took the survey from St. Louis. Of those 76 respondents, 25 indicated they are a girl (34.2%), 47 indicated they are a boy (64.4%), and 1 preferred not to say (1.4%). Additionally, three youths left the option blank.



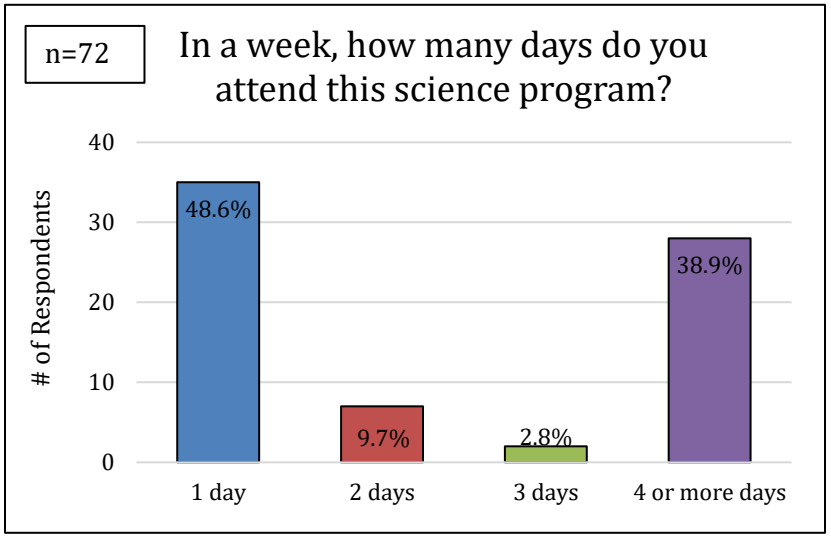


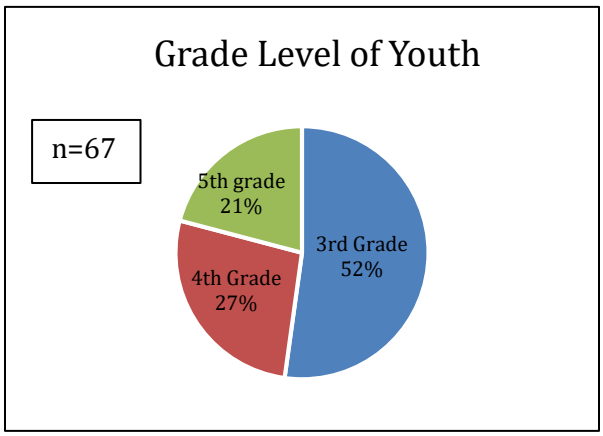
Youth were asked whether they spoke a language other than English at home. A majority of participants (77%) indicated they do not speak a language other than English at home, while 17 youth (23%) indicated they do speak a language other than English at home. Two youth left the question blank.

Youth were asked to indicate how long they had participated in their science program. A majority of youths (N= 30; 44.1%) indicated they had participated in their science program for less than a week, while 10 youths (14.7%) indicated they had participated in their science program for 1 to 3 weeks. Furthermore, 15 youths (22.1%) indicated they had participated in their science program for 4 to 8 weeks, while 13 youths (19.1%) indicated they had participated in their science program for 8 or more weeks. A total of eight youths left the option blank.



Next, youth were asked to indicate how many days they attended their science program in a week. The majority of respondents (N=35; 48.6%) indicated they attended the science program 1 day a week, while seven youths (9.7%) indicated they attend the science program 2 days a week. Two respondents (2.8%) indicated they attend the science program 3 days a week, while 28 youth (38.9%) indicated they attended the science program 4 or more days a week. Four youths left this question blank.

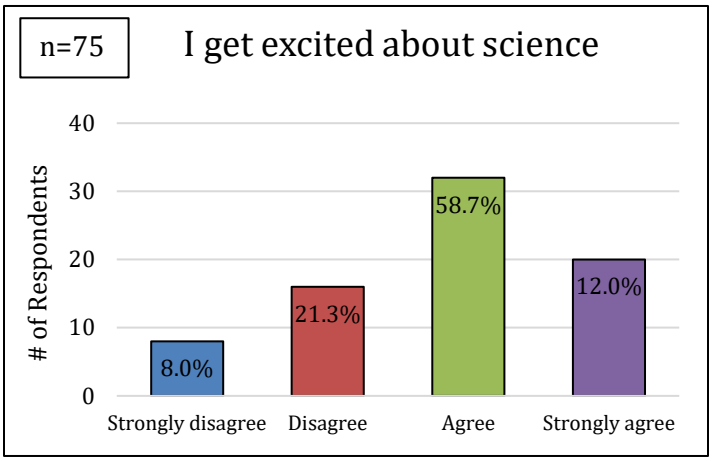


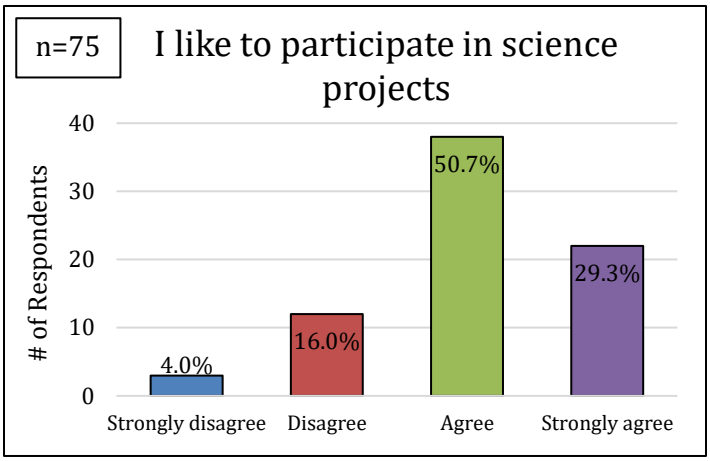


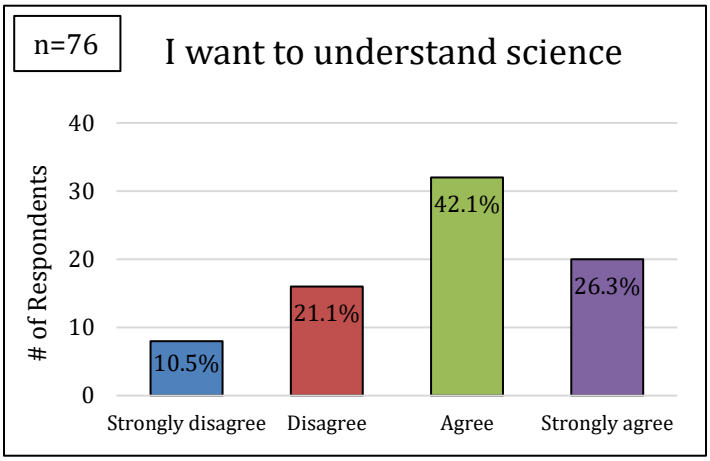
Finally, youth in St. Louis were asked which grade they are currently in. A majority of youths (N= 35; 52.2%) at this location were in the 3rd grade. 18 youth (26.9%) indicated they are in the 4th grade, while 14 youth (20.9%) indicated they are in the 5th grade. Additionally, nine youths left this question blank.

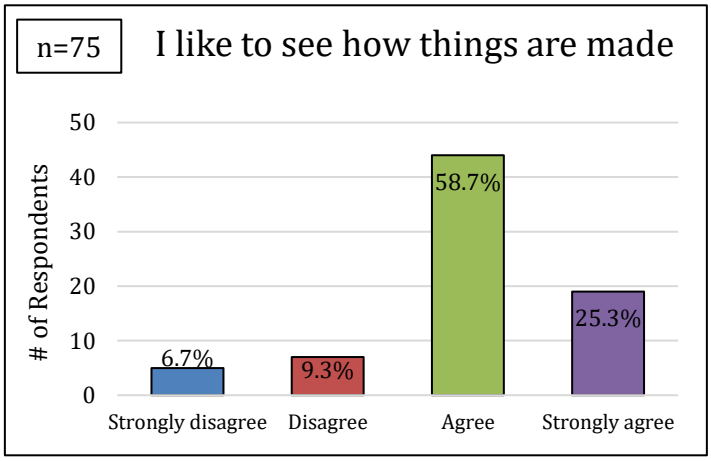
Section I: What do you think about science?

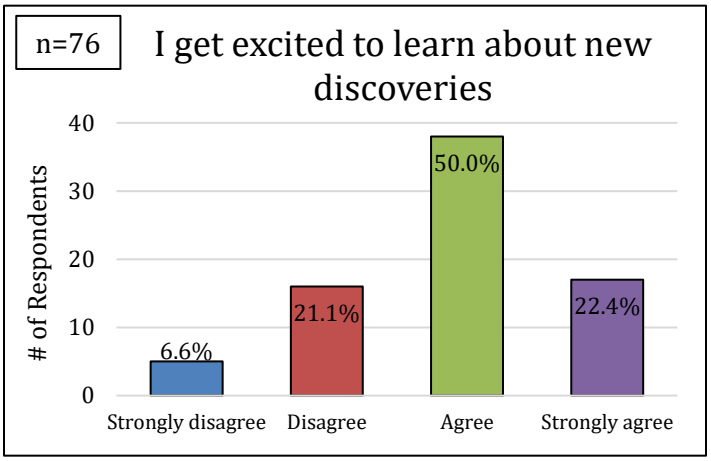
In the first section of the CI, youth were asked 10 questions on how they feel about science. The frequency distributions for each of the items are provided below, with the percentage of youth for each response (Strongly Disagree – Strongly Agree) located on each bar.

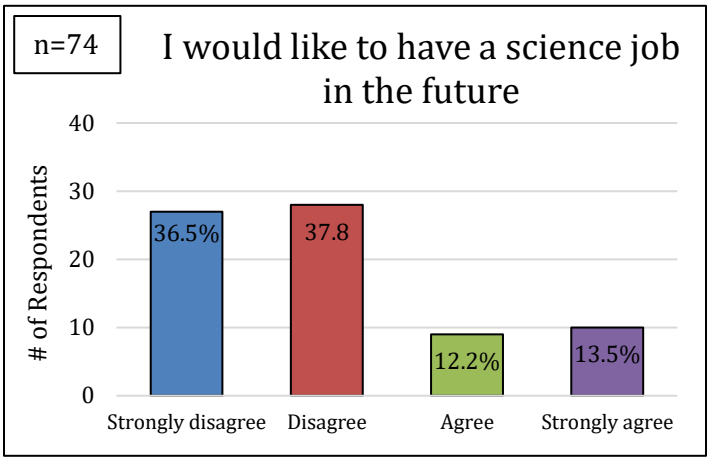


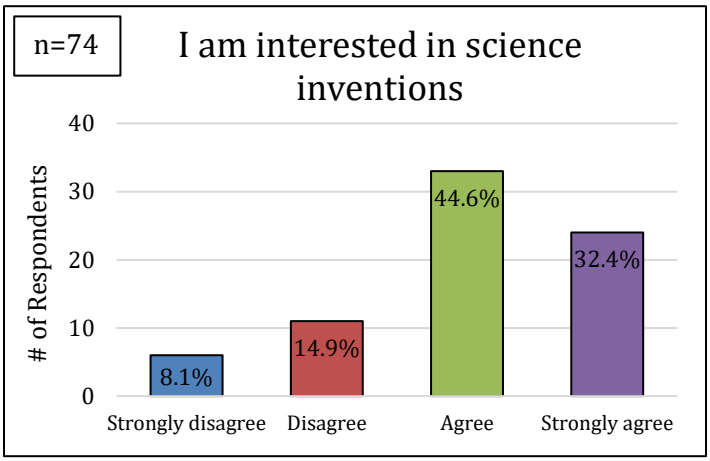


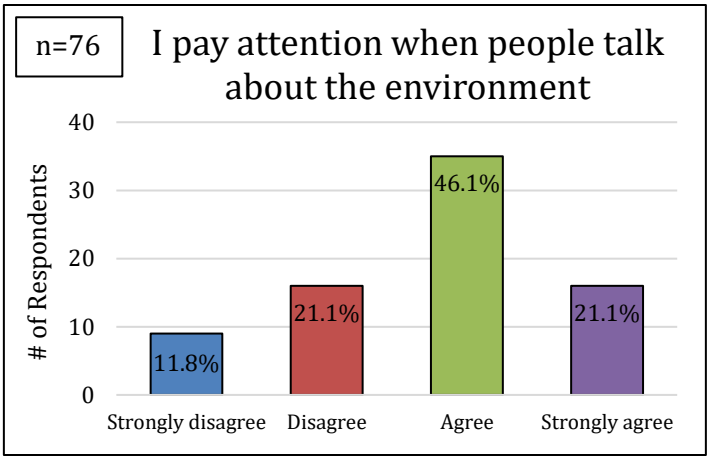


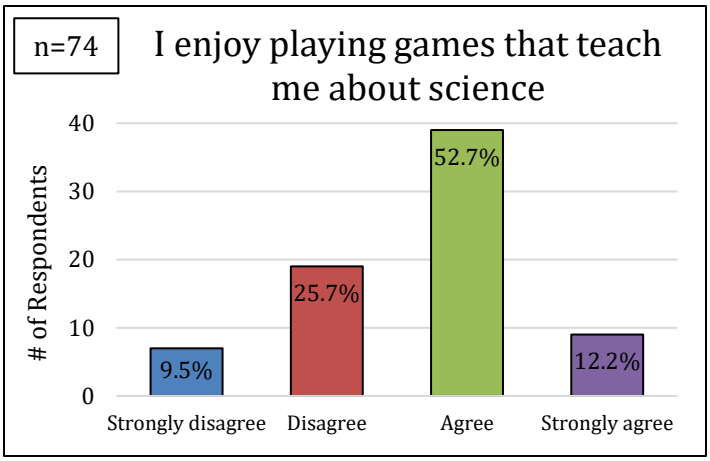


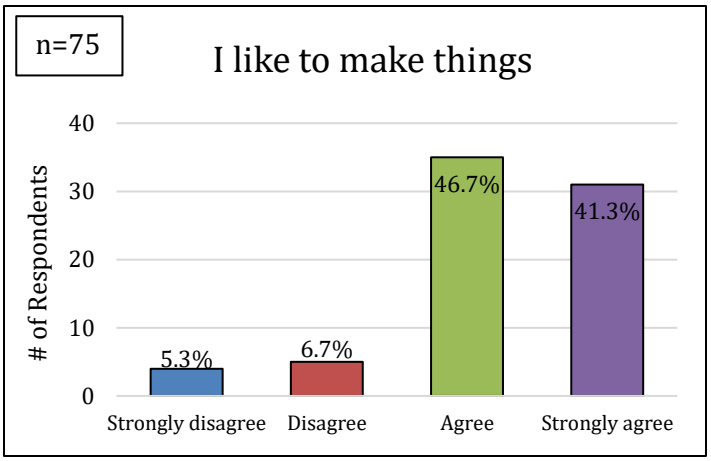

n=76
I get excited to learn about new discoveries
# of Respondents
40
30
20
10
0
6.6%
21.1%
50.0%
22.4%
Strongly disagree
Disagree
Agree
Strongly agree


n=74
I would like to have a science job in the future
# of Respondents
40
30
20
10
0
36.5%
37.8
12.2%
13.5%
Strongly disagree
Disagree
Agree
Strongly agree


n=74
I am interested in science inventions
# of Respondents
40
30
20
10
0
8.1%
14.9%
44.6%
32.4%
Strongly disagree
Disagree
Agree
Strongly agree

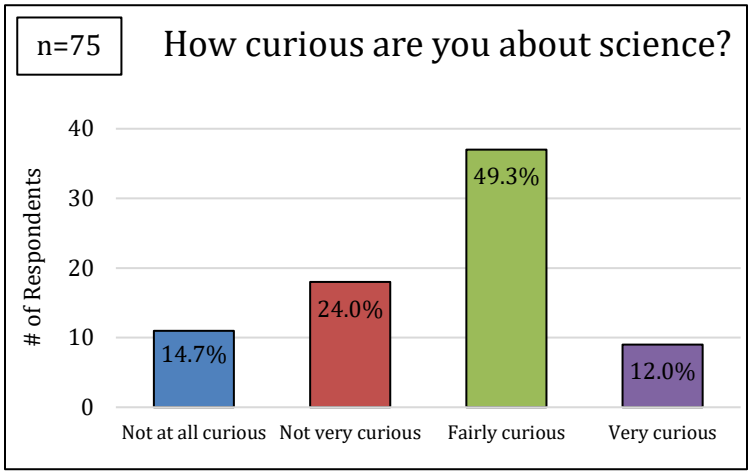

n=76
I pay attention when people talk about the environment
# of Respondents
40
30
20
10
0
11.8%
21.1%
46.1%
21.1%
Strongly disagree
Disagree
Agree
Strongly agree

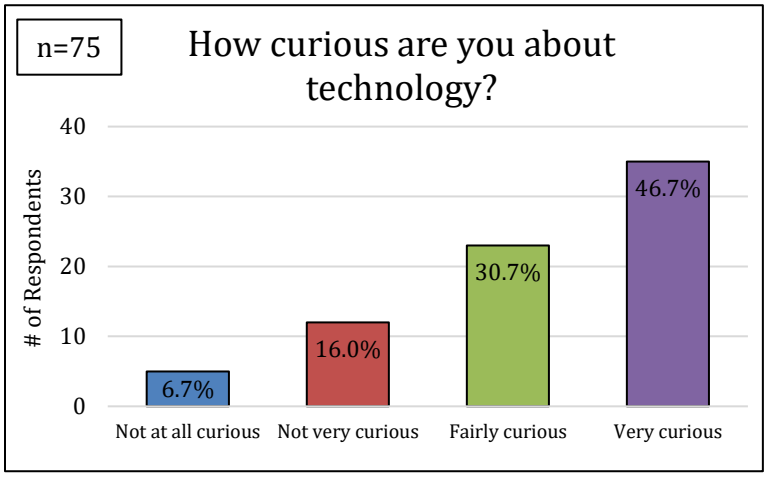

n=74
I enjoy playing games that teach me about science
# of Respondents
40
30
20
10
0
9.5%
25.7%
52.7%
12.2%
Strongly disagree
Disagree
Agree
Strongly agree

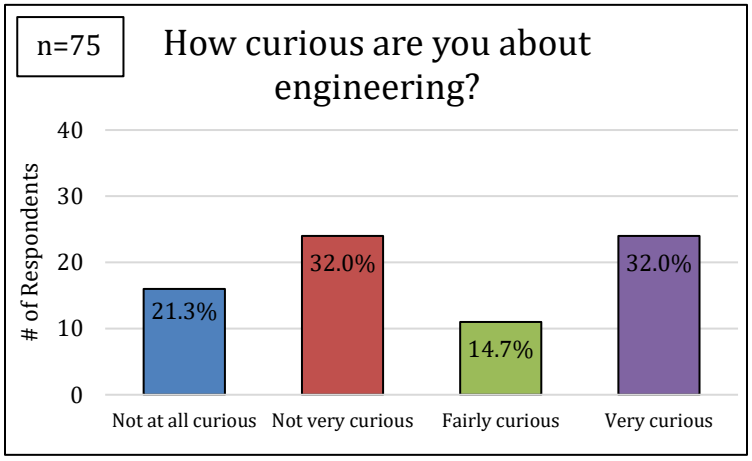

n=75
I like to make things
# of Respondents
40
30
20
10
0
5.3%
6.7%
46.7%
41.3%
Strongly disagree
Disagree
Agree
Strongly agree

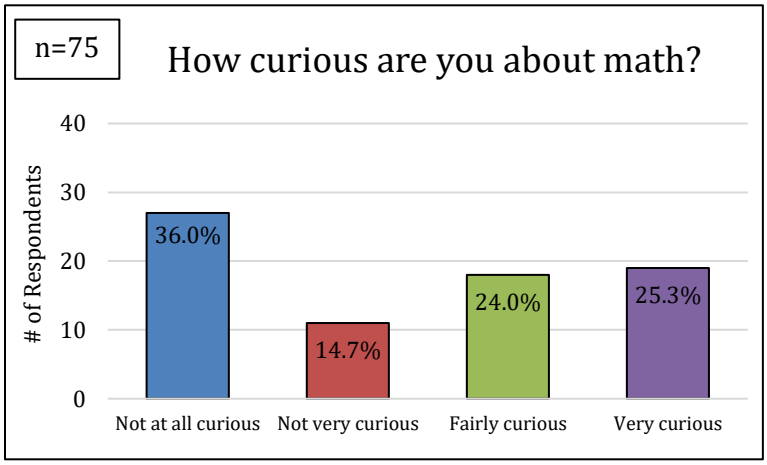
Section II: How curious are you about STEM topics?

In the second section of the CI, youth were asked 4 questions on their curiosity level of various STEM topics, including science, technology, engineering, and math. The frequency distributions for each of the items are provided below, with the percentage of youth for each response (Not at all curious – Very curious) located on each bar.









Summary: Youth Survey Feedback

Summary

Across all locations, the majority of youth reported they get excited about science and like to participate in science activities. These positive perceptions extended to the other categories asking about understanding science, seeing how things are made, learning about new discoveries, making things, and paying attention to the environment. Youth also indicated they are curious about science and technology. Overall, youth reported strong positive perceptions of science and science-related activities.

Inconsistent feedback was found with questions that asked about interest in a science job in the future and youths' level of curiosity about math and engineering. Youth feedback from St. Louis, Fort Worth, and Memphis indicated the majority are not interested in having a science job in the future. The exception to this pattern were the results from San Antonio where the majority of youth indicated they would like a science job in the future. When reviewing these results, it is important to remember that a large portion of youth included in the sample from San Antonio attend a specialized learning academy where science and technology are emphasized more than traditional elementary and middle schools. Youth feedback on their level of curiosity for engineering and math varied across locations. As to be expected, youth in San Antonio expressed higher and more consistent levels of curiosity on these topics compared to youth from the other locations. The small sample from Fort Worth expressed high levels of curiosity for math but not engineering. In contrast, youth from other locations often expressed more interest in engineering relative to math.

As a whole, the snapshot of information on youths' perceptions demonstrate youth have positive attitudes towards broad science (e.g., getting excited about science, playing games that teach science, interest in science inventions) but express varying opinions about specific STEM aspects like

engineering and mathematics. Despite the positive perceptions of science and science activities, youth in the majority of locations do not express interest in pursuing science jobs in the future.

Limitations

Youth results provide a snapshot of evidence from a sample of participants from the four locations. Although the data point to consistent evidence youth hold positive perceptions of broad science aspects, it is not possible to determine if the training in C2S was responsible for these attitudes and/or if training changed these attitudes in any way. Retrospective post-then-pre questions were administered to a select group of youth, but as mentioned above, the data quality is suspect due to potential inconsistent interpretation of some questions. Further testing is planned with these retrospective questions to evaluate the degree to which they can be used to collect reliable and valid data from youth.

Section IV: Triangulation of Evidence

This report documents efforts taken from fall 2016 through spring 2017 to holistically evaluate training experiences with C2S. This holistic evaluation included three components: 1) interviews/focus groups with site or program directors/coordinators responsible for C2S trainings and frontline staff trained in C2S; 2) DoS observation ratings of frontline staff performance before and after C2S training; and 3) youth self-report attitudes and interest in STEM.

Interviews/focus groups with site or program directors/coordinators and frontline staff revealed that participants enjoyed and valued their training experiences with C2S. Based on the reflections of participants, there was value at both levels of the training experience (i.e., trainer and trainee). Trainers felt their staff were positively impacted through the experience and staff reflected on their own perceptions of impact.

"[C2S] opened the staff's eyes to see what they were doing and how they were interacting with kids."

"I felt that it [Click2Science training] helped make me stronger in a lot of places I didn't realized I was weak in."

Changes in staff were documents through the observation evidence collected using the DoS protocol. The evidence shown in section II of this report demonstrates mean improvement on 11 out of the 12 dimensions of the protocol. Some of the largest gains were made on the dimensions of inquiry, reflection, relevance, STEM content learning, and youth voice. Some of the overarching ideas found in these dimensions are engaging youth more purposely in STEM activities by allowing them independent learners rather than observers and purposely tying the

information back to a relevant learning goal. Some of the comments made by staff in the focus groups hinted that C2S helped them think about these aspects in a different way.

> *"I feel like Click2Science has really helped provide ways to get them [youth] engaged with purposeful questions and to get them doing more hands-on stuff."*

> *"To be honest I did not know what STEM was and we've done these activities in the past and it was like 'I don't know'…but after the training and the group meetings it definitely gave me a different insight with questions and how to approach them [youth] and how to get them excited for these activities. But really I learned was STEM was and I was able to teach that to kids."*

The leaders responsible for C2S trainings also felt C2S experiences gave their staff the types of information and support needed to improve their program delivery.

> *"So many times staff take a training and it's the theory of STEM…I felt Click2Science provided them [staff] with the actual skills of this is how you ask purposeful questions or this is an example of someone in a tinker room asking purposeful questions."*

Additionally, frontline staff highlighted the engaging material and feedback structure of C2S trainings compared to standard practice.

> *"Training was great because we had a chance to practice what we learned, got feedback, and suggestions instead of 'ok that is the training, good luck,' which is what we usually get."*

The third point of evidence, youth survey data, demonstrated that youth have positive perceptions of general science content and activities. Youth participants consistently indicated positive affect on questions related to general science as well as their level of curiosity in science

and technology. Interviews from the frontline staff support the evidence found from the youth survey data.

> *"Click2Science has helped me get them [youth] more engaged…not excited yet, just interested and more curious about it [STEM]."*

Additionally, observations ratings from the DoS found positive improvements on the dimensions of participation and engagement in STEM activities. Although the youth data cannot address potential change in general science attitudes and perceptions, the snapshot of data does help support some of the other sources of evidence regarding general affect towards science.

Youth feedback showed more variability on the question that asked about interest in a science job in the future. Except for the group of youth attending the specialized learning academy, the majority of responses to this question indicated youth are not interested integrating science more into their lives. Some of the lower responses to this question may be explained by ratings on the DoS protocol. In particular, frontline staff as a whole had lower mean ratings for the dimensions of relevance and reflection. It is possible the skills needed to make connections between science jobs that would be personally meaningful and relevant for youth are areas that could be improved upon in programming. Staff made strides on the dimensions that infused more youth-led problem solving strategies but additional steps need to be taken to link the engaging, fun activities with relevant jobs that youth may be able to do later in life.

As a whole, the sources of data point to the ability of C2S training to make a positive impact on frontline staff practice. Both the reflections expressed by frontline staff, their leaders, and the empirical evidence from the DoS showing improvement over time, support the role of C2S training in helping frontline staff. Youth data cannot support claims that C2S training

changed youths' perceptions, but the data does demonstrate participants taught by frontline staff trained in C2S hold positive perceptions of broad science-related aspects.

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Section V: Limitations and Next Steps

The data collected for this evaluation demonstrate that C2S trainings can make a positive impact on frontline staff perceptions and practice. Although the evidence is promising, additional work needs to be conducted to replicate these findings with a larger, more diverse sample of frontline staff. The small sample of participants included in this evaluation gave us the ability to take a deeper look at the different sources of evidence but to expand this study to a larger audience, several considerations need to be made for the next phase of research.

An aspect that will need to be more closely examined in the next phase of work will be the fidelity of training. Based on interview/focus group conversations, site-level training seemed to vary by location. Although participants had to meet a minimum level of training in terms of hours and general structure, conversations indicated variability in the quality and duration of these experiences. The next phase of research will need to consider including fidelity indicators to capture some of the potential variation across training experiences. Observation and interviews/focus groups can capture aspects of this variability but more objective evidence collected over time is needed, especially if the goal is to expand this work with a larger, more diverse sample. The inclusion of these types of indicators with a larger sample would allow for follow up investigations of potential training or contextual factors that relate to indicators of success (e.g., improvement on DoS, changes in youths' perceptions over time).

References

Borgers, N., De Leeuw, E., & Hox, J. (2000). Children as respondents in survey research: Cognitive development and response quality. *Bulletin de methodologie Sociologique*, *66*, 60-75.

Click2SciencePD (n.d.). Click2SciencePD. Retrieved from http://www.click2sciencepd.org/.

Common Instrument Suite (n.d.). Common Instrument Suite. Retrieved from https://www.thepearinstitute.org/common-instrument-suite.

Dimensions of Success (n.d.). Dimensions of Success. Retrieved from http://www.pearweb.org/tools/dos.html.

Hawley, L.R. (March, 2017). Click2SciencePD: Summary of Evaluation Evidence. Report prepared for Click2Science.

Hawley, L.R., & Stevens, J. (December, 2016). MAP Academy: Multiple-case Study of Click2Science Early Adopters. Report prepared for Click2Science.

Kiwi Crate Inc. (n.d.). Tinker Crate: Ages 9-16+. Retrieved from http://www.kiwicrate.com/tinker.

PEAR Institute (2009-2016). Dimensions of Success Observation Rubric. The PEAR Institute—Partnerships in Education and Resilience. Harvard University.

YMCA (n.d.). The YMCA. Retrieved from http://www.ymca.net/.