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Building Confidence for Elementary Students in an After-School Engineering and Design Club

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Dedication

When I enrolled in TEAMS Tutoring in Schools, Education 497 I, fall semester of my sophomore year (2016), I was unaware that I was going to be on the receiving end of the tutoring. I remember it as my 5th class of the day and when I walked in, frankly, by that point I was typically uninspired and exhausted. Sharon Edwards did not accept that from day one. As the semester went on she continued to challenge my thinking and encourage me each class by discussing, asking me directly and bringing me into conversations. This semester was just the start.

Spring semester 2017, I enrolled in another course with Sharon where she entirely altered my understanding of my own personal learning and my relationship with math, which I thankfully discovered was just another language. I always said then that I was never a math person and look at what happened! Now I lead an Engineering School weekly in a local elementary school after school program.

Sharon Edwards and Robert Maloy have continued to inspire my learning and confidence regardless of the setting. From the nooks and crannies we found in the Integrative Learning Center where we met to do math, calling ourselves space vampires as we looked for open places, to the upstairs kitchen in Furcolo, the College of Education, we used as a center for planning weekly activities, a landing pad for paper airplanes, I was able to apply everything that I learned from Sharon and Bob not only to my work with Engineering and Design school, but in all of my undergraduate classes. I was granted the experiences to make a shift in perspective from “No, I cannot” to “Yes, everybody can” and for that I am forever grateful. This change of

belief isn't everything that I have learned from them, but this is what I could fit into eighteen pages.

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Abstract

The Engineering and Design After-School Club was created in Fall 2017 with the hope of making science, technology, engineering, and math concepts accessible to all elementary school students in an afterschool setting and especially girls. This paper presents ideas from the second year (Fall 2018 and Spring 2019) of the Engineering School (Figure 1). The foundational principles of this weekly school is student directed learning, Howard Gardner's *Theory of Multiple Intelligences*, and the methods of interaction and conversations from the book *How to Talk so Kids will Listen.* All of these ideas and theories together inform this accessible and innovative after school experience.

Other afterschool programs were examined in order to determine what practices had been beneficial and foundational for them and in order to determine what made ours unique. From this research effort you will learn what has worked for other programs and how we, with minimal cost, piloted our own model to encourage and maintain student engagement with STEM topics. Engineering was fun as opposed to frightening and students were able to feel successful each week as they completed projects of their choosing, constructed from their own design in their own time. Ultimately the students ended up creating more than weekly projects as they internalized a sense of pride and accomplishment with each student directed and tutor guided design success.

Figure 1

COLLEGE of EDUCATION
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Engineering and Design Afterschool

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Purpose
Engineering and Design Afterschool offers elementary school students the opportunity to explore STEM in an informal setting outside of the classroom. Girls and boys design, build, evaluate and express ideas through hands-on projects and activities. Encouraging curiosity, creativity, and confidence through student centered multimodal learning is the goal of the weekly experiences.

Setting and Students
Friday at Wildwood Elementary School in Amherst, Massachusetts, all students K-6 in the afterschool program are offered the opportunity to attend Engineering and Design School. During its meetings throughout the 2018-2019 school year, students of varying ages, genders and interests participate and engage with the materials and projects to design and build 3D models of their ideas.

Musical Instruments
One weekly project that everyone enjoyed was our good junk musical instrument project. Children were invited to create their own musical instruments with the material provided and the results yielded many maracas, tambourines, a multi-piece drum set, and even a new banjo variation. At the end of the hour that day students used their instruments in a rendition of "We Will Rock You."

Projects and Activities

Flight School
Designing and flying paper airplanes is the goal of Flight School. Children choose paper size, shape, color and weight, fold and modify designs, and engage in test flights to determine how models fly effectively. Airplane vocabulary introduces ideas of physics, launch, lift, force, flight, glide, spin and aerodynamics to qualitatively describe planes and flights. Students use scientific inquiry to ask their own questions, make hypotheses, and test and observe the actions of their planes. The young engineers' teach each other, share ideas and observations, encourage each others' attempts, foster a collaborative environment and create enthusiasm for using mistakes to inform their design ideas. They have a desire to build, analyze, learn, and revise to try again.

Good Junk Makerspace
Each week recyclable materials called "good junk" are brought in and repurposed into children designed creations--bath tubs, transformer costumes, lighting rods, and binoculars. Children are free to plan, design, create, and adapt their projects. Collaborative learning is encouraged and teamwork creates new products each week. Descriptive praise and inquiry questions are used to encourage children to consider the designs and make changes that they think are improving their designs.

Thank you to my faculty sponsors, Professor Robert Maloy and Instructor Sharon Edwards!

Palindromes
When is the beginning also the end? When the word, phrase, pattern, or even good junk invention is a palindrome. Students were asked the riddle and then given the opportunity to use their scientific tool box to create palindromes using whatever modality they chose and this produced artistic patterns and symmetry through exciting and innovative methods.

Conclusions
- Engineering School allows every participant to experience the fun and excitement of doing math, science and engineering projects.
- The confidence instilled in each child enlarges the effort that they put into each project.
- A setting centered around children's ideas can leads to student learning and desire to design.
- Students are encouraged to engage, revise, make mistakes and redesign. These actions produce engineering products.
- Empowering young students through multimodal education to feel in control of their ideas can lead to better health outcomes later in life.

References

WHAT OTHERS HAVE DONE

Introduction

Engineering is not always specifically included in the math or science curriculum at schools. It is frequently neglected and introducing STEM at young age can allow students to consider careers that they previously would not have considered. Not all children are provided the opportunity to engage, learn, and feel successful in STEM areas (Moreno, Tharp, Vogt, Newell, & Burnett, 2016). An early introduction is crucial for cultivating students' interest in STEM careers while preparing them for future possibilities. The afterschool setting can be a

useful space for extra learning that may not fit into the standard curriculum. This offers further enrichment for students as they attend sessions week to week.

The after school setting is distinctly different from a traditional school classroom setting. There are many characteristics that set after school programs apart. Research done at a charter school in the Southeast US found that after school STEM activities were able to place an emphasis on open-ended and collaborative scientific investigations. There were three major findings from this study. First, collaborative learning groups are essential to learning in this afterschool program. Next, after school STEM programs are extremely popular and many students are excited to engage with the material. Finally, the presence of these activities in an afterschool setting contributed to increased interest in the fields of science, technology, engineering, and math with simulations allowing students to develop 21st century skills (Sahin, Ayar, & Adiguzel, 2014). This means that even if students do not pursue specific STEM career they will still be more prepared for their respective career in this technology driven era. These after school activities can instill a mindset and way of thinking that will give students unique and innovative perspectives in whatever they choose to pursue.

It has been established that both social and economic factors have a crucial role in influencing academic success. For many students, classroom instruction simply does not supply them equitable access to education. Many young people require support that extends past the the four walls of the traditional American classroom (Noam, 2014).

After school programs have been centered around positively guiding students' personal development with their social and emotional growth. High quality after-school programs have found that children enrolled see a significant improvement in their self-perception, increased

positive social behavior and a decrease in problem behaviors (Noam, 2014). After school programs can help close the gap for equitable access to education for all students. The math achievement gap that appears between low and high-income students narrows when low-income students attend after school programs often (Noam, 2014). These programs help make up the educational ecosystem that is all encompassing and centers around individual student growth both inside and outside of the classroom. Children and adolescents who attend after school programs demonstrate increases in their self-perceptions and bonding to school; they become more engaged both in and out of the classroom. They also exemplify positive social behaviors, school grades, and academic achievement (Durlak, 2010). Youth can benefit in a variety of ways that will help them while enrolled in school to set the foundation of success that will carry them into adulthood.

The after school setting only comprises a small portion of a STEM learning ecosystem. This ecosystem encompasses schools, community settings such as after-school and summer programs, science centers and museums, and informal experiences in homes and in a variety of environments. Together these constitute a variety of learning opportunities for young people.

A learning ecosystem harnesses the unique contributions of all these different settings together to create equitable access to STEM learning for all children. These pathways allow young people to become engaged, knowledgeable and skilled in different areas under the STEM umbrella as they progress through childhood into adolescence and early adulthood. Learning ecosystems are a tool that can be used to address barriers that are parts of the education system. This ideology encompases the diversity of the students population while maintaining connected relationships that are able to adapt and evolve as students' capabilities, situations, and strengths

do as well (Traphagen & Traill, 2014). Students are able to deepen their understanding in a variety of settings so that learning becomes ever present in their lives. Children also gain the valuable experience to freely make and learn from their mistakes as an essential part of a scientific mindset and experimentation (Traphagen & Traill, 2014). The individual student's interest is able to grow and develop over time and shift as their ideas do. STEM concepts can be applied to real world concepts and problems as they arise. This ecosystem also intentionally supports young people whom are underrepresented in STEM such as girls, minorities, and individuals of lower socio-economic status in order to foster diverse, relevant, yet interconnected learning experiences for youth (Traphagen & Traill, 2014). Students are also able to receive more support and understanding in their learning when the classroom extends into the home. Creativity in teaching methodology is important to maintaining student engagement.

One way that this learning can extend beyond students' K-12 career is through improving their health outcomes. Education has long been established as a major social determinant of health. This means that when students are better able to receive equitable access to all education, not only health education, their health literacy improves. Health literacy can be described as all of the tools individuals use to understand information pertaining to their health in addition to understanding how to make informed health decisions for themselves and their family. Throughout the World "education has been an essential component of action to promote health and prevent disease throughout this century" (Nutbeam, 2006).

This is only one aspect of a student's life that faces potential for improvement through the equitable learning promoted in after-school STEM activities. However, it proves an interdisciplinary perspective that is unique to this paper.

Methods

Online search engines were used to search for current scholarly articles. Articles written more than 25 years ago were omitted in order to only examine current pedagogical practices. The online databases of JSTOR and Google Scholar were used to search for peer reviewed articles. The articles that were selected featured research that pertained to high income countries so that the data could be applied to Engineering and Design School which takes place in the United States, a high income country. Sylvia Ashton Warner's book, *Teacher,* was read as a formative text in order to understand how teaching methods of the past are still highly relevant if not more important today. The book *How to Talk so Kids will Listen* by Adele Faber and Elaine Mazlish was also read in order to incorporate a student centered approach into the club.

Results

The results of this literature review was a more informed approach to Engineering and Design School that encompassed students from a variety of backgrounds and a multitude of learning styles. Reading about other after school programs allowed for more insight into what had served students and what had not. It also allowed for a larger picture to be seen in terms of how this club is able to fit into the much larger STEM education ecosystem. There has been a large push to emphasize STEM education, but the gap still remains between marginalized populations in schools. Engineering and Design Schools will continue to use student centered multimodal learning to help minimize this gap while providing creative and fun equitable access to students of all abilities.

Discussion

A growth mindset and student centered learning is essential to maintain engagement in an after-school setting. Many of the programs read about were not not open to or attended by all students in an after-school program. When students must sign up to attend a STEM club, the club loses some of the population that does not already possess a STEM interest or mindset, and that is quite a lot of people. More efforts should be made to offer STEM after school programs to all after school attendees so that marginalized populations see the activities and want to join. After school programs should always be viewed as an essential part of the larger learning ecosytem that encompases all student learning.

STEM Education should not be be confined into a 45-minute weekly schedule of a traditional classroom curriculum. Outside the classroom situations should be considered as opportunities for activities. Many of the programs read about required grants and extra funding sources to create the program. Extra funding while potentially beneficial is not imperative to the structure and goals of the after-school STEM concept. If students engage with activities that promote science, math, and engineering in self-chosen projects that they design and build and then add to or redesign from free, recycled and at hand materials, they will be able to apply skills and a design mindset to other technology when they gain access to it.

The interests and immediate enjoyment of individual students need to be considered when choosing activities to introduce as each child has a unique learning profile. What draws one may not interest another. So having choice, open ended materials, the ability to collaborate, and to pursue one's own idea is the big impact factor of the program. The impact of after school STEM programs can extend beyond the experience itself to interest students in STEM careers

that help individuals move from systemic poverty up the socioeconomic ladder. Additionally, promoting health literacy, thus better health outcomes, is produced by building self-confidence and persistence in efforts to learn. Nothing in a child's education is isolated as each experience can impact not only their day, but also their future.

WHAT I HAVE DONE

Purpose

Engineering and Design After School was created in order to offer elementary school students the opportunity to explore STEM topics in an informal setting outside of the traditional classroom setting. Girls and boys design, build, evaluate, and express ideas through hands-on projects and activities. This club encourages curiosity, creativity, and confidence through student centered multimodal learning. These weekly experiences create a tool box for students to figueirtly carry to the classroom. This tool box is filled with a growth mindset, engineering vocabulary, qualitative descriptions, curiosity, and the most vital creativity. Having these STEM topics introduced at a young age outside of the classroom makes them less daunting so that when students begin science and math they feel empowered as opposed to overwhelmed.

Setting and Students

Engineering School meets weekly at the Mark's Meadows After School program located at the Wildwood Elementary School in Amherst Massachusetts. All of the students, grades kindergarten through sixth, enrolled in the afterschool program are offered the opportunity to attend Engineering and Design school. During its meetings throughout the 2018-2019 school year students of varying ages, genders, and interests participate to engage with the materials. From the materials students are able to create projects to design and build 3D models of their

ideas. Student directed learning is the foundation of this club as students imagine a project, organize their ideas, select materials, and then piece it all together. The volunteers act as facilitators for the imagination that each youngster possesses. This is a creative makerspace where the phrases “no” and “I can’t” are replaced with “how can I?” and “I will.” Multimodal education is used to support Howard Gardner's theory of multiple intelligences. We cater to the strengths of all students so that they are able to experience a feeling of success.

The Projects

Engineering and design school originally held the name *Flight school.* Our first project in the fall of 2017 was paper airplanes. The volunteers walked in adorned with eye catching paper airplane headbands. We wanted to capture the kids attention and that was our first success. This was the first project that students were able to add to their engineering toolbox. Designing and flying paper airplanes is the goal of Flight School. Children first paper size, shape, color and weight. Does newspaper have more lift than countructer paper? Can blue fly farther than yellow? Should we start with a square or rectangle? And most importantly why? Then students fold and modify their designs. Test flights down the masking tape runway are done to determine how models fly effectively. Airplane vocabulary introduces ideas of physics, launch, lift, force, flight, glide, spin and aerodynamics to qualitatively describe planes and flights. There is no such thing as a “good” or “bad” plane as students describe each flight qualitatively. A plane that immediately falls to the ground is not a failure, but it has too much drag and not enough lift. The young engineers understand that the outcomes of their planes are not stagnant so they revise, describe, and adapt their planes until they attain their desired outcome. Collaboration is frequent at flight school as students share designs and opinions to progress on their projects. Students use

scientific inquiry to ask their own questions, make hypotheses, and test and observe the actions of their planes. The young engineers' teach each other, share ideas and observations, encourage each others' attempts, foster a collaborative environment and create enthusiasm for using mistakes to inform their design ideas. They have a desire to build, analyze, learn, and revise.

The staple of Engineering and Design School is good junk. Each week recyclable materials called "good junk" are brought in and repurposed into children designed creations--bath tubs, transformer costumes, lighting rods, and binoculars. Children are free to plan, design, create, and adapt their projects. Collaborative learning is encouraged and teamwork creates new products each week. Descriptive praise and inquiry questions are used to encourage children to consider the designs and make changes that they think are improving their designs. This is where children truly have the freedom to make their imaginative creations come to life. Students are able to build was they see as necessary. One student built a house for her chickens, which never would have been a project offered if the teachers gave strict guidelines for learning activities every week. Students are in charge of what they make and oftentimes they have to adapt their original design as they hit roadblocks or materials get used elsewhere. This teaches students resilience as they always find a way to accomplish their goals using either alternative methods or materials. These engineers are not quitters and will do what is necessary to see their designs come to fruition.

In order to incorporate music into our engineering space we created musical instruments. Children were invited to create their very own musical instruments with the materials provided. Students were told they could try and recreate traditional musical instruments such as guitars or maracas or they could create their own new instrument and name them whatever they pleased.

The results yielded many maracas, tambourines, a multi piece drum set, and even a new variation of the banjo. Students filled “good junk” with different amounts of broken spaghetti to create sound. Some added more and some subtracted as they honed the precise sound that they wanted. At the end of the hour on the first day this concept was introduced students collaborated to use their new custom instruments in a rendition of “We Will Rock You” originally by the the band *Queen.* This was then a project that students were able to add to their engineering toolbox. As we continued in future good junk sessions students were able to revisit this idea and add to their collection of instruments. By the end of the year some students possessed enough good junk creations to be a one man or woman show.

Our final engineering framework was the palindrome. When is the beginning also the end? When the word, phrase, pattern, or even good junk invention is a palindrome. Students were asked the riddle and then given the opportunity to use their scientific tool box to create palindromes using whatever modality they chose and this produced artistic patterns and symmetry through exciting and innovative methods. For some of our youngest members the palindrome was explained using colored golf tees. A pattern was made lining up three golf tees in the pattern red, yellow, red. Then students were able to see the red book ends and manipulate the tees, but keep the red ends so that the beginning was the same as the end. Once this concept was understood using colors students had the opportunity to write their own palindrome and exemplify it with a picture such as the word “pop” or they could make a good junk creation that was symmetrical like a palindrome. This challenge allowed students to create within the confines of symmetry, a foundational math concept, which was yet another tool that got added to their evergrowing tool box.

Discussion

Engineering school takes place in an after-school setting so projects can be self-directed and approachable for students who might otherwise be intimidated by them or appear open ended and interesting not boring as some do when they are presented in the classroom. This setting allows Engineering School to attract the attention of children who would have otherwise turned away at the thought of science. The weekly workshop is also offered to all students that are part of the Mark's Meadows After School Program at the Wildwood Elementary School whereas many other after school S.T.E.M. clubs are formed on a sign up basis. This means that students who are already interested in science will sign up whereas students who are interested or intimidated will not. Engineering school is offered to every student at after school so it is accessible for all. This club integrates well into the after school community. It takes place every week on Fridays so the students that attend after school know that we will be there weekly to deliver new science skills. The kids know our friendly faces and are comfortable trying new projects weekly. Students do not feel overwhelmed by these science concepts that can often times feel daunting.

The original project that was conducted in Engineering School last year was paper airplanes. I never realized how many concepts could be connected to a small piece of paper. This year the club has taken a more imaginative approach allowing students to create inventions out of "good junk" that they feel could improve their community or their individual lives. Every week I create lesson goals. I use the word goal as opposed to plan because this club heavily applies student directed learning theory. Each Friday I go in with a goal of what the students will glean from the club, but often times they take away entirely different skills and this is part of the

beauty of the student directed learning format. They are able to take away what they want so they stay interested and keep coming back to learn more. The students are able to take the projects in whatever direction they are interested in pursuing. This allows them to following their passions so that they do not lose interest in the subject matter.

When I started working on this project during my junior year all of the projects were much more thoroughly planned. This was useful at the time as I needed more structure in order feel successful in a new setting working with with new students. Last year the club also had more of a general focus on science and math, but this year as I have stepped up to take the lead I have shifted the focus to the club to be more wellness based. This allows me to combine both of my passionsions, education and health, into one internship. This year we were able to focus on more integrative teaching strategies such as multimodal learning and student directed learning. These pedagogical methods make education more accessible to students that otherwise may have struggled to understand the concepts. Multimodal learning has also been linked to better health outcomes in students as they will be empowered throughout school because they are able to properly access their education and thus will be able to understand health information presented to them later in life. They will also be able to access the health education presented to them in school in addition to their core science and math classes. The goal of this club was always to make these larger science concepts more accessible, but in this second year that goal has begun to come into fruition. The set up of the club may be more relaxed, but the reach and its strategies are much more dynamic. This year I had the ability to focus more on teaching conceptually and less on the specific STEM based topics as I am already familiar with them.

This experience really allowed me to connect to a community both on and off campus. I was able to connect with like minded peers that are interested in improving children's health outcomes through the power of education. Last year the club consisted of mainly me and my partner Emily Chandran. This year I am fortunate to have five UMass student volunteers who help me facilitate student learning each week at after school. Every week at our meetings I was inspired not only by our supervisors, but by peers. I was also able to integrate myself into the Wildwood Elementary after school community and become inspired by the hardworking students. The students looked forward to us coming every week. One week they actually jumped up and down as they saw us heading down the hall. It was such a rewarding feeling to see the students revel in excitement to learn science. We became an important part of their weekly schedule and students would frequently ask when we would be back and if we could come sooner.

As an organization we were also able to play a role in shifting the school's culture. We strive to make science accessible and attainable. This club empowers students to explore topics that they may have previously written off as too hard or overwhelming. At Engineering School there is no such thing as "no you can't" instead we pose questions as "okay well how can you?" One answer shuts down students while the other opens up curiosity. Students have the idea that they can do whatever they set their mind to through the instillment of a growth mindset. This mindset allows students to take charge of their learning and reach their limitless potential. They are able to do anything that they set their minds to and the limits of their potential are endless.

The experience engaged me because I was able to work with a diverse group of students at varying levels of academic achievement. The students opened up to me about their personal

backgrounds and home experiences as we continued to come week to week. I was able to learn about their background and piece together parts of their health backgrounds. All of these students have different cultural experiences, but they were all able to complete various science activities regardless of their backgrounds or abilities. I was able to support these children not only academically, but also humanistically through the use of empathy. Professionally I was able to apply the skills that I have gained from both of majors, public health and psychology, to use a unique approach to working with students. I was able to use the tools that I have read about to improve health outcomes in students at my internship. This allowed my academic coursework to "come to life." This was a powerful asset to my learning because I was able to see the educational policies that I have followed so closely support the health outcomes that I care so much about. I was able to take a personal approach in a professional setting.

As an intern effective communication was a key factor in the success of the program. I had to work with my supervisors weekly (at a minimum). Each week we would reflect on the past week in order to assess what fostered scientific inquiry in students and what did not. This allowed us to decide how to best move forward and plan the activity for the upcoming week. I was always asked about what students had said then how I reacted and finally how I could respond to elicit a more complete understanding of the science concept while still remaining student centered in my teaching. It was always challenging when an activity did not go over as expected or did not allow students to access and understand the concepts that we had intended. I am extremely proud of the hard work then went into this club weekly. This club allowed students to gain confidence which enables them to take charge of their learning both now and later in their lives. People deserve to feel in control of their learning and they should be able to pursue

whatever career they would like. Some children that may have never considered a STEM field for their future career now may. Some students who may have felt stuck will now have a chance to grow and move forward in not only their academic journey, but also their health journey, and their life.

In my public health classes health disparities are often discussed. One health disparity that has a large impact on the Wildwood community is socioeconomic status. Some of the children have parents that are professors therefore they are relatively affluent and have parents that emphasize the importance of education. Children will tell me about their parents research and all the science activities that they do at home. On the other hand, some students come from less affluent families such as parents who are maintainers at the university or food service workers. The parents that hold the lower paying jobs may not have as many resources to provide their children with learning opportunities outside of the traditional school setting. The students from the lower income families really benefit from this club because they are able to get introduced to topics that they may have missed out on otherwise. They are able to have access to the exact same science enrichment activities as their more affluent peers. This club helps close the gap between the higher class and lower class as it offers a safe space for all to create and invent. The university ties this community together yet separates it at the same time. The goal of this club is to level the playing field so that students can have a chance to engage with a subject that they might have previously assumed was too hard.

Conclusion

Undoubtedly students prospered in this open ended after schools etting, but through directly engaging and observing we came to some conclusions. First, Engineering and Design

School allows every participant to experience the fun and excitement of doing math, science, and engineering projects. Students are in charge of what they create so nothing is imagined beyond their own capabilities. Once a child experiences the success of completing a project the confidence instilled in them enlarges the effort that they put forth into each project. If one project is successful then they will want to create more each week. The only way that a student could fail is if they gave up, but as engineering and imagination facilitators the volunteers do not allow this to occur. If a child does stumble or become frustrated while creating volunteers collaborate with students to find a solution that fits the needs of their project within the confines of the club. Next, a setting centered around children's ideas can lead to student learning and desire to design. If students have the opportunity to create inventions that are relative to their life they are more likely to engage. Then students are encouraged to engage, revise, make mistakes, and redesign. Mistakes are an essential part of the creative process. As students need to learn what works with their imagined design and what may not fit as they had originally intended. Finally, empowering young students through multimodal education to feel in control of their ideas can lead to better health outcomes later in life. It has been established that education is a social determinant of health so if children are able to access not only health education, but all education they will have the educational and intellectual resources to make informed health decisions as they grow older and emerge into independence. Engineering and Design School sets a foundation that children can carry into the classroom , so that these science concepts do not feel daunting, when they are introduced. This foundation can then be carried out of the classroom, throughout life, and hopefully into STEM fields that children now view as attainable and enjoyable careers.

Future Directions

In the future the club should incorporate more coding. Computer science is a valuable language that students should have the opportunity to possess at a young age. This may subtract much of the tactile modality of many of our current projects, but it incorporate technological literacy which may allow for more students to demonstrate their own technological intelligences. Another project that could be introduced is one that centers around sustainability. Energy consumption is a major issue plaguing the United States right now. If students feel empowered to create eco-friendly projects they may be able to bring that sustainable mindset home. This will then spark a chain reaction as they shift toward wiser consumption and lessen their excessive use of energy.

One of the original goals of engineering school was to get more girls involved in STEM projects. This goal was accomplished within our first year and currently our participation is comprised of a relatively even mix of boys and girls. In the future it would be interesting to pay attention to children's' ethnicity in terms of participation. The Wildwood Elementary School that holds Engineering and Design school has a diverse student body that attends the after school club weekly. Some students come from high socio-economic status with professors as parents while others have parents who are working class, but nonetheless essential to university's functioning. Tallys could be kept to see what percentage of the students are people of color or what their socioeconomic status is. All students are given the opportunity to participate, but their still may be a disparity in how many truly are engaging weekly.

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