

POVs and Experience Prototypes

LIME: Low-Income Minorities in Education

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CS147: Human Computer Interaction Education Section

Problem Domain: LIME (*Low-Income Minorities in Education*) is dedicated to finding ways to make STEM fields more accessible, interesting, and popular among low-income and minority middle school and high school students.

Initial POV: We came up with the following POV in section last week: We met K and we were amazed to realize that he considered engineering a new field. It would be game-changing to make information about engineering more accessible.

Additional Needfinding Results:

Angelica



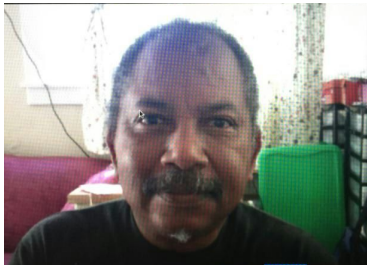
First Gen. Low-Income
College Freshman

Armando



First Gen. Low-Income
College Freshman

Keven



Low-Income Parent

Kara



Minority Educator at
Low-Income Minority
Elementary School

Donna



Low-Income Parent

Keven has noticed changes in technology between the development of his oldest daughter (age 35) who would clog the landline and youngest daughter (age 15) who primarily uses Kik. It was unexpected that although most of his daughters have chosen careers in the humanities, he still considers all of his daughters to be interested in STEM because they use technology every day. He finds it “interesting how bad information can continue to exist with such a wealth of information online.” Surprisingly, when it comes to getting low-income students involved in STEM, he thinks that exposure to technology is not the problem but instead lack of exposure to low-income minority models in the field.

Angelica found her high school teachers who attended Stanford to be an incredible resource for her applying to college. It is surprising that even with these resources, she did not know about elements of the application process like the ACTs until a little over a year before her high school graduation. She did not know what to write in her college essays and “felt very lost.” She has found the transition to Stanford to be difficult, but believes programs like the Leland Scholars Program have helped her ease into Freshman year of college.

Kara said fifth grade is about the time when girls start shying away from STEM fields, but noted that at her school students of all genders tend to consider math their favorite subject because few students are native English speakers and math involves fewer new English vocab words than their other classes. Surprisingly, when asked whether she felt that Ed Tech was widening the gap between wealthier and lower-income students, she mentioned that her school is an anomaly because they have increased funding for technology. Another surprise was that her students did not consider engineering to be a future career option, but were interested in being doctors and lawyers.

Donna revealed that parents have an important role in influencing kids to pursue STEM education. Although not all kids can be computer scientists, parents should notice early on whether their children have an inclination towards sciences and can invest in their education in those fields. In order to help them pursue a STEM education, parents need to spend time with their children, answering their questions about the world, and giving them the first insights about sciences and technology. Moreover, parents can benefit greatly from education, themselves – schools should offer parent education nights which introduce subjects that are valuable to the parents, e.g., social networks, ubiquitous computing. Once parents understand these fields, it’s easier for them to relate to children, to explain STEM concepts to them at a basic level, and to redirect them to the appropriate educational path.

Armando found college students to be more impactful and better role models during high school than older people in the workforce/industry. He said that there is a step between high school and working, which is college, so seeing a low-income minority student excel inspires him more than someone who is already successful beyond college. He had a lot of questions about career paths and mentioned that he did not know and still does not know what some majors (ie. Civil Engineering) are all about. In high school he mentioned how he wished he would have known more about different careers/majors and summer opportunities. He would have also wanted to see more representation of low income Latino students in STEM because he would be able to connect with them more.

Revised POV Samples: (See Appendix for More)

“We met Matt and were amazed to realize that encouragement and the community spirit mattered significantly for returning students. it would be game-changing if we connected adults with spare time to young adults to encourage and teach them.”

1. HMW find adults who are available and willing to help
2. HMW find a space where professionals and children can exchange ideas
3. HMW make volunteering to share one’s experiences profitable for professionals

“We met Char and were amazed to realize that she only enjoyed STEM subjects when she understood them. It would be game-changing to help her realize that not understanding something right away is normal and doesn’t mean that you should give up.”

1. HMW have games that encourage strategy and applaud not giving up
2. HMW make students feel less alone
3. How might we make hard subjects easier

“We met Keven and were amazed to realize that many low income minority homes have technologies like gameboys and TVs but they never consider tech a career because they do not see people like them working in STEM. It would be game-changing to increase the visibility of minorities working in STEM”

1. HMW highlight famous engineers in mainstream media
2. HMW get parents involved in encouraging engineering from a young age
3. HMW combine engineering with art and music?

“How Might We” Favorites and Originating Point of Views:

HMW end the glorification of natural intelligence and increase appreciation for hard work

“We met Char and were amazed to realize that she only enjoyed STEM subjects when she understood them. It would be game-changing to help her realize that not understanding something right away is normal and doesn’t mean that you should give up.”

HMW give students the ability to ask questions to experienced professionals (of varying backgrounds)

“We met Matt and were amazed to realize that encouragement and the community spirit mattered significantly for returning students. It would be game-changing if we connected adults with spare time to young adults to encourage and teach them.”

HMW write articles that students can understand on big research publications

“We met Keven and were amazed to realize that many low income minority homes have technologies like gameboys and TVs but they never consider tech a career because they do not see people like them working in STEM. It would be game-changing to increase the visibility of minorities working in STEM.”

Experience Prototypes: Our team prototyped three applications (Connect, Teach It Learn It Do It Be It, and Inside Out) which were each tested with three students: Char, Angelica, and Armando. Char is a minority high school sophomore who we interviewed during our initial needfinding. Angelica and Armando are both first generation-low income college freshmen at Stanford. All prototypes were tested by having the participants navigate our simulated apps while we role-played the information that they would get by selecting each item and giving them space to express their concerns, ideas, and delights.

Connect connects students with mentors and provides a forum to ask questions and learn about career options. Assumptions in prototyping this app were that there is a need for students to be able to find mentors, mentors would be willing to volunteer their time to make videos and answer questions, low-income students have access to



the technology needed to run the program, mentors and information are integral to achievement, and that students are motivated to ask questions.

The prototype was made with Pixelmator, an editing tool that is similar to Photoshop. The size of the images was set to be that of an iPhone screen. Pages were made for Homescreen, Mentors, Mentor, Answers, Answer, Profession and Professions. The goal was for our trial users to be able to imagine using the prototyped features.



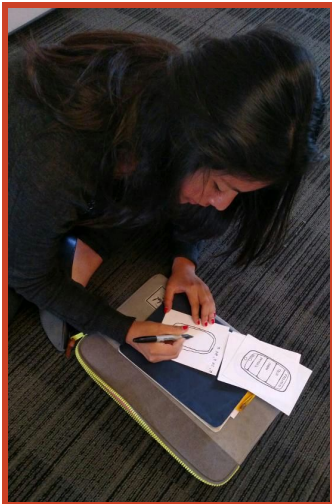
Armando wished that the prototype had more people of color. He thought that it would be more useful to see people who looked like him and were in college to know that his aspirations were achievable. Angelica believed that the app would have been useful in highschool and even now that she is in college and planning out her career path. She wished that there was a way to contact mentors directly and message other students. Char liked the quizzes on Connect and wanted to be able to connect with mentors outside of STEM like Ellen DeGeneres.

After user testing, most of our assumptions for Connect still held true or simply could not be tested. New assumptions were that low income first generation students appreciate hearing stories from mentors of similar backgrounds, quizzes are popular, and perhaps widening our mentor field to include college students and leaders outside of STEM subjects would be helpful.

Teach It. Learn It. Do It. Be It exposes students to STEM related projects that are low budget by scaffolding the learning through videos, a virtual learning component, and then explaining how to carry out the project at home. Some assumptions made were that students would have access to the materials to complete each project, that each project lent itself well to being explained virtually, students had access to wifi, and that students learned best visually. In order to prototype this idea, we drew out (marker and pen) a simplistic skeleton for different phases of the experience and asked people to press “buttons” that would take them to different pages.



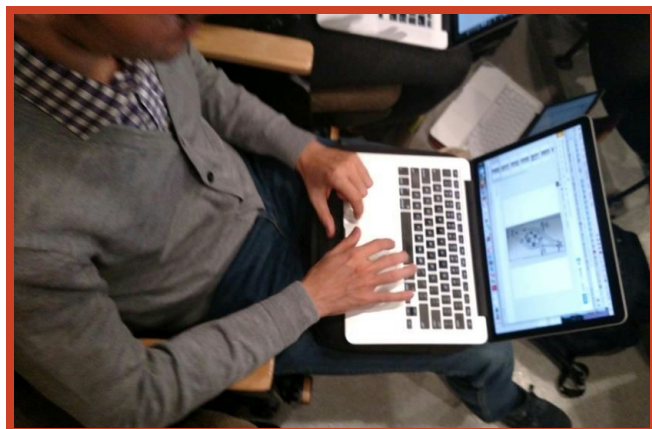
Armando wished the virtual component was treated more like a game so that he would be more likely to enjoy dragging things around. He thought it was great for science fair project ideas. Char liked the idea of doing these projects with other people and wished it was more descriptive on how much time it took. Angelica believed the virtual component was powerful and would have wanted to have this during high school. We learned that although the virtual component would scaffold the learning, we might need to disguise it as a game for students to stay engaged.



Our assumption that students would have access to materials came up during every user test because users asked how much the projects would cost and if the materials were accessible. We learned that what “ordinary household items” is not the same in every home. We also learned that not everyone has the privilege to use, for example, milk for a project. New assumptions were that people do not really enjoy virtual components in learning, that students would want to do these projects with other students, and that giving these projects a further purpose in their education career has a positive impact.

Inside Out allows students to understand difficult concepts that they may be curious about, through a mobile device experience involving videos, animations, pictures, and a straightforward language. Many times students hear about an event, e.g., “refugees from Syria migrate to Europe”), an activity, e.g., “my best friend started playing soccer”, or a discovery, e.g., “water is flowing on Mars.” By explaining such phenomena, including the science connected to them, can make students curious to explore that science in more depth.

In making this app, we assumed that students are naturally curious to find out more about activities they can relate to or concepts they don’t understand, that they’d appreciate having a streamlined tool to find information they are interested in, and that they want to share discoveries they find cool.



The prototype was first sketched on paper. Each sketch represents a screen that is accessible from a previous screen. Each screen sketch was then photographed, and each resulting image was included in a Google slide deck.

Jasmine and Cristian tested the prototype via a Google Hangout with Char, by sharing the screen, observing the behavior, body language, and responses during the flow through the various slides (representing screen sketches).



Char liked being able to decide broadly what to learn about, but was not always interested in each component of the lesson that Inside Out presented. We were surprised by the ambiguity of what she considered a social app – she said she would consider the app an individual experience, but then also stated that she would “share” content with friends if the app had that functionality.

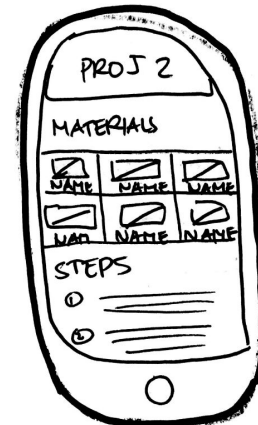
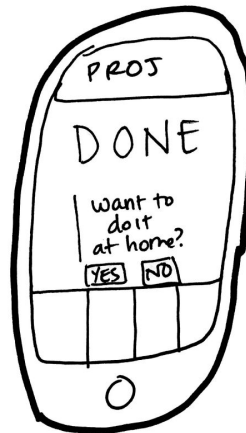
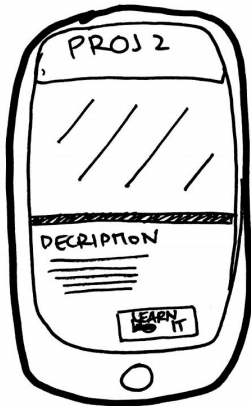
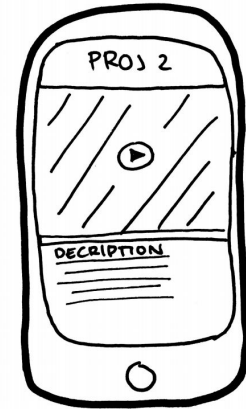
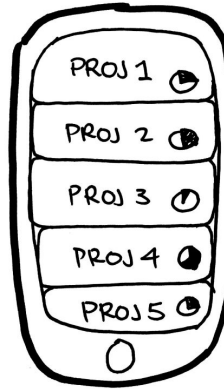
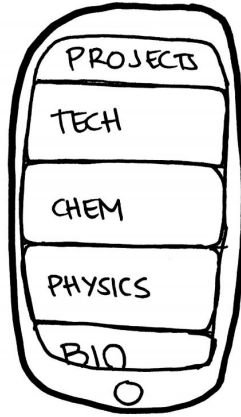
In terms of our assumptions, users were not always as enthusiastic to learn the science behind things they enjoyed as we expected, but they did still express interest in the app. Our assumption that they would want to share the interesting things they learned also turned out to be true. Going forward, one new assumption might be that enjoyment of an activity/object does not necessarily mean that the STEM behind that interest will be the best entry point for a student.

Most Successful Prototype:

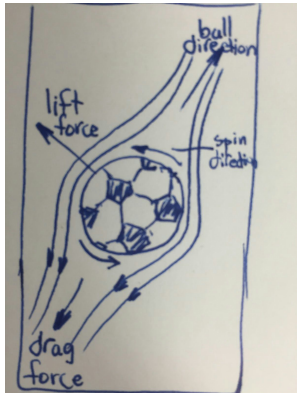
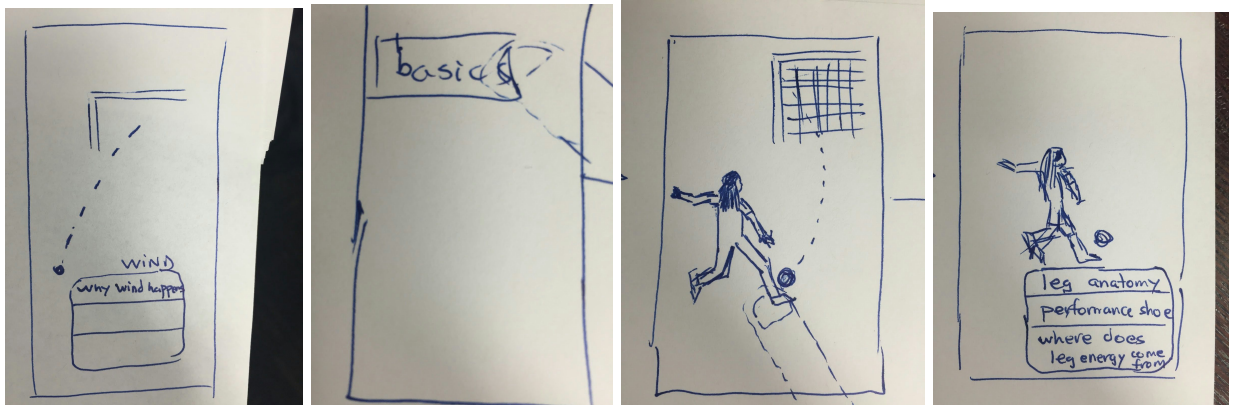
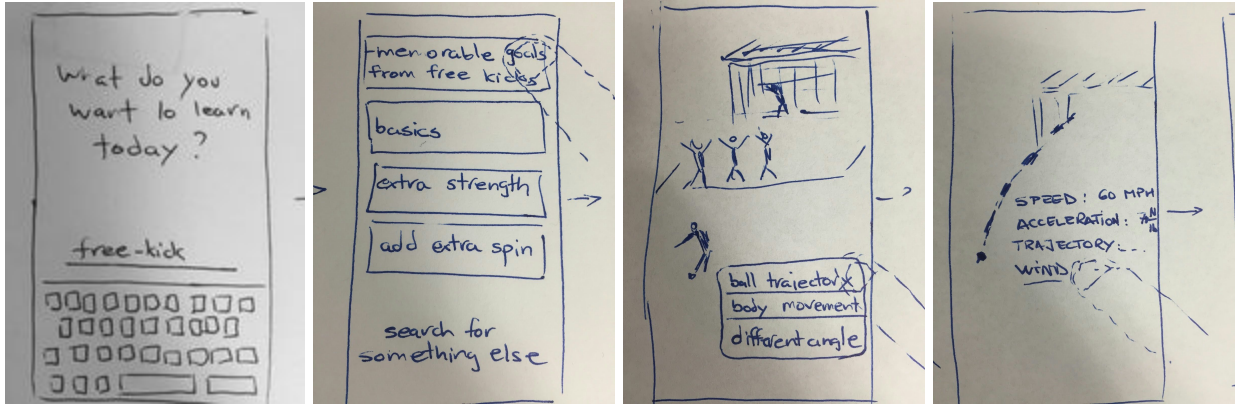
Based on our needfinding and user experience prototype testing, Connect is the prototype most successful in achieving our desired solution. It addresses one of our top HMWs (HMW give students the ability to ask questions to experienced professionals of varying backgrounds), and it also links back to our core problem domain: to make STEM more accessible to low-income minority students. All three of the students we tested with had an overall positive opinion of the app, and the feedback they gave us about how we can improve it (quizzes, increased personalization, and inclusion of college students as well as professionals) helped define the needs we will need to meet as we move forward.

Appendix:


Teach It. Learn It. Do It. Be It. Prototype




Inside Out Prototype




Connect Prototype



Mentors You Might Like




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Facebook CEO
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Elon Musk
Tesla Founder
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Interest Quizzes



What Sort of Engineering Fits My Interests Best?






Computer Scientist

Computer Science is a refined skill like sugar can be a refined sugar. Yum! Computer Science is an art for those who like creating, art, problem solving, organization, the list goes on.

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


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- 2) Talk to Oprah about possible solutions
- 3) Take out low interest loans. Do not have the loan shark running after you!


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Point of Views

“We met Lesley and were amazed to realize that students expected things to happen instantaneously because they were used to the quick response time of technology. It would be game-changing to find a way to help technology promote patience instead”

1. HMW we make apps slower so that students have a slower expected response time
2. HMW limit student access to technology
3. HMW create technology that develops patience without stating that is its purpose
4. HMW keep students focused on the same app for a long period of time
5. HMW combat the soundbite mentality of technology
6. HMW end the need for patience in the world
7. HMW show students examples of patience that led to great results
8. HMW make patience cool through technology
9. HMW make raps encouraging patience
10. HMW have technology that takes long multiple steps to accomplish (Ex: Sims)

“We met Matt and were amazed to realize that encouragement and the community spirit mattered significantly for returning students. it would be game-changing if we connected adults with spare time to young adults to encourage and teach them.”

4. HMW find adults who are available and willing to help
5. HMW create an atmosphere of trust between said adults and schools
6. HMW make children more interested in listening to adults
7. HMW find a space where professionals and children can exchange ideas
8. HMW make sure that students are hearing from people like them, not just the stereotypical professional
9. HMW bring adults that young adults admire to offer stories, encouragement, and advice
10. HMW give students the ability to ask questions to experienced professionals, and to rate the questions asked by others
11. HMW create trust in students and their parents of using such a service
12. HMW make volunteering to share one’s experiences profitable for professionals
13. HMW make STEM careers exciting
14. HMW reinforce the awesomeness of STEM careers (interesting projects, good pay, tangible difference in the world, etc)
15. HMW ensure that adults HAVE spare time to spend helping students
16. HMW reward good behavior of students for applying the advice received

“We met Char and were amazed to realize that she only enjoyed STEM subjects when she understood them. It would be game-changing to help her realize that not understanding something right away is normal and doesn’t mean that you should give up.”

4. HMW have games that encourage strategy and applaud not giving up
5. HMW give students access to stories about people who had to work hard to make it big
6. HMW end the mentality that even if people struggled to make it big, concepts still came easily to them
7. HMW end the glorification of natural intelligence and increase appreciation for hard work
8. HMW help teachers support students that are struggling
9. HMW make students feel less alone
10. HMW expose students to successful people who worked hard to make big accomplishments
11. HMW limit the thinking that you have to be the best at something to enjoy it and do well
12. HMW make everything so hard that students are used to working hard no matter what subject it is
13. How might we make hard subjects easier

“We met Keven and were amazed to realize that many low income minority homes have technologies like gameboys and TVs but they never consider tech a career because they do not see people like them working in STEM. It would be game-changing to increase the visibility of minorities working in STEM”

4. HMW expose students to engineering without knowing what it is
5. HMW bring the gaming community into engineering fields
6. HMW show what engineers do to make students more appreciative
7. HMW highlight famous engineers in mainstream media
8. HMW write articles that students can understand on big research publications
9. HMW make famous people encourage engineering
10. HMW get parents involved in encouraging engineering from a young age
11. HMW make sure students know what engineers are
12. HMW make engineers cooler
13. HMW show that engineering is not as hard as some students think
14. HMW combine engineering with art and music?
15. HMW turn Beyonce into a Computer Scientist?