



Read Me

December 12th 2022

Client



Policy Innovation Lab: Public Interest Technology

**Meher Dhaliwal
Nahal Abdul Ghaffar
Oravee Smithiphol**

Overview

Science, technology, engineering, art, and math—commonly referred to as STEAM—is a growing industry, offering lucrative employment opportunities. STEAM occupations provide greater stability and higher salaries than non-STEAM positions and are therefore often viewed as pathways for financial security and independence.¹

While demand for these jobs continues to steadily grow, representation in the STEAM workforce remains unrepresentative of America today. A Pew Research Center analysis of 2017-2019 IPUMS data reveals the persistent gender, racial, and ethnic gaps exist in those occupations. Black and Hispanic adults continue to each make-up less than 10 percent of all STEM jobs, despite accounting for a combined 28 percent of all jobs in the U.S.² ³ Likewise, males are disproportionately concentrated in higher-paying STEM jobs like computer science, engineering, and architecture, while women are disproportionately overrepresented in lower-paying health-related STEM occupations.⁴

This lack of diversity in the STEAM field prompted ToyzSteam to develop a program to cultivate a diverse workforce in this industry. Programming entails a multipronged approach, offering an experiential learning-focused college course, mentoring, and an app to encourage students to engage with STEAM concepts and cultivate self-identity through culturally relevant virtual superhero role playing and toy design.

Quick Links

[Trello Kanban Board](#)
[Project Planning Dashboard Mural](#)
[Google Drive Folder](#)
[Weekly Sprint](#)
[Interviews](#)
[User Research Document](#)
[User Personas](#)
[User Synthesis Mural](#)
[User Research Findings Report](#)
[Prototype I](#)

¹ National Science Board, National Science Foundation. 2021. The STEM Labor Force of Today: Scientists, Engineers and Skilled Technical Workers. Science and Engineering Indicators 2022. NSB-2021-2. Alexandria, VA. Available at <https://nces.nsf.gov/pubs/nsb20212>.

² Fry, R., Kennedy, B., & Funk, C. (2021, April 1). Stem jobs see uneven progress in increasing gender, racial and ethnic diversity. Pew Research Center Science & Society. Retrieved October 31, 2022, from <https://www.pewresearch.org/science/2021/04/01/stem-jobs-see-uneven-progress-in-increasing-gender-racial-and-ethnic-diversity/>

³ *Note: due to the recent addition of art to STEAM, current diversity and wage data exclusively reflects STEM.*

⁴ Ibid.

[Prototype II](#)
[Prototype III](#)
[Final MVP](#)
[Github](#)

Project Outline

The past two years have dramatically reshaped our interactions in all facets of life. The world underwent a pandemic which spurred a global economic crisis, massive demand shocks and job losses that exceeded the scale of the Great Recessions a decade ago. As countries strive to recover from it, new ways of working are born **which require digital skills**. According to the Congressional Budget Office, the unemployment rate in the USA is 3.7 %.⁵ The biggest brunt of the last several years has been borne by individuals who have lower educational attainment, people with disabilities, people of color, women, younger workers, and individuals who have less formal income.⁶ This project aims to upskill underserved communities, increasing their representation in STEAM fields.

Problem Statement

1. Are college students in the Pittsburgh community **interested in serving as mentors** and would they **be effective mentors** to students enrolled in ToyzSteam programming? If so, what is the **most successful approach to recruit and retain student mentors**?
2. How do we **collect data to track the impact of community engagements** for ToyzSteam?

How Might We?

HMW provide a platform to:

- **Access near peer mentorship and tutoring and,**
- **Identify communities which need this access?**

In order to provide a pipeline of diverse talent in Tech Whilst capturing data.

This project focuses on identifying ways to promote STEAM education and employment within underserved communities. Through this, we aim to reduce STEAM education disparities and develop a diverse STEAM workforce. At this point, we are restricting the project locality to Pittsburgh, PA. Desired outcomes include:

- Streamline a mechanism to track data for different initiatives, measuring their quantitative success and metrics.
- Encourage privileged students to give back to historically marginalized communities.

⁵ Brad Smith, Microsoft launches initiative to help 25 million people worldwide acquire the digital skills needed in a COVID-19 Economy, Official Microsoft Blog, June 30th 2020, <https://blogs.microsoft.com/blog/2020/06/30/microsoft-launches-initiative-to-help-25-million-people-worldwide-acquire-the-digital-skills-needed-in-a-covid-19-economy/>

⁶ Ibid

- Identify in-demand STEM jobs and their required qualifications by collaborating with workforce experts and prospective employers to contribute towards developing a robust curriculum.
- Identify global best practices in developing future leaders and implementing them within marginalized communities.
- Map out the user journey of those involved with STEAM mentorship and data collection metrics, including POC students, employers, educators, and community ambassadors.
- Devise a strategy to attract persons of color towards STEAM careers.
- Produce an MVP that tackles one implementable part of this problem.

Key stakeholders

Name	Role	Contact Information
Damola Idowu	CEO (Client)	damola@toyzsteam.us

Name	Role	Contact Information
Nahal Abdul Ghaffar	Project Manager	nabdulgh@andrew.cmu.edu
Oravee Smithiphol	Policy Specialist	osmithip@andrew.cmu.edu
Meher Dhaliwal	User Researcher	kdhaliwa@andrew.cmu.edu

In defining the client and community stakeholders, it is important for ToyzSteam and the project team to focus efforts on historically underrepresented groups in STEAM (Science, Technology, Engineering, Arts, and Math) – Black, Latino and Native American students, and female students. This will enable ToyzSteam to work towards their mission of creating a diverse and equitable talent pipeline in the STEAM industry. The key stakeholders for this project would be potential employers, field experts in workforce development and education programs, college students, the client's team, and individuals who have worked in marginalized communities through programs like PeaceCorps or Teach for America.

Opportunities

The Biden Administration has passed an executive order on advancing racial equity and support for underserved communities through the federal government. Equal opportunity is the bedrock of

America, yet it is next to impossible for many to attain the American dream.⁷ Research shows that closing the racial gaps in wages, housing credits, lending opportunities, and access to higher education can generate an additional \$5 trillion in GDP over the next 5 years.⁸ Given racial equity is the goal of the current government, if we are able to develop a feasible MVP there is an opportunity for funding to expand the program across different states.

Lack of diversity represents a loss of talent. Scientific advancement relies on scientific talent. Chronic underrepresentation in the workforce leads to an inescapable critical shortage of contributors to the talent pool.⁹ If the project is successful, we will contribute towards making the talent pool diverse and inclusive, which will in-turn lead to better problem solving and long-term economic growth.

According to Microsoft, over the next five years the global workforce will add an estimated 149 million technology jobs.¹⁰ The top ten jobs roles which Microsoft claims are in demand today and are likely to grow in the future are software developer, sales representative project manager, IT administrator, customer service specialist, Digital marketing specialist, IT support, data analyst, financial analyst, and graphic designer.¹¹ These statistics signal that the tech industry is booming and there is an acute need for technical skills. A robust STEAM specific academic plan and development tools to capture success data could serve as best practices across industries.

Challenges

The diversity in the STEM workforce is closely tied to the STEM education system across the US. That being said, members of Black and Hispanic communities are less likely to earn degrees in STEM than other fields thereby making a small share of STEM graduates as opposed to their share of the adult population. These individuals are underrepresented in earning advanced degrees and have the lowest representation in the fields of Math, Physical Science, and Engineering. **Therefore, if the project is unable to attain the set objectives, there is a risk that the representation of BIPOC in the education and STEAM industry will worsen.**

Through this project, we want to be able to influence communities through consistent initiatives rather than a one-time activity. This can be achieved via grants and funding. That being said, if ToyzSteam wants to secure funding, it will need data to serve as evidence of the impact their initiatives have created. If the project is not successful and we are unable to develop a mechanism to analyze data, we

⁷ Executive Order to Advance Racial Equity and Support for underserved Communities through Federal Government, The White House, Accessed November 9th 2022, <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government/>

⁸ Ibid.

⁹ Kenneth Gibbs Jr, Diversity in Stem: What It is and Why It Matters, Scientific American, September 2014, <https://blogs.scientificamerican.com/voices/diversity-in-stem-what-it-is-and-why-it-matters/>

¹⁰ Brad Smith, Microsoft launches initiative to help 25 million people worldwide acquire the digital skills needed in a COVID-19 Economy, Official Microsoft Blog, June 30th 2020, <https://blogs.microsoft.com/blog/2020/06/30/microsoft-launches-initiative-to-help-25-million-people-worldwide-acquire-the-digital-skills-needed-in-a-covid-19-economy/>

¹¹ Ibid.

will run the risk of declining funding in the future thereby negatively impacting future community uplifting initiatives.

Finally, there is a risk of continuing affirmative educational programs that seek to minimize educational and employment disparities. The upcoming Supreme Court's decision on affirmative action is another challenge we foresee within the field. In other states, like California, where affirmative action in the public sphere has been banned since 1996, we see that bans on affirmative action prevent targeted educational programming for girls, and children from underrepresented ethnicities.¹² A potential challenge we foresee for this project is that similar affirmative programs like ToyzSteam could lose the ability to target specific demographics, based on upcoming supreme court decisions. These programs could be protected by action at the state level.

Audience

There are four main audiences impacted by this project as follows:

1. Students of Color

This is our main target audience. We want to identify what are the challenges and roadblocks to success this segment of the population faces and what could enable them to pursue a STEAM education and/or career. Understanding their backgrounds and stories will allow us to ideate a solution which will resonate with them thereby increasing success rates.

2. Employer

This user group is the group that experiences difficulties in recruiting and filling in STEAM-related job positions. The representative is the one whose job position is related to human resources or is a manager who manages team members, preferably for middle to large sized companies.

3. Educator

This user group has the custody for delivering high quality education to students of color (user group 1) to equip them with digital skill-sets and prepare them to be future leaders in the STEAM industry. This is a critical user group for us as they are likely to play a crucial role in administering/delivering our end product. The educator is an important figure in our project as they play an integral role in shaping the perspectives of students in the education system.

At this point, based on our project direction, we are considering eliminating the Educator as a persona as we move towards a focus on career mentorship for students of color, outside the classroom.

4. Community Ambassador

¹² California Proposition 209, Affirmative Action Initiative (1996), (n.d.), Ballotpedia, [https://ballotpedia.org/California_Proposition_209_Affirmative_Action_Initiative_\(1996\)](https://ballotpedia.org/California_Proposition_209_Affirmative_Action_Initiative_(1996))

This user group represents individuals from educated backgrounds who aspire to give back to the community by inspiring and motivating students of color from marginalized communities. They may self-identify as a member of a historically underrepresented group in the STEAM fields. They want to dedicate their time and efforts towards supporting marginalized communities whilst ensuring members of these communities can discover their potential. They serve as role models for students in marginalized communities.

Our team has created [personas](#) and [user journey maps](#) to visually represent the characteristics of each of these audiences.

We have interviewed representatives from these user groups as well as subject-matter experts in the field of workforce development. Interview details and the user criteria are available in the [User Research Plan](#) document.

Communication Plan

We commit to attending meetings on time, contributing equitably to the project, and making sure that we value each other's diverse perspectives. As we are a small team, we will make decisions by consensus, utilizing Google Suite, text messages, and direct communication between ourselves, and email communications with our client.

Stakeholder Communication

After finalizing a slot with our client, we will be having a standing Tuesday 11:30 AM meeting with our client to keep them abreast of all new developments and to solicit feedback on how we are moving forward. Should the need for further communication arise, we will communicate via email or schedule another meeting, schedules permitting. A recurring Zoom invite has been sent to all stakeholders.

Internal Communication

Within the project team, we will meet every Thursday from 8 pm to 9 pm to discuss our path forward, with a WhatsApp check-in on Saturday to do a quick pulse check of the team. Every Sunday, we will reconvene after the tasks have been completed for the following week's deadline. At any point in time, if a team member has not made significant progress, we will have an internal huddle to check in with the team, adjust deadlines and tasks, and in case of an emergency, communicate directly and clearly with the client. Recurring meetings via Zoom have been scheduled for the rest of the semester and a WhatsApp group has been created for quick communication.

Project Outline (Next Steps)

After our meetings with the client and researching the company/industry, we have narrowed our scope to identify ways to extract data for every initiative ToysSteam carries out along with bridging the gap between the marginalized communities and potential employment opportunities. Continued meetings and user research has helped us to narrow our scope further, identifying emerging themes from which to ideate. As we iterate solutions towards an MVP, we will work with our client to refine our project and scope. Our deliverable plan is chalked out below:

Phase	Timeline	Action Items
1. Research and Data Collection	11/07 - 11/11	<ul style="list-style-type: none"> • Industry practices research • Identify prospective employers • User interview recruitment strategy • User research preparation
	11/14 - 11/18	<ul style="list-style-type: none"> • User Research <ul style="list-style-type: none"> • Employer interview • Field expert in workforce development • Field expert in education program • College student interview • Client's operation team interview • Synthesizing user research
2. Ideation & Prototyping	11/21 - 11/28	<ul style="list-style-type: none"> • Ideate • Create prototype • Testing Preparation <ul style="list-style-type: none"> ○ Define testing criteria ○ User testing appointment
3. MVP & Testing	11/29 - 12/05	<ul style="list-style-type: none"> • Complete the prototype (MVP) • Testing with Users
4. Final Deliverables	12/06 - 12/12	<ul style="list-style-type: none"> • Final delivery (MVP) • Final documentation • Project handoff

Research Findings

At this point, we have conducted [interviews](#) and an internal user interview synthesis, highlighting the key takeaways we gleaned from the interviews. The overview of this research can be found on our [User Synthesis Mural board](#). We have also created a [User Research Findings Report](#), highlighting our key takeaways from our user research. Overarching themes from the user interviews can be summarized under three topics:

- **Educational Support**

Under educational support, we heard that encouragement from near peers and mentors was instrumental in setting individuals up for success in STEAM endeavors. Additionally, access to quality education - through bootcamps, institutions of higher education, or K-12 education was valuable. However, overwhelmingly people of color found navigating education alienating and found

navigating institutions left them feeling disconnected, as though these institutions were not created with them in mind.

- **Mentorship**

Under mentorship, we heard the value of having a mentor and the impact that a mentorship relationship had on our user's lives - whether through a parental figure, other family, near peer, or community member. Through access to mentorship, users could see themselves following the path of their mentors into their chosen field. However, access to ongoing, long-term mentorship opportunities seemed sparse. Users were divided on ease of access to mentorship, with some speaking to the availability of mentors within their journey and others stating they had gone through it alone.

- **Community / Future Leaders**

In conversations around giving back to the community, we heard a repeated sentiment of giving back to the community and setting up the future leaders of the world with the tools they need to prosper in their personal and professional lives. Alongside community, users spoke of working together to overcome trauma, inequity and disparity.

Overall, our research and conversations with our client thus far have led to us identifying mentorship as a continuing issue where we can focus our efforts. Our client, our users, and our research confirms that there is a lack of diversity in STEAM careers. This lack of representation can feel alienating from a student attempting to learn and become employed within STEAM fields.

Mentorship, as our client and users directly attest to, can lead to great positive outcomes.

PROTOTYPE I

After conducting user research and synthesizing interviews by identifying key quotes and 'Aha moments' we were able to develop our first prototype. Our initial idea is to develop a community ambassador program called "Dah-Varsity Superhero Passport". Through this Superhero Passport, we hope to support students from marginalized communities with STEAM education, and recent graduates seeking to join the STEAM industry through mentorship and tutoring. To make the project scope attainable, we have narrowed our focus to the "T" of STEAM, *Technology*. Additionally, the prototype maps out two different paths, depending on whether the user is a mentor or a mentee.

From prototype to implementation, we have divided the project into three distinct phases:

Phase 1: In order to have a quick turn-around, the first phase involves launching the community ambassador program in colleges across Pittsburgh using basic Google forms and Zoom links. Registration forms can be implemented using Google forms and data gathered can be analyzed in the backend.

Phase 2: Moving forward, phase two involves developing a portal for the community ambassador program which can be integrated into the existing TOYZSTEAM website. This will enable

community members to directly apply to the program. This portal will also track the progress of enrolled community ambassadors and students from marginalized communities. Collection of data is integral for the company to track progress and bolster future funding opportunities.

Phase 3: As the project picks up, the concept of the portal can be integrated into other platforms like the existing Dah-Varsity App. The client can at that point determine whether they wish to invest further in the prototype, based upon the success of Phase 1 and 2.

We will develop a playbook to showcase the journey of a student of color that is how he/she will be equipped with the right skills to become a future leader.

As we continue to move forward with ideation and prototyping, we will refine our initial prototype based on feedback from the client and the users.

Prototype I Documentation

We created our first prototype during an ideation sketching that we did in class. The images of this ideation can be found at this link within the Partner folder: [Prototype 1](#). The first image was when we had the idea of a passport and a skill radar as well as the concept of experience point (XP) earned through program engagement. Both mentors and mentees can earn XP and develop skills. Mentee's skills would be related to pre-college preparation for the education and career of interest. Mentor's skills would be teaching/training skills, leadership skills, as well as the technical skills that the mentor provided to the mentees. The second image was when our team discussed STEAM fields, since STEAM is a broad term we decided that we should focus on just one field first for the MVP. We chose Technology which is the field that is related to our partner's interest and we have more resources on the field.

PROTOTYPE II

After developing the first prototype, we debriefed our client and took him through the whole concept. After an in depth discussion, we narrowed our solution to developing a mentor-mentee portal on the client's existing app and creating a playbook for the development of the portal and launch of the community ambassador program.

We plan to continue the 'Superhero' brand alignment across the portal and also plan to look for existing softwares which could be integrated to speed up the development and launch of the portal. Our second prototype was presented via a slide deck.

We framed this prototype as a roadmap, initially to our client to secure buy in and solicit feedback. After this, we workshopped the idea in class with peer and professor support. This prototype roadmap slide deck can be found in our Partner folder, and is also linked here: [Client Prototype Roadmap](#).

As we move to the next ideation and final MVP, we have locked time with our client for Monday December 5th 2022 to take the TOYZSTEAM team through the MVP.

PROTOTYPE III

For our third prototype, we used feedback received from our client in our weekly client meeting and in class to ideate on a mentor-mentee platform. To help with our ideation process, we created a Playbook that synthesized the information gleaned from our user interviews, background research into ToyzSteam and research into the educational equity and STEAM fields. This Playbook provides background information, metrics for success, and long and short term roadmaps.

Through the creation of this Playbook, we were able to ideate a user-friendly mentorship connection pathway wireframe, created through Justinmind. This prototype utilized the feedback received from our client and was presented on a tablet interface wireframe. Additionally, we made sure to include ToyzSteam's own 'Superhero' brand alignment, with Superheroes and Rookies connecting in the roles of mentor and mentee.

Building off the client's existing interface, our wireframe covered five clickable screens, envisioning the mentorship pathway through the following steps:

- Superhero or Rookie Selection Page
- Sign Up Page
 - Superhero Screen
 - Rookie Screen
- Matching Page
- Learning Progress Dashboard page

The wireframe and playbook created for prototype III can be found at this link: [Prototype 3](#).

Final MVP

Building up on our final prototype, we presented the solution to the Client and peers. We took the post-presentation feedback and incorporated it into our prototype to meet the needs of the client and enable smooth execution of the idea. The updates were as follows:

- Mentees were now called Sidekicks instead of Rookies
- A sharing feature was added to the profile of the mentee on the wireframe
- Developed a roadmap for the next action items to lead the solution into execution mode.

The next steps for the project are as follows:

- Interview High School students to test the prototype - we were unable to incorporate them in our research as they were less than 18 years of age. Hence, would be great to test the prototype and idea with the target audience.
- Devise a scoring mechanism to capture the efforts and progress of sidekicks, heroes, and superheroes.
- Test the Third-party App (Chronus) to verify integration with the existing Dah-Varsity App.
- Hire a project resource through Handshake to manage the project end to end.
- Design a standardized launch poster for Mentors and Mentees which can be floated in Schools and Universities via career offices.

A link to our final MVP can be found here: [Final MVP](#). A link to the final Playbook for implementation can be found here: [PIL PIT Playbook.pdf](#).

This project is publicly licensed under Creative Commons. A copy of this license can be found by visiting this link: [Creative Commons — Attribution 4.0 International — CC BY 4.0](#). The source code form is subject to the terms of the Mozilla Public License, v. 2.0. If a copy of the MPL was not distributed with this file, you can obtain one at: [Mozilla Public License, version 2.0](#). Link: <https://github.com/NahalG/Policy-Innovation-Lab-.git>.