FINAL EVALUATION REPORT FOR MENTORED YOUTH BUILDING EMPLOYABLE SKILLS IN TECHNOLOGY (MYBEST)

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EXECUTIVE SUMMARY

The MyBEST (Mentored Youth Building Employable Skills in Technology) project, funded by a grant from the National Science Foundation's Informal Science Education program, concluded its three years of operation in 2006. This youth-based program was intended to provide participants with in-depth learning experiences involving information and design technologies. These experiences had a dual focus: enabling youth participants to gain fluency in using these technologies while showing them how adults apply them in work and academic endeavors.

MyBEST was a collaboration of the Youth Science Center (YSC) and the Learning Technologies Center (LTC) at the Science Museum of Minnesota. Year I focused on *design, engineering, and invention.* Year II focused on larger *social and environmental systems* at different scales and the ways that pieces of a system can inform understanding of the whole system. Year III focused on *communication and networks*. Participants gathered, formed, organized and presented information using computer-based communication, including digital movies and animation, web pages, music, and audio stories.

The conceived impact of the MyBEST project was inherent in its targeted audience: young people between the ages of 11–17 living in the inner-city neighborhoods of Minneapolis and St. Paul. The MyBEST project especially emphasized three under-represented groups with regard to their performance in science: girls, youth of color, and young people with low socioeconomic status.

Youth participants, comprised of volunteers, interns, and team leaders, each accomplished a planned sequence of learning activities. The participant pathway, from volunteer to paid participant (team leader or intern), was also a key element of the MyBEST informal science learning model. The internship program became a highlight for MyBEST. Staff members brought expertise both in youth development and technology education. They put a lot of effort to run the internship program. Interns worked on a variety of projects including building MyBEST website, working with museum visitors, and doing outreaches to communities. Most youth realized the increased responsibility of being interns.

Over the three years, MyBEST staff gradually defined the MyBEST approach to learning. The approach created hands-on opportunities for youth to build comfort with science process, including problem-solving, observation, and teamwork, rather than traditional science content. It was also an approach that recognized the value of each participant's creativity and uniqueness.

Scheduling remained a logistical challenge for MyBEST. Other challenges included the underdevelopment of the mentor program and the lack of a central database to track each youth's progress because of the program's drop-in nature.

PROGRAM DESCRIPTION

The MyBEST (Mentored Youth Building Employable Skills in Technology) project, funded by a grant from the Informal Science Education program of the National Science Foundation, concluded its three years of operation in 2006. This youth-based program was intended to provide participants with in-depth learning experiences involving information and design technologies. These experiences had a dual focus: enabling youth participants to gain fluency in using these technologies while showing them how adults apply them in work and academic endeavors.

MyBEST was a collaboration of the Youth Science Center (YSC) and the Learning Technologies Center (LTC) at the Science Museum of. The original program plan was organized by three major themes coinciding with the three-year duration of the project. **Year one** focused on *design, engineering, and invention*. Participants used different types of programmable computers and develop ways to adapt and connect those computers to everyday materials and events so that their projects move, sense the surroundings, or create light or noises. **Year two** focused on larger *social and environmental systems* at different scales and the ways that pieces of a system can inform understanding of the whole system. Participants developed methods for monitoring, collecting data, and making computerized and physical models to help analyze what is happening in a complex system so that they could predict change in the system over time. **Year three** focused on *communication and networks*. Participants gathered, formed, organized and presented information using computerbased communication, including digital movies and animation, web pages, music, and audio stories.

The MyBEST project was broken down to cycles, seasons, and years. The project lasted three program years (2003-2004, 2004-2005, and 2005-2006). There were three seasons within each program year: fall, spring, and summer, and there were three to four cycles within each season (Please refer to Table 1 for the breakdown of the MyBEST schedule within one program year).

Unit	Fall		Spring			Summer					
Cycle											
Season											
Year											

Table 1. Breakdown of the MyBEST Schedule within One Program Year

Youth participants attended a series of *workshops* where they were introduced to new technologies and had time to achieve some fluency in using them. They participated in *open labs* where they applied these technologies to projects of their own design with support from knowledgeable adults and peers. They also attended *career workshops* that included team building, effective communication skills,

developing an educational plan, and *field trips* to colleges and corporations. They prepared and presented their projects to museum visitors and/or children at community partner sites. Those participants who were ready held internships in academic and corporate work settings.

The conceived impact of the MyBEST project was inherent in its targeted audience: young people between the ages of 11–17 living in the inner-city neighborhoods of Minneapolis and St. Paul. The MyBEST project especially emphasized three under-represented groups with regard to their performance in science: girls, youth of color, and young people with low socioeconomic status. Youth participants, comprised of volunteers, interns, and team leaders, accomplished a planned sequence of learning activities.

The MyBEST project engaged youth in creating a learning community for science, technology, engineering, and math (a.k.a. STEM-based IT) through creative technology projects led by adult professional mentors in science and the arts. The MyBEST staff led orientation sessions for mentors as new mentors were recruited. The youth participants had opportunities to present their ideas and projects to museum visitors, online audiences, and community organizations.

Volunteers were recruited from the community to participate in MyBEST workshops, labs, and field trips. Team leaders, who assisted the volunteer team, were relatively older in age and have stayed in the program for a relatively longer time. Team leaders received a nominal salary and performed a leadership role among volunteers. Interns were hired in the third season of Year I. During Years I and II, interns were recruited (interviewed and hired) from the volunteer pool, and were youth whohad stayed in the MyBEST project for a relatively longer period and felt comfortable working on technology-related projects within the Science Museum. In Year III, as the intern component of the project grew, some interns were recruited from the community, and joined intern teams without first being volunteers.

MyBEST involved participation from both adult and youth volunteers as well as program staff. The descriptions of different roles are given in the Table 2.

Roles	Description
Volunteer	Volunteers are youth participants (7 th -9 th grade) who are
	recruited to MyBEST and participate in workshops, labs, and
	field trips.
Team Leader	Team leaders are youth participants who are relatively older in
	age (10 th -12 th grade) and have stayed in the program for a
	relatively longer time. The team leader gets a nominal salary
	and performs the leading role among volunteers.
Intern	Interns are youth participants who are relatively older in age
	$(10^{\text{th}}-12^{\text{th}} \text{ grade})$ and have stayed in the program for a relatively

Table 2. Description of MyBEST Roles

	longer time. Interns are hired to work on projects for the Science Museum, and occasionally outside clients.
Project Lead	Project leads are part-time staff who assist with the leadership of MyBEST teams.
Mentor	Mentors are adult volunteers who help youth participants with their assignments and answer their questions while conducting hands-on instructions.
Assistant Project Managers and Project Managers	Project managers and Assistant Project Mangers are full-time or part-time museum staff who lead MyBEST teams by designing workshops, implementing programs, and performing administrative work to run the project.

EVOLUTION OF MYBEST

At the beginning of Year I, MyBEST had the following goals:

- Learn creative problem-solving skills, enabling them to use appropriate technologies in innovative ways;
- Achieve sufficient fluency with selected information technologies to enable them to apply these technologies in academic and workplace settings;
- Learn how to connect the skills and habits they develop through program activities to the achievement of future work and academic goals;
- Surround themselves with a support network consisting of working professionals in a variety of fields, family, peers, and museum educators;
- Develop communication and interpersonal skills crucial to successful work and life relationships.

These goals sounded rather ambitious. However, they were hard to understand and amorphous to implement.

MyBEST staff were concerned by the above mentioned goals as well as the interpretation of the Year I evaluation because of the tension between academic rigor and youth participation. According to the program director, "Science is included where it is relevant to the technology, but rigor for rigor's sake leans too much toward formal education. This question of the delicate balance between informal settings and academic settings continues at each advisory meeting and during each content planning session. The project team believes that program goals can and are being met within the informal structure of the MyBest program."

The Year II advisory meeting was convened in April, 2005. The focus of the meeting was to identify strategies for assessing learning to help answer the content question initiated in year one and to help the youth participants, their parents, and program staff think about program impact more concretely. The meeting redefined and simplified the language of MyBEST program goals as follows:

- Enjoy learning;
- Feel comfortable using new technologies;
- Creatively solve problems;
- Know about technology careers and what is needed to join those careers; and
- Present their knowledge to others.

Staff members and advisory members were able to agree upon modified goals. The new goals were clear enough to implement and relatively easy to measure. Over the three years, MyBEST had developed the pathway model for informal science learning - volunteer→intern→outreach. The model emphasizes on hands-on learning, learning-by-doing, and exposure to science and technology.

Mary Ann Steiner, the former program director recapped what MyBEST was really about:

So basically, everybody has different interests. For some people, it is communicating with people, some people is the science, some people is contributing to the museum. What we are trying to do is to grab all these people with different interests and get them engaged in science. To bridge their interests. I think especially with the volunteers who are in the middle school, if they could have a fun experience with science and technology, with that, when they are going to high school, instead of saving, "I am not going to take that because I am not good at math," they might say, "That's what I did in the museum, I am going to take that." They may say here, "I am not going to be a scientist." If this opportunity opens up several doors to them, it's just about creating a rich environment around them. It's about changing their attitude, what's possible to them. It's not saving this is what you should become. It's saying you have all these possibilities. We try to help kids to discover this is fun and exciting. It's about innovation, it's about picking up things and trying them out, working in the team. We are casting a wider net, maybe bringing in kids who never thought about these opportunities.

There were two critical incidents, which, in reality, shaped MyBEST into what it looks today. The first incident happened in Year I when the tension between academic rigor and informal hands-on learning surfaced at the advisory meeting. Whether MyBEST should emphasize promoting rigor of science content in programming became a bewildering question. Not until Year II did the situation get more clear.

In March 2005, MyBEST staff tested youths' use of technology in a playful way. The test was designed to employ rapid prototyping skills and the ability to choose and apply the appropriate technology to a problem. Two of the youth team leaders, planned the challenge: to booby-trap the Youth Science Center (YSC). They introduced the idea, showed an example of a simple circuit with an aluminum foil switch, a battery, and a buzzer. They showed the materials that they'd gathered: wire, batteries, lights, foil, tape, and wire-strippers. They said there were crickets (tiny programmable computers) if people wanted to use them. The volunteers worked on teams of 2 and 3, and had only 30 minutes to build – this activity was about prototyping an idea and getting as far as you could, not about making something that would work forever.

Youth loved this activity. They used lots of ideas. Two volunteers started building a buzzer that went off when you sat on the couch – they had fun trying to figure out where to place it and how hard a person had to sit down to trigger it.

Two girls strung together lights in series. They triggered these to light up when somebody moved the computer mouse over a certain part of the mouse pad. They had to figure out which bulbs were burned out so that the whole circuit would work, as well as how many bulbs the batteries could power.

Three boys built a car and added sensors to it so that it would drive around your feet. Then they mounted a stuffed armadillo to the top to create a moving creature.

Another two volunteers asked for a sound recorder that could be controlled with the cricket. They used a light sensor so that the food cabinet would shout, "Put your dishes in the dishwasher now!" whenever someone opened the door.

Staff members reflected on this test, volunteers' ideas was novel, but all drew upon things they had done or seen done before: programming cars to pay attention to their surroundings, circuits with sensors and outputs they had tried in building pinball machines and musical instruments, and an attention to the bigger system of the YSC – which couch did people sit on the most, what would surprise people, how can we remind people to clean up after themselves. It was an informal and fun way to see the design skills volunteers had been building in action and to see materials and technologies they been working with applied creatively to a new problem. The central goal of MyBEST became clear – youths' fluency with technology over time by developing hands-on problem solving skills.

The second incident was around interns' scheduling. The internship program did not go smoothly all the time. The program director reflected on the clash between staff members and interns around a schedule conflict in the annual report. The clash revealed two lessons learned: 1) personal relationships and social environment are crucial for youths' participation; and 2) informal leaders, who are mostly vocal, do not necessarily represent the whole group.

A MyBEST Program Story: Change and Set Back MaryAnn Steiner

At the end of the summer 2004, two of MyBest's three coordinators, the youth and mentor program coordinators, both resigned, one to pursue a PhD at Kings College in London and one because her family moved to California. MyBest brought on several new staff in the winter of 2004/5 and learned a new lesson, the hard way, about preparing teens for the changes in these essential relationships. This experience has reinforced the importance of the social environment and relationships as central to teen participant success.

MyBest leadership failed to attend to the importance of transition or to recognize the teens' knowledge of the program as new staff members came into MyBest. This set the new staff and teens up for a clash. The issue was not fully recognized until a parent called staff members to complain about their child's experience, they reported that the teens did not find the program fun like it used to be. In an effort to make the intern positions serious and content focused (partially in reactionary rather than reflective response to evaluation and advisory comments), the new crew came across as dismissive and bossy. The overall situation was the result of two things, staff transition and the upcoming sports season. Both of these situations combined together and created a melt down that was hard to sort through until the whole program sat down together and talked it through.

The untangled feelings, distilled by the teens after a group discussion were:

- The interns were feeling the loss of large group time (as interns they worked in small focused teams whereas before the intern program all the teens met together)
- They wanted flexibility in scheduling to participate in sports (no more cycle flexibility like in the volunteer program with the intern's longer term projects of 6 months to a year.)
- Staff attitudes changed resulting in a lack of "family feeling"
- Work time felt like school and it never used to
- The program says this is real world, but we are treated as kids and not valued for what we know about the program- we should have trained the new staff in!

Steps teens requested to attend to those feelings:

- Program staff and teens created a weekly Saturday meeting for all the interns to meet together, report on their experience and progress, and have professional development workshops.
- Teens and staff together created a schedule with one shift per week so interns could work around game schedules.
- YSC provided more professional development and coaching to new staff to help clarify the MyBest/YSC approach to working with teens.

This process was very important for the now larger MyBest staff. It brought the focus back to the importance of communication across projects about teen

experiences and interests, of communicating with parents to gain support in engaging youth participants, and of sharing strategies to engage the teens in particular content areas.

The changes made in response to this upheaval were important in re-establishing the role of the teens in defining the program and their involvement in it. It was also important in pointing out the value of speaking out. Around the sports schedule, staff had been very clear about the commitment of the position, and most of the interns were prepared to give up a sport for the position. The combination of new leadership and conflicting interests in activities were what caused this larger problem. It was hard for the teens to decide what to do. Suddenly staff were asking for more focus and they had new responsibilities, they knew they were frustrated and new staff who were asking them to choose between sports and work became the target of that frustration. Stopping to talk through the experience helped to refocus everyone on what makes the program work--shared commitment to the experience and learning.

As the season progressed, more interns talked with staff, as did their parents about the value of the position, the importance of commitment, and the importance of holding a job with real-world expectations. In the end, only a few interns used the flexible schedule or left the program. Many of the interns were frustrated with the scheduling piece of the discussion, but didn't speak up until after the process was over. These experiences led staff to believe that the main frustration had been that they were not feeling heard and didn't like the sudden change in style of the program team. It also reminded us that even though these are jobs, work can be fun, social, creative, and meaningful all at the same time. MyBest at its best helps young people develop a sense that work can be something inspiring and motivating and that you have to speak up for what you want and consider the interests of others in what you do.

EVALUATION DESIGN

Evaluation Purposes

The evaluation of MyBEST followed the trajectory of the MyBEST program (See Evaluation Report of MyBEST-Year I, 2004 and Evaluation Report of MyBEST-Year II, 2005). The purposes of this final MyBEST evaluation were to collect information about the impact upon student learning as a result of participating in the MyBEST Project, as well as to summarize the lessons learned. In addition, these evaluation results will add to the ITEST Learning Center's shared knowledge.

Areas of Inquiry

Logic model evaluation

• Investigated a model based on a constructivist approach to hands-on design

and playful investigations with computer technology, electronics, engineering and art (Please refer to Appendix A for the MyBEST logic model).

Impact on the project participants

- Determine students' needs, concerns, and opinions about the project's technology as a facilitator of their learning.
- The impact of participation in MyBEST on students. Discover and describe the different ways in which students use the program's resources in their learning.

Tracking student impact

• Find efficient ways for MyBEST to record and track student impact over time in the areas of student knowledge, skills, and attitudes.

Recruiting and retention

• Evaluate the systems that recruit and support students and adult mentors.

The program as a whole

• Determine which aspects of the overall program are most successful and which aspects are least successful or most problematic, and why.

As described in the proposal, the evaluation plan had a number of components and evaluation activities for each cycle, season, year, overall, and the end of the project (Please refer to Appendix B).

Data Collection Methods

Site visits. The evaluator spent, on average, 4 hours a week at the Science Museum, observing and speaking with youth participants, mentors, site coordinators, and staff about their satisfaction and involvement with MyBEST. The evaluator also went on field trips and outreach together with youth participants and staff.

Observations. When on site, the evaluator observed youth participants' participation in workshops, labs, projects, field trips, outreach, and other events (e.g., family events, youth festivals, and etc.). The observations were noted down and the observation notes were kept on file for analysis.

Interviews. Both individual interviews and group interviews were conducted at different times throughout the 3 program years. Thirteen youth participants (including volunteers, interns, team leaders, and the youth coordinator), 3 mentors, 7 staff members, 4 parents, and 3 teachers were individually interviewed. The individual interviews were semi-structured. The interviews lasted 30-50 minutes. Three group interviews with parents were conducted at the end of each program year (13 parents attended in Year I, 9 in Year II, and 11 in Year III). Each group interview lasted 1 hour to 1 hour and a half. In Year III, a group interview with teens was also

conducted. Over 40 youths attended the group interview. The number was overwhelmingly large for a normal group interview. Only some outspoken teens shared their views out loud, although many of the rest nodded their heads from time to time. All interviews were transcribed and themes were categorized.

Document and artifact analysis. A review of program documents was conducted. The program documents included program goals and expected outcomes, the program proposal, and annual reports for Year I and Year II. Youths' written journals were reviewed to evidence their MyBEST experience. Program staff also created logs to document what happened on each program day. One intern team (Make-it team) initiated online blogs so that interns were able to put their journals online to substantiate their learning. In addition, many end-project products were kept as artifacts to show the program results (e.g., volunteers' efolio websites, computer games, the MyBEST website, pinball machines, pinhole cameras, and etc.).

Survey. A series of surveys, including entry surveys, end-of-season surveys, end-ofyear surveys, and end-of-project surveys, were created and put online for youth participants. New-to-the-program youths would fill out the entry survey before they started participating in MyBEST. There were 54 entry surveys collected. The results of entry surveys were analyzed and considered as baseline data. Other surveys were implemented at the end of the seasons, years, and the end of the project. The results of the end-of-project surveys were analyzed and served as output data. Two different sets of surveys were created for volunteers and interns including team leaders respectively because volunteers and interns could not be compared directly based upon their different level of involvement with MyBEST. One limitation of the comparison between the entry survey and the end-of-project survey was the population had changed because of the drop-in model MyBEST was using. Youths came and went. Only several youths had stayed with MyBEST from beginning to end. Therefore, the direct comparison of the results between the baseline data and the output data was a little problematic although the overall trend did show differences before and after.

Informal case studies. The sample of 4 individuals was purposefully selected originally by recommendation of staff members. However, two of them dropped out: one of them switched to the other program in the Youth Science Center, and the other quit MyBEST for the time the case study was conducted. The evaluator had to find two replacements. The evaluator ended up having selected 2 volunteers, a boy and a girl, and 2 interns, a boy and a girl, as case study subjects. The girl volunteer had consistently attended the workshop during Year II; the boy volunteer was not able to participate regularly because of the limited transportation accessibility. The girl intern started MyBEST since its inception. She later dropped out the program before the program concluded. The boy intern was only able to attend MyBEST during the summer time. In Year III, none of these 4 youths was able to attend MyBEST regularly. Therefore, the case studies were of informal nature and were not able to manifest thick and rich stories.

RESULTS OF THREE YEARS

A Diverse Group of Youth Participants

In Year I, according to the survey results, the youth participant body was comprised of 32% white students and 68% non-white students with nearly half of youth participants came from low income families, based on whether they received free or reduced lunch at school. In Year II, this ethnic diversity remained. Among the eleven new volunteers, four were Asian American, three were African American, two were Caucasian, one was other African descent and one was bi-racial. In Year III, 8 out of 27 youth were African American and 11 out of 27 were Asian American. (Please refer to Table 3 for the breakdown of youth ethnicities, including total numbers from the participant database). Among this diverse group of youths, the percentage of girls is higher than that of the boys. (Table 4 shows the percentages of boys and girls who joined MyBEST). Because MyBEST maintained a diverse group of youth participants, one parent was very happy about the diversity MyBEST promoted. She commented in the parent group interview:

The best thing I see in MyBEST is diversity – the exposure that the kids are getting to diversity in a setting that is generally all Caucasian. Because we live in a multicultural world, we need to learn how to navigate that.

	End-of-project Survey		Consolida Sur	ated Entry vey	Participant Database	
Ethnicity	# of people	Percent (%)	# of people	Percent (%)	# of people	Percent (%)
Asian/Asian- American	13	31.71	17	31.48	15	18.07
African American	14	34.15	15	27.78	27	32.53
Caucasian	7	17.07	12	22.22	19	22.89
Hispanic/Latino/Sp anish	3	7.32	3	5.56	8	9.64
Other African descent	1	2.44	3	5.56	4	4.82
Bi-Racial	1	2.44	2	3.70	7	8.43
Not Provided	2	4.88	2	3.70	1	1.2
Total Respondents	41	100.00	54	100.00	83	100.00

Table 3. The Breakdown of Youth Ethnicities

Table 4. Gender Distribution in M ¹
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	End-of-pro	ject Survey	Consolida Sur	ated Entry vey	Participant Database	
Gender	# of	Percent	# of Percent		# of	Percent
Distribution	people	(%)	people	(%)	people	(%)
Male	19	48.00	21	38.89	34	40.96
Female	21	52.00	33	61.11	49	59.04
Not Provided	1		0	0.00	0	0.00
Total Respondents	40	100.00	54	100.00	83	100.00

Youth Satisfaction with MyBEST

According to the end-of-project survey, 95 percent of youth participants felt positive or somewhat positive about MyBEST. Only 1 youth out of 40 who were surveyed said his or her feeling about MyBEST was somewhat negative. Nobody felt negative about MyBEST. (Please see Table 5).

			Percent
		Response	(%)
Positive		32	80
Somewhat positive		6	15
Neither positive nor negative		1	2
Somewhat negative		1	2
Negative		0	0
	Total Respondents (skipped this c	uestion 1)	40

Table 5. Overall Feeling about MyBEST

To measure satisfaction, the evaluator used the following rating scale in the end-ofproject survey: not very satisfied-soso-ok-satisfied. (Please refer to Table 6). The top three satisfied areas were "Comfortable, supportive atmosphere," "Friendly and helpful staff/mentors/intern hosts," and "good place to learn." The relatively least satisfied areas were "Getting paid," "Learning about technology careers and what is needed to join those careers," "Getting help with homework and ACT prep," and "Time and schedule." (Please refer to Appendix C for the complete list of these rankings).

		Not very				Response
Ranking	Item	satisfied	So-so	lťs OK.	Satisfied	Total
	Comfortable, supportive					
1	atmosphere	0% (0)	5% (2)	15% (6)	80% (32)	40
	Friendly and helpful					
2	staff/mentors/intern hosts	3% (1)	0% (0)	18% (7)	79% (31)	39
3	Good place to learn	0% (0)	0% (0)	24% (9)	76% (29)	38
18	MyBest times and schedule	3% (1)	13% (5)	32% (12)	53% (20)	38
19	Getting help with homework and ACT prep	5% (2)	3% (1)	41% (15)	51% (19)	37
20	Learning about technology careers and what is needed to	20/ (1)	159/ (6)	269/ (14)	460/ (18)	20
20	Join those careers	3%(1)	15% (6)	30% (14)	40% (10)	39
21	Getting paid	24% (8)	6% (2)	27% (9)	42% (14)	33
	Total Respondents					41

Table 6. Youth Satisfaction with MyBEST

One limitation of these results was the surveys did not get to all youth participants who had ever participated in MyBEST. Since many volunteers and interns did not participate in the summer season, they didn't get the chance to take the end-of-the-

year surveys. This was, however, unavoidable due to the drop-in model MyBEST was using.

Enjoyable Learning

To assess learning has long been a difficulty in evaluating the MyBEST program. Being an exploratory informal science education program, MyBEST brought a very hands-on approach to learning. The Year I evaluation report noticed this challenge and recommended holding youth more accountable by implementing performance assessments to find out what they have learned, letting them reflect, and documenting their learning.

Youth reported in the interviews that they had been learning

To document their learning, the evaluator interviewed youth participants in Year II and Year III. Most youth participants told the evaluator that they have learned a lot by participating in MyBEST. The following two quotations were examples of youth reported learning. One of them was from a volunteer; the other was from an intern.

I remember we learned – well, I know how to use crickets (a tiny programmed computer), of course, so I know how to program them and everything – and then one of the first things we learned how to do was, like, learn how to circuit, use circuits, have a battery and then kind of have an alligator clip, connect it to something and it can turn a light on or something. And then I remember in school we had to kind of do the same thing and I was like, "Oh my God, I already learned that at the Science Museum," so I kind of knew how to do it, and that was cool.

I really appreciated it [the internship] because I learned how to work with people and I really learned how, like if you don't know someone, you just can't assume and understand. You have to try to do something, even if it's hard. You have to try, you know. It's mainly I changed the way I do things in life. Like if I meet someone, I can't just be like I don't like her because she doesn't have nice clothes. It's not the clothes that the person has on their back that makes them a nice person. It's their personalities and how they are around people. It got me to do a lot of the things I do, just work with people and just see what kind of careers I want to go to. Like how to do projects and how to work with others, like these people are equal – your co-workers.

In terms of things learned in MyBEST, the most popular answers were computer skills and working with data, MyBest is an interesting program, conjoining of many elements. It combines science with art and moves students to explore the areas inbetween. -- From a volunteer's journal interpersonal communication skills, hands-on experience, leadership skills, and creativity and art.

Parental Appreciation of MyBEST

They let them [students] play with them [the technology]. They tell them: "Here is the principle you are working with, here are some materials we have. See what you can do to apply it." For a lot of kids, it's an effective way of really getting them to see how it works. When they did musical instruments, some of them were very sophisticated, given the materials they were working with. MyBEST hosted three parent group interviews. All parents reportedly felt grateful to have their children participate in the MyBEST program. They also reported their children became more focused in school and that their interests in science and technology were growing.

-----A parent

Parents saw behavioral changes in their children

Parents noticed their children sounded positive, excited, and tended to use the terminology of science and technology at home. They felt their children's self-esteem was boosted. They became more confident in themselves. One parent said that their child was given full respect, which increased his self-esteem and sense of responsibility.

I see an increased sense of confidence in my child - just tremendous. And because, I think, the kids are given so much responsibility – they have badges, they're allowed to get into secured areas of the building – she treats that with a great deal of respect. I see her sense of responsibility growing and hitting on a more mature level.

Another parent talked about how the interview selection process to join MyBEST actually helped her son increase his confidence.

I think it [joining MyBEST] is one of the best things that has happened to him.....He knew it was kind of competitive because he had to interview. And so he had to learn how to express himself, and the fact that he was accepted just sort of was a boost to his self-esteem, and he's taken the program really serious because...yeah, he's taken the program really serious because he had to interview and he had to be accepted by a group of people who looked at him and said that he would be a good candidate.

Parents also saw their children become more responsible and take the program really seriously.

As far as I see my child...I see him becoming more responsible. And the reason why I say that is because I don't have to tell him that he has to go to the Science Museum for the program, I don't have to tell him what time to take the bus or anything like that. He looked up the bus schedule for school for the first time when he joined this program, was when he was able to take the bus because I always pick him up and take him. And so he takes the bus from school. He makes sure he's on time. And then in the summer he leaves one program, which is up in Lauderdale, to take the bus all the way here from that. So I see him growing more responsible because he looks at it as – he takes it very seriously – he looks at it as a job.

Parents appreciated MyBEST staff members' hard work

All parents who attended the group interview agreed that the program was going well. They appreciated the diversity in MyBEST. They believed MyBEST had a very healthy and encouraging environment because staff members were very respectful to young people. Staff really worked well to make sure young people's needs were met. Parents were reportedly pleased with staff. One parent said, "I appreciate the supervision as well as the independence that staff all expect of the kids. They are assigned projects that they have to do, they are responsible for that, and they take pride in that.

Participants' Comfort with Using Technologies

Youth participants reportedly benefited most from activities that were both fun and challenging. They got exposed to science and technology in a way most people do not. They attended a series of workshops where they were introduced to new technologies and then participated in open labs where they applied those technologies to projects of their own design with support from knowledgeable adults and peers. They prepared and presented their projects to museum visitors and/or children at community partner sites. They were encouraged to think independently and solve open-ended problems. The program gave them time and support to explore options. The program provided an opportunity for students to move through it, gain more responsibilities, and eventually get paid for their efforts. Table 7 illustrates youths' comfortable level with their computer skills.

In addition, among the new technologies learned at MyBEST, 50 percent or more youths reported they felt comfortable working with cameras, online research, crickets, teaching others, and stop motion. Between 46 percent and 49 percent youth were comfortable working with iMovie, Scratch, and Flash. (Please refer to Table 8).

According to	End-of-Project Survey		Consolida Sur	ated Entry vey
	Response	Percent (%)	Response	Percent (%)
Very comfortable (can answer questions and teach others)	11	28.0	11	20.4
Comfortable	17	42.0	19	35.2
Pretty comfortable (can usually figure out how to do what you want to do)	6	15.0	19	35.2
A little comfortable (have to ask some questions)	6	15.0	4	7.4
Not comfortable	0	0.0	1	1.9
Total Respondents	40	100.0	54	100.0
skipped this question	1		0	

Table 7. Youth Participants' Rating of Their Computer Skills





Creative Problem Solving

One of the five goals of MyBEST was to build youths' creative problem-solving skills. Both interns and volunteers had opportunities to work in teams, carry out projects, and present to different audiences. They had clearly mastered certain problem solving skills. Table 9 uses examples youths provided to evidence their development of problem-solving skills.

Table 9. Examples of How Interns and Volunteers Problem Solve	Table 9. Exar	nples of How	Interns and	Volunteers	Problem Solve
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	Interns	Volunteers
Find	I have done some substitutions for	Basically coming up with alternatives.
alternatives	projects.	
	I consider all the possible solutions and the consequences of each solution. I pick the best one	If I am making a sandwich and I don't have any mayo left. I could use a problem solving skill of replacing the mayo with a different material.
		When you do an experiment and something doesn't go with it, you can take it out or add something else.

Ack for help	I talk to my frianda about how to do	Talk to one enother
ASK TOT NEIP	things.	
	If I'm not sure, I ask others for help and advice.	
Need patience	Sometimes I mess up a command. I'd have to calm down and go back and fix it.	
Look for tools	Figuring out certain tools that are more appropriate for the job.	Instead of having to use big huge electronics to figure out the speed of the river than I can just use a pin wheel.
Develop management skills	When I was trying to figure out the groups for the skill swap, I had to problem solve because it was difficult to figure out who needed to be teaching when, and who needed to learn what, and when.	
Better with younger kids	I learn how to get through kids who don't seem as interested in different ways.	
Take a try	I was in a group and we didn't have the material we needed. So we decided to improvise and we ended up making our project better than what we thought it would be.	
Pay attention to cause and effect		When my crank wasn't working, I found out that the hole was too small. So I used the power tools to make it bigger.
Find a solution		When the YSC meeting area got too loud we got together and thought up different ways to improve the space to minimize the noise that goes on in there.

Knowledge of Technology Careers

That youth came to MyBEST for different reasons was connected to their career goals. Because of the diversity, some of them were really serious about getting a career in technology (e.g., to get a job in computer/technology related field, to become a video game designer, to work with computers and engineering), but others were not. It was even more so for volunteers since they were still young; they would not necessarily start thinking of what they would like to do when they grew up.

However, when asked how MyBEST experience helped youth to achieve their career goals, most of them answered yes, MyBEST had been helpful to them. (Please refer to Table 10 for youths' career goals and how MyBEST had helped by ethnicity and gender.)

African American and other African descent					
career goals	How My BEST has helped?				
Female					
doctor, surgeon	yes				
to be a pediatric or doctor who listen to ultra sounds	yes learn how to use the computer				
To be a teacher or an athlete.	It's helped with my teaching goal because I now know more about different technologies and that helps.				
Entrepreneur. Actress. If I did anything in the science/math and technology field it would either be an interior designer, exterior designer/architect.	Yeah it gave me an experience in architecture.				
Marine biologist, something that has to do with science.	l don't know.				
being a pediatrician	technology				
I WOULD LIKE TO BECOME A CHILDREN'S DOCTOR.	YES IT HELPS ME IN SCIENCE WHICH I NEEDED.				
I want to be a medical scientist. be a doctor	Yes. Because it kept me focused on science. not really				
I'm still thinking about it	I like what I learn but I'm still thinking about my career				
	ı Male				
to become an auto technician computer engineer I really don't have a clear idea yet. video game designer	N/A am a better computer programmer (Read # 14) I created a few games				
	My Best has given me experience in teaching to others.				
Asian/As	ian-American				
career goals	How My BEST has helped?				
For I don't know yet, still thinking.	emale maybe, and I hope it's helpful in my career.				
I'm not sure yet bit its leaning more toward to science field for now.	Yes, it has help in more way then one. But showing me that there are more than one way to link science with.				
not sure yet, but am thinking more of math, science and technology careers	yes, it's helping out my work skills and what to kind of expect from other jobs.				
I'm planning to have my career goal in the technology field in the future. But one of my greatest dream is to become a fashion designer.	yes, my best help me learn more about computer. My experience on computer have increase since I became a intern here.				
My career goals in the future are to go to college, find a job I'll like to work also my interest, and I learn what I need to learn to do go in my career. I'll like to be a nurse or computer designer.	Yes. I have learned a few technology that can be useful for me for my career goals. I've learned to teach people and listen to them well.				
I want to be a teacher and a artist in the future.	Yes, My best helped me to gain what I was lacking at. What I was lacking at was communicating skills which in My best it made me feel comfortable communicating with others.				

Table 10. Youths' Career Goals and MyBEST by ethnicity and gender

Male					
Some kind of engineering job (don't know)	Not really, most of the things I already knew how to work, or don't apply to what I would like to do in the future, like I Movie or something like that				
going to college, getting a good job, and helping my family out	yes, It made me more interested in what I want to do.				
technological careers - graphic design - web design - flash design	yes, made me become more aware of what I need to learn				
I would like to major in physics and popular technology.	It shows what choices I have in careers by giving examples of jobs.				
something in computers or auto world	Yes. It give me way to get my hands on computers. It is the way that could lead me into a place in the SUM that give one opportunity in computer field.				
Not sure yet at the moment.	yea is has it's made my goals more clearer and showed me what my skills are.				
Information technology Infrastructure, Biomedical Engineer, software engineer	maybe				
Hispanic/Latino/Spanish					
career goals	How My BEST has helped?				
F	emale I				
I have not really decided that yet, but MY BEST has opened up a lot of great opportunities for me.	well I don't know about continue, because I had nothing really planned, but it has given me more options.				
Male					
A career in testing/making/distributing video games, or the something similar. Hopefully not a desk job.	Maybe. Don't know.				
I would like to be a Veterinarian. Not really					
Ca	ucasian				
career goals	How My BEST has helped?				
F	emale				
I want to be a Marine Biologist	I have learned a lot about science, so yeah somewhat.				
to either be a biology teacher or a contortionist in circa du sole.	yes be teaching me more about science				
Pharmacist, a doctor, a Psychologist or a career that has to do something with marketing.	The improvements and problems solving helped.				
I would like to join the Peace Corps and work with children either teaching or taking care of them. I would also like to help empower women in different countries to bring equality	Yes. I have worked with many children				
	Male				
become an electrician or an engineer	helped me learn more about new stuff				
I don't know specifically, but I want to do something involving technology.	Yes. It taught me about programming.				

Lessons from the Pathway Model

The MyBEST pathway developed volunteers to interns and moved them to outreach activities. MyBEST intern positions were created to allow older youth (grades 9-11) to develop a project with the guidance of adult museum staff, thus engaging them in science and museum work at a different level than the volunteers. The internship program became a highlight in the second year of MyBEST. The internships provided youth a variety of experiences. When asked what they have learned working as an intern/team leader, youth reported that they not only learned technology skills, but also learned soft skills like being more patient, flexible, problem-solving, public speaking, etc.

"Another strength of the internship program was the pathway that youth participants could take," as one staff member described,

They started out as a volunteer being exposed to a whole big wide array of technologies and applications and projects and people. And then they could move into internship that they choose. We don't assign them into a group. They are not assigned. They were interviewed for different internships. Then they stick to it for a while. They have a chance to change.

Underdeveloped Mentor Program

The Year I Evaluation indicated that sometimes mentors had a hard time connecting with students or finding things to do. If mentors were only around sporadically, then it was difficult for them to hop into a project or for student participants to include them in their projects. Sometimes the guest presenter and mentors were underutilized resources, either because of the timing or frequency of their visits or because of unclear roles.

In Years II and III, mentors for volunteers were still underutilized. As a matter of fact, the number of mentors who came to the MyBEST site became smaller and smaller. The end-of-the-year II survey asked about how volunteers would view mentors as role models; over half of them answered "no" since they were not around for most of the time. Different from volunteers, interns "liked" their supervisors very much. Staff members did take efforts in improving the mentor program. Those who did work as adult mentors enjoyed their time with MyBEST youth. Since adult mentors were volunteering their time and expertise, a commitment of multiple hours each week was hard to achieve.

Conclusions

MyBEST has served its designated goals although it did struggle in Year I with the tension between scientific rigor and hands-on learning. MyBEST represented a diverse group including youths from different ethnic backgrounds and different interests. Most of youth came to MyBEST for technology, social activities, and fun. Almost all youth participants were satisfied with their MyBEST experience. Parents were happy to send their children to MyBEST. They were very satisfied with MyBEST staff.

MyBEST created its pathway informal science learning model. The internship program became a highlight for MyBEST. Staff members worked hard to run the internship program. Interns worked on a variety of jobs including building the MyBEST website, working with museum audiences, and doing outreach to communities. Most youths realized the increased responsibility of being interns.

One logistical challenge for MyBEST was always the scheduling. At a superficial level, the scheduling conflict was because of the incompatibility of some youths' sports schedule and MyBEST hours. At a deeper level, the clash was caused by the negligence of the importance of personal relationships and social environment for youths' participation and an overestimation of informal youth leaders' influence. Other challenges included the underdevelopment of the mentor program and the lack of a central database to track each youth's progress because of the program's drop-in nature.

Over the three years, MyBEST staff gradually determined what they believed was the essence of informal science education. They were less concerned about the tension between the rigor of teaching science content versus hands-on learning. They believed MyBEST prepared youth participants to be creative and solve problems rather than focusing on science content.

Appendix A: MyBEST LOGIC MODEL						
ELEMENTS OF THE MODEL "The Program"	AS MEASURED BY "The Outcomes"					
 ELEMENTS OF THE MODEL "The Program" DESIRED RESULTS What is my long-term vision for the children, adults, or families in my community, or for my community as a whole? Contributing to the development of self-sufficient youth/young adults Greater representation of women, people of color and people from low-income background in the field of science and technology Technological fluency Ability to utilize local resources (people, materials, and funds) to accomplish goals MotivATING CONDITIONS AND CAUSES What are the factors, issues, or problems that my program is trying to improve or eliminate? Poor performance of schools with low income and minority youth Lack of opportunity to use materials and equipment to solve design and creative problems Isolation of young people from the world of work and professionals at work Consumer-based society – used to ready made products not problem solving Lack of participation by low income and minority communities in IT higher education and careers Lack of information technology programs that incorporate oren.ended activities and learning avertiences 	AS MEASURED BY "The Outcomes" © INDICATORS Ultimate Indicators – How will I know if my program's desired results have been achieved in the long-term? - Proportional diversity in IT careers, science and technology careers, college Require community-wide effort to affect Interim Indicators – If my program is successful, what changes do I expect to see in my community in the next few years? - Youth identify with IT careers and take steps toward achieving that through internships, math and science classes at school, and extracurricular activities - Youth graduate HS - Youth participation in internship program is model for STEM supportive programs					
 MyBEST PROGRAM STRATEGIES What are the broad categories of services or approaches that my program provides? Emphasis on learning process rather than specific tools or knowledge Awareness of careers using technology and ability to get those jobs Fluency using technology (appropriate use; a tool for problem solving) Working with people (of different age and background) to solve problems Fostering participation and desire to contribute to own community Leadership development MyBEST PROGRAM ACTIVITIES On a day-to-day basis, what do staff in my organization do? What services do we provide? Career and life skills workshops Presentations and teaching opportunities Field trips Summer and Year-round Internships Cycle workshops and hosts 3-week cycle open labs Open lab – independent work on projects Mentoring/Mentor interactions Homework help Interviews for youth and mentors Celebrations/Family open houses Trainings and orientations Food snacks and hang-out time 	 Ø PROGRAM PERFORMANCE MEASURES Measures of Effect – How will I know that the children or families I work with in my program are better off? Able to identify pertinent questions for their projects so they can get the information they need Able to transfer knowledge from one type of project to another Able to owork with materials and technology to solve openended problems Increased comfort with technology Able to explain what they've learned and teach others Broader definition of science and technology Able to work and solve problems with a variety of participants, mentors, and staff Measures of Effort – What does my program generate, what levels of activity do we produce? Number of participants Number of participants Number of presenters/hosts (partner participation) Number of trainings/meetings offered Number of potential contact hours 					

Appendix B: Evaluation Design

Cycle evaluation

- Entry questionnaire (to document prior involvement) and/or the entry questionnaire for first time participants (attitude toward technology, self-report of technology skill level, demographics)
- Written and online journals created by youth participants and mentors
- Observation during sessions and fieldtrips

Season evaluation

- Evaluation data for each cycle (as above)
- Baseline and post-season interviews (random sample of 10% of participants in that season)
- Individual longitudinal case studies (another 10% of initial participants randomly selected, monitored, and interviewed throughout the three year period)
- Participant survey (last session of each season)

Yearly evaluation

- Evaluation data for three seasons (see above)
- Annual survey of parents, mentors, and project staff

Overall evaluation

- Development of a participant database with unique IDs for each participant and data kept throughout the course of the project
- An entry questionnaire for first time participants (attitude toward technology, self-report of technology skill level, demographics)
- Analysis of application materials
- Individual longitudinal case studies compiled and written at the end of the third year

End-of-the-project evaluation

- Culminative survey of a sample of participants (stratified random sample by community, age, level and year of participation)
- Interactive skill demonstration/participatory evaluation sessions (built into community days during final season of Year 3)

Appendix C: Youth Satisfaction wit	h MyBEST
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	Not very satisfied	So-so	lt's OK.	Satisfied	Response Total
Comfortable, supportive					
atmosphere	0% (0)	5% (2)	15% (6)	80% (32)	40
Friendly and helpful					
staff/mentors/intern hosts	3% (1)	0% (0)	18% (7)	79% (31)	39
Good place to learn	0% (0)	0% (0)	24% (9)	76% (29)	38
Knowledgeable staff/mentors/intern hosts	0% (0)	0% (0)	25% (10)	75% (30)	40
Availability of hardware and software	0% (0)	5% (2)	22% (9)	72% (29)	40
Quality of computers and computer programs	0% (0)	5% (2)	24% (9)	71% (27)	38
The YSC space (the room, furniture, etc.)	0% (0)	2% (1)	28% (11)	70% (28)	40
Social atmosphere	2% (1)	0% (0)	30% (12)	68% (27)	40
Socializing with museum	270(1)	070(0)	0070(12)	0070(27)	40
staff/mentors/intern hosts	2% (1)	2% (1)	28% (11)	68% (27)	40
Socializing with other participants	2% (1)	5% (2)	25% (10)	68% (27)	40
Food and drinks provided	0% (0)	10% (4)	22% (9)	68% (27)	40
Developing creativity	0% (0)	5% (2)	32% (13)	63% (26)	41
Opportunities for parents, families and other adults to see what you accomplished	0% (0)	2% (1)	35% (14)	62% (25)	40
Developing problem-solving skills	3% (1)	3% (1)	33% (13)	62% (24)	39
The learning of computers and other technologies	2% (1)	2% (1)	38% (15)	57% (23)	40
Developing communication and interpersonal skills	2% (1)	2% (1)	41% (17)	54% (22)	41
Using technology in different ways	2% (1)	10% (4)	34% (14)	54% (22)	41
MyBest times and schedule	3% (1)	13% (5)	32% (12)	53% (20)	38
Getting help with homework and ACT prep	5% (2)	3% (1)	41% (15)	51% (19)	37
Learning about technology careers and what is needed					
to join those careers	3% (1)	15% (6)	36% (14)	46% (18)	39
Getting paid	24% (8)	6% (2)	27% (9)	42% (14)	33
Total Respondents					41

	Agroo	Tend to	Tend to	Diagaraa	Doononoo Totol
Leniov being at MyBEST	Agree 85% (34)	12% (5)	2% (1)		
The VSC is a safe place to	0070 (04)	1270(0)	270(1)	070(0)	40
hang out with friends.	78% (31)	18% (7)	5% (2)	0% (0)	40
I enjoy sharing what I know					
with others.	70% (28)	30% (12)	0% (0)	0% (0)	40
I would like to keep	700/ (20)	200/ (0)	00/ (4)	00/ (2)	40
	70% (28)	20% (8)	2% (1)	8% (3)	40
new technology	69% (27)	26% (10)	5% (2)	0% (0)	39
Learning in MyBEST is very	0070(21)	20/0 (10)	0/0 (2)	0 /0 (0)	
different than learning in					
school.	60% (24)	32% (13)	8% (3)	0% (0)	40
new technology in					
MyBEST.	59% (23)	33% (13)	8% (3)	0% (0)	39
I don't know of other places					
that provide a similar					
opportunity as MyBEST.	59% (23)	28% (11)	10% (4)	3% (1)	39
I understand more about					
what is needed to join	F70/ (00)	000/ (0)	000/ (0)	00/ (0)	40
technology careers.	57% (23)	20% (8)	22% (9)	0% (0)	40
technology careers	50% (20)	28% (11)	18% (7)	5% (2)	40
My problem-solving skills	0070 (20)	20/0 (11)	1070(1)	070(2)	10
have improved a great deal.	48% (19)	40% (16)	10% (4)	2% (1)	40
MyBEST helped to develop					
my interest in math and	400/ (47)	000/ (45)	400/ (5)	00/ (0)	40
Science.	42%(17)	38% (15)	12% (5)	8% (3)	40
another team in the YSC	40% (16)	22% (9)	20% (8)	18% (7)	40
Lenjoved the social element	1070 (10)	2270(0)	2070(0)	1070(1)	10
more than anything else.	36% (14)	46% (18)	15% (6)	3% (1)	39
My personality has					
changed because of					
participating in MyBEST.	32% (13)	25% (10)	20% (8)	22% (9)	40
During MyBEST meetings,					
there was not enough	400/ (7)	00/ (0)	400/ (40)	000/ (44)	40
Lam not particularly	10%(/)	0%(3)	40% (19)	20% (11)	40
interested in technology					
careers.	15% (6)	28% (11)	32% (13)	25% (10)	40
I would prefer more adult					
mentors around.	8% (3)	28% (11)	52% (21)	12% (5)	40
Total Respondents					40
(skipped this guestion)					1

Appendix D: Youths' Opinion about MyBEST

Acknowledgments

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