

**An Autoethnography of T9Hacks: “Designing a Welcoming
Hackathon for Women and Non-Binary Students to Learn
and Explore Computing”**

by

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An Autoethnography of T9Hacks: “Designing a Welcoming Hackathon for Women and Non-Binary Students to Learn and Explore Computing”

Thesis directed by Dr. Lecia Barker

Student hackathons are a type of demographic-specific event that are aimed at college students. Students may attend hackathons because they provide an opportunity for informal learning, networking, and building products for social change. Hackathons are usually designed to give their participants opportunities to learn or expand their technical skill sets. During the process of building a project, participants learn about project management, task delegation, and the organization and production of a hack with a working demo within the limited time span. Hackathons are great at giving their participants informal and incidental learning opportunities. Participants may have different goals or motivations for attending a hackathon that can change how they participate in the event. Student hackathons have been growing in popularity over the last decade and are only becoming more popular as the computing field grows in size and demand. In the 2017-2018 school year, over 71,000 students in North America and Europe and over participated in a student hackathon. In 2017, every US university with a top-ranked computer science department hosted at least one student hackathon. However, despite their popularity with students, research about student hackathons is sparse and little work has been done studying student experiences at these events. There are also fewer women attending hackathons than men, on average, only 23% of the participants are women. This dissertation is situated within the existing hackathon literature and complements the work showing hackathons as places of informal and situated learning.

This dissertation focuses on the design of a women and non-binary hackathon, T9Hacks. I founded T9Hacks in the Fall of 2015 and, with a team of undergraduate students, we hosted our first hackathon event in late-February 2016. T9Hacks is open to all students, but specifically encourages women and non-binary students to attend through marketing, structure, and strategic

use of competition. Our mission has always been to create a welcoming and safe environment where women and non-binary students can learn and explore with computing. I was drawn to autoethnography as a way to analyze, interpret, and attach meaning to the design of T9Hacks. Autoethnography is a form of self reflection on one's personal experiences within a cultural context to look deeper at social interactions. Articulating the design choices that the team and I made created a list of design principles and lessons learned (listed below) and can give insight into the inclusive practices of student hackathons.

This autoethnography discusses the design of T9Hacks, a women and non-binary hackathon, in regards to its branding, design of competition, and structures that supported our participants. I discuss the name of the event, the graphic design, and the labels and the ideologies and values associated with those choices; how the nature, value of prizes, and framing of the contests were impactful to students; how the professional development and technical resources we provided to the students satisfied their personal goals for attending the event. These elements of the hackathon changed multiple times through the most change and give insight into the challenges our team faced when trying to design an inclusive and welcoming hackathon. The decisions the T9Hacks team was faced with can help inform other hackathon designs as well.

Dedication

To Simone and Brandon.

Without you this dissertation never would have been finished.

I owe you more than this dedication can ever describe.

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And to Ani, your first novel.

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Chapter 1

Introduction

I remember my first hackathon. The opening ceremonies were an adrenaline-filled pep rally welcoming and energizing the crowd as we prepared to build great hacks. During team formation, I met three other people with a great idea for a social web app. It was 36 hours of frantic coding, learning as much as we could, and building something we were proud of. After hacking ended, we excitedly presented our app to the judges. We didn't win any prizes, but we watched the teams who did and were amazed at what they had created in so little time.

I remember my first hackathon. During opening ceremonies, one of the presenters said we should invite girls to join our teams because they are "better at communicating and design." During team formation, I was the only person that was asked, "So do you know how to write code?" After coding ended, a local news site took my picture and labeled me an "up-and-coming programmer." My team and I didn't win any prizes, but I watched the other teams who did: a team of all men, a team with 3 men and 1 woman, an all-male team, another all-male team and I wondered why there weren't more women.

Being a woman in computer science has guided my work in academia to be predominantly focused on increasing the representation of women in computing. I was one of six women who graduated in my computer science program. I remember what it was like being the only woman in a computer science class. In the US, only 19% of the students graduating with Computing Bachelor's degrees are women [54]. Women make up only 26% of the U.S. computing workforce [54]; 30% of technology executives state that their organizations have no women in leadership positions [195]. In the last two decades there have been many efforts to increase the number of women in computing, from revamping introductory computing courses to changing hiring and supervisory practices in the computing industry. Student hackathons are one way that beginner students can learn about

computing for the first time and more advanced students can strengthen their ties to the computing field.

The work presented in this dissertation is heavily motivated and connected with my personal journey attending, organizing, and researching student hackathons. Below, I describe my first hackathon experience, during which I learned about student hackathons and began to think about the structure of these events. I then tell the origin story of T9Hacks, a female-focused hackathon I founded in 2016, and I introduce a few of the tensions I experienced building an inclusive event. Finally, I describe the research presented in this dissertation and where I would like to take this work in the future.

1.1 Spring 2015: Attending My First Hackathon

I opened this dissertation with a piece of writing I wrote one year after attending my first student hackathon. The hackathon I attended lasted 36 hours and was the first student hackathon held at my university, the University of Colorado Boulder (CU). A student organization with no formal connection with the computer science department was hosting the event. About 200-300 students, most of us computer science or engineering majors from CU, participated in this hackathon. I went alone, without the intention of staying for the whole event; I thought I could stop by, see what a “hackathon” was, and leave early. For two hours I sat in an auditorium and watched as it filled with predominantly white men. Looking around for other women, I felt a little self-conscious for being alone while all the other women seemed to be with groups. Eventually, opening ceremonies began. Different students introduced themselves as hackathon organizers before welcoming presenters from local tech companies. One of the presenters told an awkward sexist joke about including women on our teams, but he seemed well-intentioned. I felt that he had a real enthusiasm for hackathons and wanted everyone to feel the same joy and excitement he had towards these types of event.

What really surprised me was that a student hackathon was a competition. The people presenting in opening ceremonies were “sponsors” who were hosting their own sponsor contests

(the role of sponsors at a hackathon will be discussed in more depth in Chapter 2. Most of these contests were easy to enter; the sponsors either presented a problem to solve or required that we use their technology in our projects. I was also surprised to learn how much of a team-based event this was. All the organizers and sponsors spoke with the assumption that participants worked in teams, building one project, and competing for the sponsor contests. These realizations shaped my first impression of student hackathons: they were team-based, competitive, coding competitions. However, as I later learned, as a hackathon model, it didn't describe my experience at this particular hackathon nor did all hackathons have to emphasize these elements.

Based on the technology team members wanted to work with, I joined a team with three men: two sophomore computer science majors from CU and a senior computing major from a university in Texas. The two sophomores had an idea for a website and the senior and I had expertise in web design. We thought about entering for some of the sponsor contests, but we ultimately were more interested in the idea for building a website. Once we began planning our project, the senior also told us he also wanted to take advantage of the hardware at the hackathon and play around with one of the smartwatches. We divided the work for our project to include all four of us, but gave the senior less work so he could also work on his own project. Our team was building a simple geo-based online forum and the senior was creating a high-five counter. (All of our hands were sore by the end of the hackathon because of the number of test high-fives we had to give each other.) We worked on these projects for the entire 36 hours of the hackathon. None of us went home. We took shifts sleeping on the frozen concrete floor by our table, loaning each other coats to cover up and using each other's backpacks for pillows. Late on the second night, I remember seeing a friend of mine and asking him how he was doing. He mumbled, "tired as shit" in response. I was so sleep deprived I thought it was the funniest joke I ever heard. Eventually, the 36-hours ended and an organizer of the hackathon came around and told us to submit our projects to the hackathon website. We received a link to an unfamiliar website, created accounts, and wrote descriptions of our projects. Before we officially submitted our projects to the hackathon, the website asked us if we wanted to enter any of the contests, but we didn't really understand what the contests were

or if we were qualified to submit. We guessed and submitted the group project to the design and UI/UX contests, hoping we weren't doing anything incorrect.¹

Once our projects were submitted, we waited for demos to begin. The organizers messaged all the teams with a table number we were supposed to set up at, so we packed up our things found moved into the demo space. The demo space was a 15-20 tables lined up, with numbers taped to the top, designating the demo spaces for each team. Once we found our table, I set up my laptop to display our website and we all waited, still not really understanding what was happening. Occasionally someone would come up to us and ask what our project did and how we built it. These people looked older than than traditional undergraduates, so we assumed they were the judges, but weren't really sure. We were interested in seeing what the other participants built, so we took shifts staying at the table and looking at the other projects. At one point a hackathon organizer came up to us and asked us which team we were, the geo-based online forum or the smartwatch. We said both, but the organizer told us this could cause confusion with judging, since the hackathon divided judging by project type and two our projects were in different categories. The organizers ended up separating us, moving the senior at his own table so he could show off his smartwatch app by himself. It felt weird. Even though the senior didn't contribute much to the group project, we all felt like one team. We all just spent the last 36 hours working side-by-side, yet he was placed at a separate demo table because he mostly worked on a different project. In the end, neither of our two projects won any prizes. The senior left right before closing ceremonies to catch his plane back to Texas. I sat in closing ceremonies with my other two team members and watched the winners demo their projects. I was struck again by how few women were at this event. There was one team with a single female student and a slew of other all-male teams. I fell asleep for a few minutes during closing ceremonies and don't remember who won first place.

The project I built during that event wasn't solving a problem that would change the world. It didn't cater to sponsors' contests and it didn't win any prizes. But it was fun. I learned how

¹ UI/UX stands for "User Interface/User Experience", it refers to the graphical interface that the user interacts with.

to use different software and new techniques that I had been interested in but had not had the time to learn. I was able to teach what I knew about programming to my teammates and they were able to build a project they were interested in. I liked being in an environment where we were just focused on working, though I could have benefited from more sleep. That semester I was teaching an introductory programming class and the following Monday, I told my students about hackathons. I was inspired by the nature of these events that encouraged students to explore and gave them time and space to build any kind of project they wanted. My love of hackathons was born out of that first experience.

1.2 Fall 2015: The Hackathon that Inspired Us to Create T9Hacks

A few months later, in the Fall of 2015, the student organization hosted a second hackathon, this time a 12-hour event. I attended alone again, with the intent to work on a solo project. My colleague and mentor, Aileen Pierce, was volunteering as a mentor for the hackathon and we grabbed a table to sit together. We began talking about the low number of women who seemed to be attending the event, even trying to count the number of women we saw. The hacking space was spread out over two floors, from our vantage point, we could see one group of all women and a handful of other groups with one or two women. Interested in seeing if there were more women at the event, I walked to the other floor to get a rough estimate of the how many women were working there. I didn't see a single one. This wasn't unexpected, we knew that CU didn't have that many women in the computer science department, but Aileen and I still thought it was a shame so few women were attending the hackathon.

Aileen and I talked at length about women at student hackathons. Both of us had attended the two student hackathons at CU and thought they were a great experience for the students who attended them. Students were learning new computing concepts or techniques that were not offered in CU classrooms, gaining experience working on a team, building interesting projects, networking with mentors and sponsors from local tech companies, and being offered internship opportunities; yet there few women were reaping these benefits. As women in CS, this was a narrative that we

had seen over and over again. There were interesting and cool computing events happening, but women were not taking advantage of them. We began imagining what a hackathon would look like, if it was intended to attract more women to it. A hackathon could be more welcoming and less intimidating. It could focus on specific technology that students would be interested in learning about. It could directly advertise to women. It could be a women's hackathon. Then we asked ourselves: what if we created our own hackathon?

The following week, Aileen and I began work on creating what came to be called, T9Hacks, a women's hackathon held at the CU Alliance for Technology, Learning, and Society (ATLAS) Institute. We recruited five undergraduate students to our team. Only half of our team had attended a hackathon before and none of us had any experience in event planning. We wanted to create a female-focused, beginner friendly, and inclusive student hackathon for CU students. We partnered with Major League Hacking (MLH), an organization that helps student hackathon organizers create events. The structure of T9Hacks was based on the mainstream student hackathon model that MLH provided (this model is described in more detail in Chapter 2) [163, 165, 173]. Partnering with MLH put some restrictions on the event. For example, the event had to be free and open only to students; we had to have at least 80 participants; the hackathon had to be at least 24 hours long; we had to provide food during all meal times; and we had to include a team formation event, a mini-event, and demos [171]. However, the T9Hacks organizing team had control over other design elements of the hackathon, such as marketing, theme or focus, sponsors, mentors, and how we wanted to run competition. Our mission was to create a welcoming hackathon for women and beginner hackathon attendees.

1.3 Research Agenda

My research focus is on the design of hackathons, the goal of my work is to gain a deeper understanding of which hackathon elements can be inclusive and impactful for students, especially for women and non-binary students. This work was guided by two broad guiding questions: (1) What design elements might have contributed to creating a welcoming (or unwelcoming) environment at

T9Hacks?; and (2) What were the tensions I and the T9Hacks team faced when designing these elements of T9Hacks? Chapter 2, gives an overview of the issues surrounding women in computing, introduces student hackathons as a potential avenue to help expand the field of computing, and describes the autoethnographic methodology I use for analysis. Chapter 3 discusses the branding issues we encountered when creating T9Hacks, such as deciding our name, selecting a theme color, and (re)determining our labels over three years. For us, the difficulty as a women's hackathon was identifying how we should express femininity at an obviously gendered event, suspecting that our choices would create an image of the event that may turn off some people, but which might appeal to others. Chapter 4 discusses the competition elements of T9Hacks. In the first year we were against hosting a competition, thinking it was intimidating and unappealing, but as we gained experience as organizers, we chose to embrace competition, primarily because it was a mainstream element of a hackathon, but also because we learned how to build a low-stakes competition that was fun, rather than intimidating for the competitors. Chapter 5 discusses how we designed the support structures for the event to appeal to and support beginner and experienced programmers. Finally, Chapter 6 discusses the tensions the T9Hacks team faced when designing the event, as we tried to match a mainstream hackathon model while adapting the event to be more inclusive and welcoming of women and non-binary students.

Chapter 2

Background

2.1 Problem Space: Women in CS

There are very few women in the computer science (CS) field.

Fewer girls enroll in middle school computing classes than boys [54, 153], there are fewer girls taking the AP computer science test in high school than their male peers [40], fewer young women choose to enroll in CS majors in college [54], and if women do begin CS programs, they also switch majors at a higher rate than men, leading to fewer women graduating with CS degrees [54]. There are fewer women entering the computing workforce [213], and few of them chose to stay in those computing jobs [54]. In the 2017-2018 school year only 19% of the CIS (Computer and Information Systems) Bachelor's graduates in the US were women and only 8% were women of color [54]. It is difficult to track the number of non-binary graduates in computing because it is common for colleges to only report graduation rates of men and women [50]. In 1985, we saw the smallest gap between the number of women and men CIS graduates, when women earned 37% of the computing Bachelor's degrees, but this gender gap has only widened over the last few decades [54]. Figure 2.1 shows the number of CIS Bachelor's degrees earned by men and women since 1985. Though the number of women graduating with CIS degrees has fluctuated over the years—and in 2018 we are approaching historic peaks once again—the number of degrees earned by men far exceed those of women and is growing at a faster rate than the women. The computer science field is particularly dominated by white men, Figure 2.2 shows a gender and race breakdown of CS majors. In the 2015-2016 school year we see that just under 50% of CS majors are white men. Though we have seen

trends of increasing racial diversity among men in CS, there have only been small improvements in the racial diversity of women, and since the 2006-2007 school year, the percent of women in CS has stagnated around 19-21%.

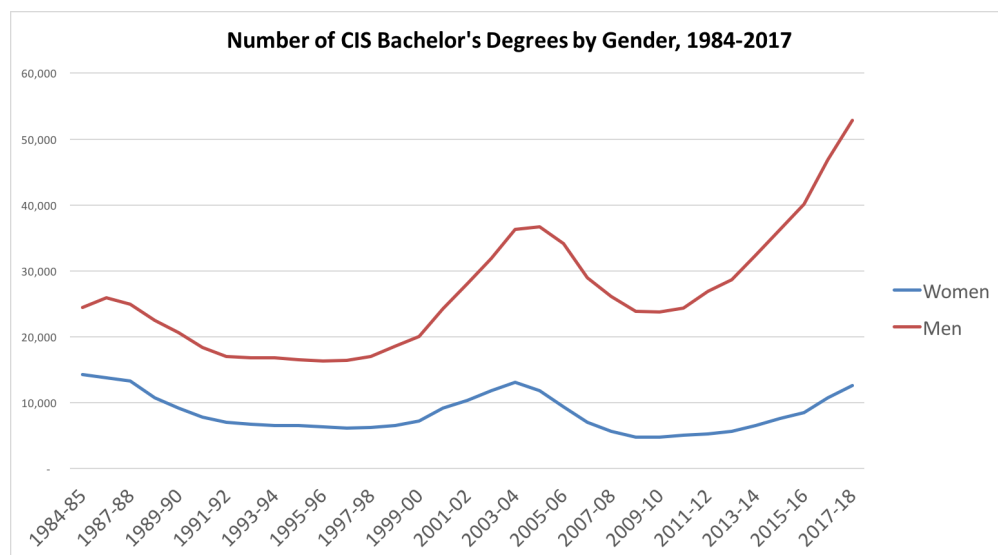


Figure 2.1: This graphic shows the number of degrees earned by women and men in CIS (Computer & Information Sciences) from 1984-2017.

So why is there such a severe gender gap in computing? The frustrating part is that, through decades of research on the “women in computing problem”, we already have the answers [249]. We know why girls don’t take computing classes, we know why women choose to major in fields unrelated to CS, and we know why women leave the computing field. When we look at the rates of students who are entering computer science programs, who are graduating with computing degrees, and who persist in the workforce, we see that women, non-binary folks, and people of color are systematically and continuously marginalized and pushed out of the field [186, 249]. There are multiple ways this happens and I cover three areas where we can see this happening: stereotypes about who belongs in CS the highly competitive environment it creates, and obsession with computing.

First, there are a number of social stereotypes about CS. A stereotypical computer scientist is someone who is technology-oriented, singularly focused on computers, lacks interpersonal skills, and

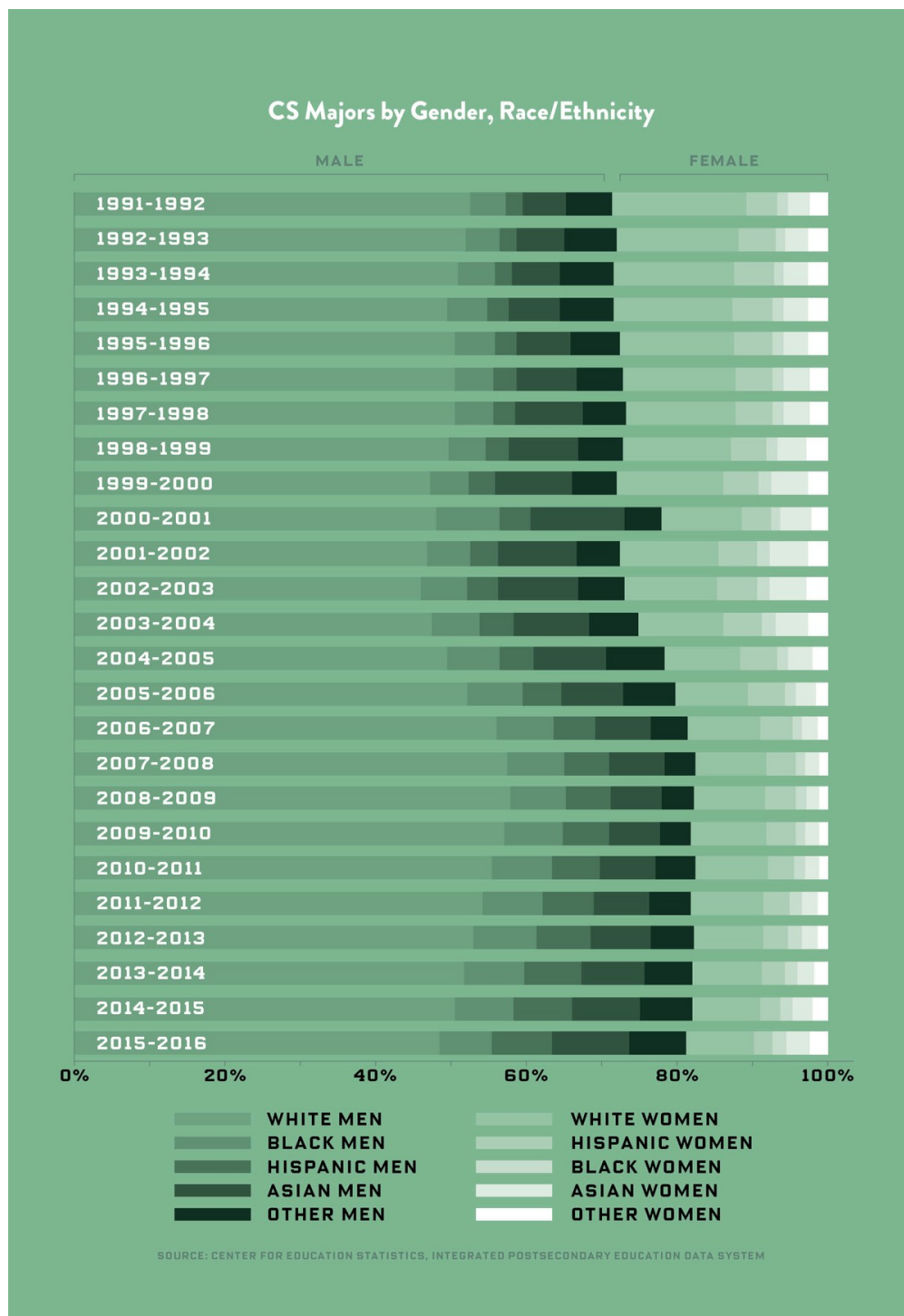


Figure 2.2: This graphic shows the percent of CS majors by race and gender from 1991-2016.

has the “look” (i.e. white, male, skinny, wears glasses) [31]. These stereotypes influence perceptions

about who a computer scientist is and how they are expected to behave. In Margolis and Fisher's study, undergraduate women at Carnegie Mellon University explained that their professors and fellow classmates held this ideal of the computer scientist and used it as a standard to judge how well students succeeded in the program [147]. Physical environments can be just as impactful in creating an unwelcoming environment for women in computing. In experimental studies, classrooms filled with traditionally masculine and geek objects, such as Star Trek posters, have been shown to negatively affect women's sense of belonging and desire to work in that type of space [32]. The geek image is closely tied to computer science [247] and can conflict with how students see themselves and deter women from entering CS [13]. Even the masculine coding of "software engineering" can affect women's idea of who a computer scientist is and who belongs in the field [1]. Creating a model of what a computer scientist looks like and where their focus lies is harmful to women, students of color, and students with other interests. Out of this, an unwelcoming environment develops for those students and sets them up as an "other" compared to the the students who may more closely fit the idealized notion of a computer scientist [150].

Next, CS culture has been shown to be highly competitive. The idea of competition is also ingrained into the computing field; this notion is reinforced with "weed-out" undergraduate courses that seek to select only top-performing students [198, 222], competitive and defensive climates [11], and the sentiment that smart people write good code [147]. There is also the stereotype that good programmers work alone to solve problems [261] and working in teams is not as productive or efficient [260]. These structural manifestations and cultural attitudes favor solidarity, individualistic, and competitive behavior. Students who favor do not favor these behaviors or prefer to work in collaborative or personable environments may feel that their interests or working styles do not match with the norms of the discipline. The competitive culture of computing can lead to certain students feeling like they do not "fit in", decreasing their interest in CS [150].

Computer science culture is also obsessed with computers and programming. Margolis and Fisher [147] interviewed female CS majors who talk about their male peers being "myopically obsessed with computers" (p. 65) and who "dream in code" (p. 5). The purist ideal that computer

scientists are only focused on technology and computers excludes many students who have aligning interests and see computing as a tool to fulfill other purposes. This behavioral philosophy also creates the idea that a successful computer scientist is obsessed with computing, leading to an elitist system where those who have a singular or dominant orientation to computing are representative of successful computer scientists and those with varied interests have a harder time fitting into the role of a successful computer scientist. Beyer's survey of female CS students found that women valued interpersonal interdependence, but were also pragmatic about choosing their major [13]. Women are more likely to choose careers that match their values and interests, promote work with others, or facilitate combining their careers with potential family life [147, 252, 264]. Students may not see CS as a field that can provide them with a fulfilling career or may not align with their other interests.

For the past few decades, the field of computing has developed a negative culture through stereotypical perceptions of the field, overly competitive climates, myopic focus on computers, and creating an unwelcoming environment. This culture makes it difficult for anyone who does not identify with this stereotype to succeed and feel like they belong within the field. Many women feel discouraged from pursuing long-term careers in the computing field. This has been an identified problem for many years. Margolis' book was published in 2003 and the women she interviewed attended CMU in the mid-to-late-1990s. Women who were born after the CMU students were interviewed are now entering college, still presented with a field that perpetuates an uninviting culture. Hackathons were born out of this singularly technology-focused culture [23, 119]. They embody many of the unwelcoming stereotypes about computing, but make interesting places to intervene for the benefit of women and non-binary students.

2.2 What is a Student Hackathon?

Hackathons are events where people gather together to build projects or solve problems about computing. These events are usually co-located and time-constrained, and the projects can be limited by content. The term "hackathon" came about in 1999 when an OpenBSD event coined

the term for a development gathering [23]. However, the idea of coming together and building software in a marathon-style has been around for much longer; in the 1960s MIT students would meet up for 24-hour programming “marathon bursts” [135]. Recently, hackathons are being loosely defined as events where groups of volunteer participants develop a project or prototype within a limited time frame at a centralized location and sharing resources [133].

In recent years, hackathons have been growing in popularity and the hackathon format has been adopted in many different fields. We see hackathons used to teach, address domain-specific issues, or innovate in areas such as; data science [2, 5]; big data [29, 215]; open data [4, 117]; social good [61, 197]; urbanization [137, 196]; civic good [139, 151]; entrepreneurialism [111, 205]; technology corporations [30, 123, 192]; healthcare [49, 185]; biology [121, 179]; scientific software [132, 243]; education [6, 191]; user experience [136], marketing [27]; dance [22]; journalism [119]; art [73]; and video games [69, 64].

Depending on the domain, the issues the participants of these hackathons seek to solve may be limited in problem, scope, or by available technology. For example, a hackathon for social good may partner with multiple non-profit organizations and invite participants who want to help these organizations build software projects for their organization’s needs. The two education hackathons mentioned were exploratory hackathons where participants brainstormed different educational lessons. The user experience and journalism hackathons let their participants pitch projects to each other and teams were formed by each person’s interest and capabilities to build projects. Video game hackathons, or “game jams” as they are more commonly referred to, also promote team-based approaches to project ideas.

Student hackathons are a type of demographic-specific event that are aimed towards students. These hackathons can be for middle school, high school, or, more commonly, college students. They can be hosted by companies or organizations, much like other domain-specific hackathons, but most student hackathons are organized and hosted by college students. Due to this difference in organizers, the intent and structure of student hackathons can differ from other domain-specific or issue-oriented hackathons. Often student hackathons are limited to currently enrolled students,

recent (within one year) college graduates, or coding bootcamp students.

Students may attend hackathons because they provide an opportunity for informal learning, networking, and building products for social change [64]. Many previous hackathon studies show that learning or skill building is a potential benefit to their participants [5, 64, 119, 122, 180, 183, 202, 244, 251]. Sometimes hackathons offer new technology or software for participants to learn about and use, which builds the participant's technical skills as they hack [5, 202]. Scientific hackathons may focus on building or adding new features to existing software and technology tools, allowing their participants to learn a new system or delve deeper into a problem they have been meaning to solve for a while [244]. Hackathons are usually designed to give their participants opportunities to learn or expand their technical skill sets. In addition, participants can also learn about project management and teamwork. During the process of building a project, participants learn about project management, task delegation, and the organization and production of a hack with a working demo within the limited time span [5, 183, 251]. These tasks can become particularly challenging when working in teams; Collaboration and communication skills become especially important when teams must form quickly and begin working closely with one another for an entire event [5, 24, 119, 244]. Hackathons are great at giving their participants informal and incidental learning opportunities. Though I discuss competition, learning, and teamwork here, it is not guaranteed that every hackathon participant will want to engage with these elements of a hackathon. Participants may have different goals or motivations for attending a hackathon that can change how they participate in the event.

Student hackathons have been growing in popularity over the last decade and are only becoming more popular as the computing field grows in size and demand. In the 2017-2018 school year, over 71,000 students in North America and Europe and over participated in a student hackathon [177]. In 2017, every US university with a top-ranked computer science department hosted at least one student hackathon [251]. However, despite their popularity with students, research about student hackathons is sparse and little work has been done studying student experiences at these events [251]. There are also fewer women attending hackathons than men, on average, only 23% of

the participants are women. This dissertation is situated within the existing hackathon literature and complements the work showing hackathons as places of informal and situated learning.

2.2.1 The Mainstream Student Hackathon Model

The mainstream student hackathon model is the student hackathon model developed by Major League Hacking (MLH). MLH is a global organization that partners with student hackathons in North America and Europe. They have a hackathon organizer guide that helps organizers create, plan, and manage their events. MLH has created a model of student hackathons that they require all the hackathons they partner with to conform to [163]. Many of their guidelines describe the type of communication they expect between the organizers and the participants, for example requiring that organizers make the hackathon date, time, and venue available and to clearly communicate any changes to the event to the participants, or that the event provide enough food for all participants and cater to participants with dietary restrictions [165]. They also provide expectations for the design of the hackathon, which affects how the hackathon can be structured, such as stipulating that an event:

- Host attendees for a minimum of 24 hours, overnight.
- Be predominantly run by students or school faculty.
- Ensure that participants own any intellectual property they produce at the event.
- Check in all attendees as they arrive at the event and make sure they have up-to-date name, email, mobile phone number, and school for each of them.
- Have at least one lead organizer who has full ability to make decisions on site at any time during the event.
- Do[es] not have entry fees.
- Advertise well enough in advance for hackers in the area to learn about the event.
- Do[es] not discriminate on the basis of race, religion, national origin, color, sex, gender identity, sexual orientation, social class, economic status, veteran status, disability, or age.
- Make a good-will effort to advertise and make the application for admission publicly available.
- Aren't secret or invite-only events.

- Have a straightforward and publicly known general application process.
- Publish the criteria for admission to their event.
- Publish the rules and regulations for competing in their event.
- Be open to hackers who are students at the time of the hackathon or who have left school within the current school year. They welcome non-students as volunteers, mentors, sponsors, and judges.
- Adopt, make available, and enforce the MLH Code of Conduct. Make it clear that the Code of Conduct extends to all attendees, including hackers, volunteers, organizers, sponsors, judges, mentors, and MLH staff.
- Whenever possible, events, provide sleeping spaces for attendees and encourage attendees to take advantage of them.

This list of requirements usually means that most MLH student hackathons are run in a similar fashion and any student attending any MLH event has a similar experience, no matter what state or country they are in. This also creates a standard, “mainstream” hackathon model that is common among most events. The mainstream model of a hackathon is 24 or 36-hours long and open to all students. Some events may allow for high school students to participate, but others, like T9Hacks, do not because of the extra liability underage participants add to an overnight event. Events are hosted by teams of students, commonly computer science undergraduates, who do all the organizing themselves. I’ve seen a few events hosted by faculty as well (for example, WiCHacks [259] and TechTogether [240]), but they have a team of students helping them organize and run the events. Hackathons are usually hosted annually, but some more popular events may be hosted once a semester (MHacks [156] and PennApps [194] do this). Hackathons are primarily funded by external sponsors, often tech companies (e.g. Twitter, Google, Microsoft, Amazon, etc) or other businesses that want to support the event (for example, one year a hackathon had KFC as a sponsor [144]). To build sponsorship, hackathon organizers create create a sponsorship packet with different tiers of financial sponsorship that provide different services to the sponsors. In this configuration, top-tier sponsors might be able to set up a recruiting table at an event while lower-tier sponsors may only get to hand out swag merchandise [167]. Depending on the event, the sponsors may also provide mentors for the event, host workshops, and host sponsor contests [167].

A mainstream hackathon may follow this schedule: check-in, opening ceremonies, team formation, hacking, workshops (if applicable), more hacking, hacking ends, demos/judging, and closing ceremonies where contest awards get handed out. The overall goal of a hackathon is for students to build projects to be demoed at the end of the event. Demoing usually has two formats: presentation-style where students have a few minutes to present their projects in front of everybody at the end of the event, or science fair-style, where students present their projects at a table and talk with people who come by. Demoing projects is something that MLH tries to push and encourage all participants to do [163]. However, the point of demos is also for judges to evaluate the projects for various contests that are held. Most, if not all, hackathons I’ve seen also have some type of competition element to them. The competition can be hosted in the form of sponsor contests (e.g. “Best use of Company XYZ’s API”¹) or an overall placement contest where 1st, 2nd, and 3rd prizes are awarded to the top teams. MLH also hosts two continental “league” contests (one for North America and another for Europe) and awards a school as the season winner. Student participating in hackathons earn points for their school by attending hackathons and winning contests.

A defining element of a hackathon is the competitive nature. Though student hackathons can be advertised as collaborative events [183, 251], competition can ultimately stifle collaboration, as students are competing for limited resources and to be judged against one another [202]. Grace [69] draws from literature about play to theorize about the effects the presence of placement contests at a hackathon have. He argues that placement contests shift the the focus of a hackathon to be on the product generation and winning contests, which creates a *competitive state* for hackathons. Whereas, game jams primarily focus on creating a fun experience for their participants, valuing the process of building projects instead of the end product, which creates a *play state* in their events. (Game Jams are game-building marathons where participants build games within a specific constraint or limitation, such as time, technology, theme, or mode of transport [64].) Grace argues that a play state better supports informal learning and mastery of skills. By adding a competition

¹ API stands for “application programming interface.” It is set of defined software methods, usually used to access data. For example, the Twitter API can be used to access tweets programmatically instead of looking at tweets through a phone app.

element into a computing event, nearly every aspect of the participant's experience at the event can be influenced by the competition. This can be seen in the projects they create at the event, which teammates they choose to partner with, and what technologies they use. Though the influence may be subtle, the students are always aware they are in a competitive environment and their choices at a hackathon demonstrate that understanding [69].

Still, many hackathon and computing competition participants enjoy the competition aspect of these events. Kearse [122] and Richard [202] interviewed students who participated in their computer science olympiad (a computing competition) and hackathon, respectively. The students talked about liking the competitive aspect of the events and said it was a motivating factor to participate. However, other research shows that the effect of competition is more nuanced. Fowler [64] reviewed hackathon and game jam studies that found that competition is only a partial motivator: only 28% of the participants from one study listed winning prizes as a motivating factor for participating at a hackathon. Chew found that only half of the students were motivated by the competition and prizes that the event offered. Though a competitive environment may be motivating for some students, it cannot be assumed that all students enjoy a competitive environment. Warner [251] also surveyed student hackathon participants and saw that some students felt like the presence of prizes made the atmosphere overly competitive. Using Grace's terminology, hackathons clearly produce a competitive state. This can be a motivating factor for some participants, who thrive on competition, but it can also be discouraging for others, who do not like competing with their peers for prizes or recognition. Students with a limited background in computing or who may be experienced in computing, but are not confident about their computing skills, may choose to not attend a hackathon, believing that the goal of the event, winning contests, is out of their reach. (Competition at student hackathons are discussed further in Chapter 4.)

At mainstream hackathons, participants are also expected to work in teams. Some events require that all projects be completed by a team, and some cap the maximum team size [163]. If students do not have a team, MLH encourages organizers to host a team formation event that to help the students who have come alone or the students who want to find teams [171]. These

teams can stay together for the entire event, but it is also common to see teams disbanding or for participants to switch teams [119]. The teams think of a project idea at the beginning of the event and can be influenced by the contests that the hackathon is offering and choose to tailor their project so it can be entered into one or more contests [68]. A hackathon may have workshops for the participants to attend, which can range from technical workshops, possibly hosted by a sponsor about their API for the sponsor contests they are hosting, or introductory workshops. Some hackathons may have themes, for example MedHacks is a hackathon about health [154] or Fashion/Tech Hackathon is about wearable computing [78], but a lot of hackathons are open and do not mandate the types of projects students should build [202]. Students may stay for the whole hackathon event, something that MLH encourages, but hackathon attrition rates can reach upwards of 50% over the course of the event [173].

2.2.2 Hackathons Can Impact Participation in CS

Munro [180] and Richard et al. [202] have studied their own iterations of students hackathons with the goal of retaining students in computer science and broadening participation and perceptions in computing. Munro reports on preliminary findings on hosting five students hackathons, with the goal of retaining students in CS by offering events that boost a sense of community within the undergraduate program. Though Munro did not conduct a formal study, he reports on his experiences hosting the talking with students at these events and claim that the hackathons boosted a sense of community in the five semesters they hosted hackathons [180]. Despite Munro's experience hosting multiple student hackathons, he does not describe the hackathon environment in much detail. He talks about ordering pizzas for one of the meals, giving out free t-shirts to participants, giving away an iPod as an incentive to register, and projects that aid one of the technology sponsors. Richard and her research group conducted a mini-hackathon, Stitch-Fest, at one of the largest student hackathons in the country, PennApps [194, 202]. This hackathon focused on wearable computing and had a theme of "Wear and Care", or to create meaningful wearable experiences in people's lives. Richard and her team designed their hackathon space to be

a welcoming and collaborative space, offering hardware kits to anyone who wanted to participate in their study. The participants of their study reported that the participants of the mini-hackathon reported broadened perceptions of CS and felt that the design of the mini-hackathon, StitchFest, felt more collaborative than the larger hackathon, PennApps.

The Munro and Richard studies show the potential for student hackathons to reach a broader audience and expand student's perceptions of computing. However, these two researchers also describe different hackathon environments. Munro's hackathons, though lacking detail in his descriptions, produce more stereotypical hackathon and computing environments: Munro orders pizza, gives technology as incentive, and encourages students work on projects for technology companies, whereas Richard and her team chose to create an open and collaborative space with shared materials and promoting that students create projects that benefit other people. These hackathons provide two examples of different types of hackathon environments that might be appealing to different types of students, especially students who fill the stereotypical image and norms of a computer scientist and the students who do not identify with their image and have other interests. A hackathon that does not embody the stereotypical masculine image of computing, creates collaborative and not competitive environments, and does not focus on technical output can be appealing to non-stereotypical students. This is the type of environment that I tried to create at T9Hacks.

2.3 Designing a Welcoming Hackathon: T9Hacks

This dissertation focuses on the design of a women and non-binary hackathon, T9Hacks. My colleague, Aileen, and I founded T9Hacks in the Fall of 2015 and hosted the first hackathon event in late-February 2016. At the time of writing this dissertation, T9Hacks has run annually for four years, most recently occurring in February 2019. It is a student-only hackathon, and it has required that participants be enrolled (or recently graduated from) a college, university, or coding bootcamp. It is open to all students, but specifically encourages women and non-binary students to attend through marketing, structure, and strategic use of competition. T9Hacks is run by a student group that is responsible for organizing and hosting the event. Our mission has always been to create a

welcoming and safe environment where women and non-binary students can learn and explore with computing [226, 228, 230, 233].

T9Hacks follows the structure of a mainstream hackathon based on the model put forth by MLH, but with some changes. It primarily is intended to appeal to and support students with less computing experience and who do not feel welcome at mainstream hackathons, groups that many women and non-binary students belong to. MLH partners with a number of gendered hackathons—some female-focused, women and non-binary-focused, and some supporting female participants only—and all of these implement their gender policies differently. For example, HackHERS [87], calls itself a “women-centric hackathon,” but allows participants of all genders to participate, whereas events like WiCHacks [259], Pearl Hacks [193], and Technica [239] are open to female and non-binary hackers only. Recently, there has been a trend in hackathons formerly only open to women beginning to include non-binary and transgender participants. TechTogether used to be a women-only event named SheHacks, but in 2019 went through a rebranding process where they changed their name and now label themselves as a “Women and Femme Non-Binary Hackathon” [212, 240]. T9Hacks went through a similar change, where we began as a “women’s hackathon” and in the past two years changed the name to become a “women and non-binary hackathon”. Most women’s hackathons are also held at college campuses where there is a mainstream (and non-gender focused) hackathon as well; AthenaHacks [9] and HackSC [98] are held at the University of Southern California; WiCHacks [259] and BrickHack [21] are held at the Rochester Institute of Technology; Technica [239] and BitCamp [15] are held at the University of Maryland; HackHERS [87] and HackRU [94] are held at Rutgers University; PearlHacks [193] and HackNC [92] are held at The University of North Carolina Chapel Hill; and T9Hacks and HackCU [83] are held at the University of Colorado Boulder (CU).

The goal of T9Hacks was to create a separate space that was different from the feel that mainstream hackathon tend to evoke with women and non-binary students. We were creating a “counter space” within the student hackathon community [186]. Counterspaces are often considered “safe spaces” that lie outside mainstream educational spaces [214]. Counterspaces are particularly

valuable for women, women of color, students of color, LGBTQIA+ students in STEM because have traditionally not been included in STEM education or STEM careers at levels that represent their US populations [38, 186, 187]. STEM’s culture often privileges norms that are competitive and individualistic, norms that are often associated with white male scientists and professionals [31, 120, 187]. T9hacks was intentionally created to push back against some of the normative practices we saw in other mainstream hackathons. I called T9Hacks a “reprieve space.” It was a place that was supposed to be a break from the everyday computing culture. The T9Hacks team was intentionally trying to create a hackathon space that didn’t mimic the uninviting culture of CS, we wanted to create a space that was collaborative, fun, not overly competitive, friendly, and welcoming to women and non-binary students.

/noindent /textbfIntentionality of T9Hacks

The story of the development and design of T9Hacks is the story I tell here in this dissertation. We made a number of changes from the mainstream hackathon model and maintained many other elements. Over the three years I worked as the lead organizer, T9Hacks went through changes in branding (Chapter 3), the design of the competition (Chapter 4), and structures we used to support hackers (Chapter 5). We struggled with how to label ourselves, changing from “women’s hackathon” to “student hackathon” before settling on “women and non-binary hackathon”. In the first year, we were adamant about avoiding competition at the event to mitigate intimidation, but eventually hosted multiple contests in the third year. We also went through multiple iterations of how to structure the hackathon to appeal and provide support for beginner and experienced programmers at the event. The design changes that we made for T9Hacks were made with the intent to build an inclusive and welcoming event for all our participants. Every year the team and I had to re-evaluate what an “inclusive and welcoming event” meant to us and make decisions about how we wanted to build and implement a hackathon that supported this goal. In writing this dissertation and trying to organize the practices and interventions the T9Hacks team had with the mainstream hackathon model, there were some practices that we consistently tried to fall back on. Below, I list mission-driven implementation practices that the T9Hacks team created to push

back on the normative, intimidating practices or norms of mainstream hackathon spaces. These practices are partly based on T9Hacks' mission and values, but they also represent lessons learned from our first three years.

Environmental Practices

- Create an atypical CS culture: To us, this meant trying to mitigate some of the markedly masculine culture that CS can embrace. We could keep tech culture, but we could try to add to or present it in a more gender-neutral or feminine way.
- Provide some incentive to the participants: Have a competition or something at the end of the event for participants to look-forward to that provides them motivation to continue in the event for as long as it lasts.
- Lower intimidation: In lieu of an intense or cutthroat competition, competition should be fun first. Host fun categories that are not dependent on skill or project type. Offer low-stakes prizes, like coloring books or microcontroller kits, and never cash prizes.
- Make it welcoming: Student comfort should be a high priority and the event should try its hardest to cater to participants of different needs. For example, providing a variety of food options or having pronouns on nametags.
- Be upbeat: The event should be positive and fun for the participants. For example, use bright colors on the marketing/website. Use positive language when communicating with the participants. Provide affirmation to all participants.
- Be beginner-friendly: Advertise specifically to beginner programmers. Follow through at the event with workshops, tracks, or other avenues for beginners to learn programming and successfully build a project.

Goals for Participants

- Learning: The most important experience we should provide to the participants is an opportunity to learn about computing. Provide workshops, mentors, or tracks to help guide the learning process for participants. Not all participants will use these resources, but they should be available for those who want and need them.
- Fun: The hackathon should be a fun and enjoyable experience for the participants. For example, host other activities at the event like a dance party. Do not push participants to conform to a particular hackathon experience; if they wish not to work in teams or enter into any of the contests because it would not be fun for them, allow them freedom to create their own experience within the event.

We did not have this list of design principles to guide the planning of T9Hacks in the first three years. Instead, I have extracted this list through an autoethnographic analysis of our design choices and lessons learned. That is the subject of this work. Throughout this dissertation I'll be

referring to these design principles as ways we tried to implement our stated mission of creating a “welcoming space for women and non-binary students to learn and explore computing.” My hope is that they provide a useful, but brief overview of the principles that were leading the T9Hacks team in our design decisions.

2.4 Methodology: An Autoethnography of T9Hacks

This dissertation takes the form of an autoethnography of the design of T9Hacks. Since the its start, I’ve always known that this dissertation was going to be about T9Hacks. I think it was the single most important thing I did in grad school. But it took me years to understand how I was going to analyze such a complex and multi-faceted event. Personally, I was interested in investigating the participant experience at a hackathon to see how it might impact their perceptions of computing. Did it even change what they thought of computing? Did it change how they thought about themselves in relation to computing? But as the years went on and I continued to attend more hackathons and host additional iterations of T9Hacks, it became more and more difficult for me to get to a point where I could perform empirical research on the participant’s experiences. I was working as the lead organizer of T9Hacks, taking classes, teaching classes, and preparing for my PhD examinations. It was difficult to both design the experience of T9Hacks and study it. Instead, what I slowly began to understand was that I was becoming an expert on T9Hacks. I knew everything there was to know about organizing and hosting it; I learned what the participants liked and didn’t like; I learned why some students choose to participate and why others didn’t want to come; I learned what kinds of experiences the participants were expecting and how to cater to them; I learned what kind of support the participants needed and how to provide that; and I learned what didn’t work. There isn’t anyone on the Earth who knows more about this event in its first three years than I do (though Aileen comes in at a very close second). So when I began structuring this dissertation and looking for avenues for analysis of the event.

I was drawn to autoethnography as a way to analyze, interpret, and attach meaning to the design of T9Hacks. Autoethnography is a form of self reflection on one’s personal experiences

within a cultural context to look deeper at social interactions [102]. It is generally done to tie one's personal experiences to wider cultural, political, and social meanings and understandings [58]. This shifted my focus of analysis from participant experiences to organizer design decisions, but it was not a departure from my personal goals for my work, which is broadly to increase the representation of women and non-binary people in computing, and specifically to make hackathons more welcoming to women and non-binary students. Articulating the design choices that the team and I made created a list of design principles and lessons learned (listed below) and can give insight into the inclusive practices of student hackathons.

Autoethnography can take many forms, such as a personal narrative, poetry, or performance, but it is intended to engage the reader with the text and elicit a response and reaction to the issue raised [59]. Traditionally, it is a way to attempt to link a researcher's ideas about their personal narrative to a broader culture and the other people who inhabit it. It leads to a different kind of understanding of one's experiences. Self-reflection and self-narration offer a means to acknowledge power relations in the research relationship and challenge the subjectivity of the researcher [44] while giving readers a way to evaluate the researcher/author as an active participant in research and the process of meaning creation [100]. Autoethnography draws on ethnographic and narrative traditions with the goal of creating rich, evocative stories that are grounded in personal experience [216]. It offers a method of connecting fragmented individual stories into an analytical text that provokes reflection, discussion, and empathy in the reader with the goal of illustrating wider social and cultural issues [43].

Dashper [43] is a critical event studies researcher who maintains that autoethnographic research is a useful method for understanding and exploring meaning in events research. Critical event studies is an emerging field within events management and events studies that uses multidisciplinary methods to gain a political, social, and cultural understanding of events. Event studies is a good place to methodologically situate my work and critical event design provides methods to gain a holistic understanding of events. Dashper advocates for the use of autoethnography in events research because it can provide for valuable and detailed insight into the event experience.

She writes:

“Autoethnography allows the researcher to use highly personal, often emotional and (hopefully) evocative accounts to try and engage the reader in the event experience. Personal stories can be powerful ways through which to discuss wider social issues and have the potential to enrich critical event studies by providing alternative and revealing accounts of event experiences” (p 213-214) [43].

Dashper [43] also describes a methodology for conducting autoethnographic studies in events research. She describes a four step process for creating an autoethnography about an event study: (1) Select a topic, an autoethnography needs to be a good story, it has to be exciting, interesting, and had to draw the reader in through the narrative. (2) Collect data, often, researchers realize after an event that it would make for a good autoethnographic story, so it is necessary to rely on “headnotes”, emotional recall, and “systematic sociological introspection” (p. 219). A researcher must imagine themselves back in the place and situation, both physically and emotionally, to create a detailed and analytical narrative of the event. (3) In writing autoethnography should have short vignettes which are evocative and analytically powerful. This is challenging to master, but makes critical events research more methodologically rich. (4) An autoethnography must be shared with others to understand the power and potential the narrative has to emotionally connect with and impact the reader.

When I was working to develop my autoethnography of the design of T9Hacks, I followed Dashper’s outline for conducting autoethnographic research on events. I thought about everything I wanted to say about T9Hacks and started writing potential topics for analysis. I collected as many historical artifacts I could about organizing the event, going through the team’s archives and looking at the documentation we had.² I collected the team meeting notes and personal fieldnotes from 65 planning meetings with the T9Hacks team and other sponsors. I collected every email I could find that had to do with the event, a total of 543 email chains and 2,102 individual emails. I wrote in-depth summaries about what I remembered from each year. I spoke with our faculty advisor and other organizers for the event, collecting oral histories about the things they

² For a full list of the archive documentation I gathered, refer to Appendix A

remembered from planning and hosting the event. I was repeatedly forming and reforming the stories I had to tell about T9Hacks. This dissertation went through six major thematic shifts before it reached its current form. I tried to find the most salient and evocative stories I could tell about the planning and hosting of T9Hacks. This autoethnography is filled with and rests on anecdotes, oral histories, and observations from my time with T9Hacks.

Positionality

Writing an autoethnography about an event where I worked as the lead organizer for three years positions me as an “insider” to hackathon organization, but an “outsider” to participant experiences. Positionality refers to “the practice of a researcher delineating his or her own position in relation to the study, with the implication that this position may influence aspect of the study, such as the data collected or the way in which it is interpreted” [200]. A researcher is positioned as “insider” when they are conducting research on participants who are similar to themselves, whereas they are positioned as an “outsider” when they look at other participants who are different from themselves. As the lead hackathon organizer, I was an “intentional agent” in the design of T9Hacks. I am not only studying the design decisions of T9Hacks, but I am studying *my* design decisions at this event. My position as a lead organizer also influences the interactions I discuss in this autoethnography. Every conversation I had with potential participants, event attendees, sponsors, mentors, and even the T9Hacks team were had when I was working as the lead organizer. Being in this position of power and authority could have influenced the topics people were willing to discuss with me or how they framed our conversations. Since this dissertation is an autoethnography, I try to make my position as the lead organizer clear within this narrative.

As the lead organizer of T9Hacks, I was also responsible for forming and influencing the mission, goals, and design of the event, all of which are affected by my experiences with computing, CS culture, and student hackathons. In Chapter 1 I discussed the first two hackathons I attended, so my experiences with hackathons was extremely limited when I was planning T9Hacks in our first year. In the first year of T9Hacks, I was a third year PhD student who was working in computer science education. I have Master’s and Bachelor’s degrees in computer science, both earned CU.

I remember my graduating class, I was one of six women graduating from CS, it was often that I took classes where I was the only female student. I've worked two computer engineering jobs, one where I was the only woman in the company, and the other, where I was the only woman on my team. My experiences with computer science have been tokenizing, hyper-visible, and often, ostracizing. My intention with T9Hacks was to create an event where, for at least for 24-hours, other women wouldn't feel the same way I often did in computing spaces.

When I began writing the final draft of this autoethnography, I was also faced with the decision about how to represent the various organizers, sponsors, mentors, and community members that were a part of this narrative. I've chosen to write this autoethnography centered in my experiences, and I anonymize and partially-obscure many of the people and organizations I interacted with. This choice was made, primarily, to protect the identity of the people who spoke with me, but to also position these people and organizations as representative actors in the larger story of T9Hacks. I may write about an experience I had with a mentor, but my intent is not to call attention to the mentor specifically, but to give more weight to the situation that arose and how it affected the design of T9Hacks. I only name one other person in this autoethnography: my colleague Aileen Pierce,³ who was the faculty advisor for T9Hacks and a committee member for this dissertation. T9Hacks would have never happened without Aileen and I think it would be a disservice to the tremendous dedication and work she has put into our hackathon to anonymize her in this autoethnography. I also name other student hackathons as they are relevant to providing a landscape of student hackathons and describing the variety of student hackathons that are available. As the lead organizer, I was constantly faced with the dilemma of making judgment calls as to whether an interaction I had was an isolated incident or was representative of how a larger group of people felt about the event. In this autoethnography, I have attempted provide some clarity about these interactions and how I interpreted them as the lead organizer.

This autoethnography presents three of the most important stories I have to tell about T9Hacks: branding (Chapter 3), competition (Chapter 4), and structure (Chapter 5). These

³ Aileen consented to the use of her name in this dissertation

elements of the hackathon changed multiple times through the most change and give insight into the challenges our team faced when trying to design an inclusive and welcoming hackathon. The decisions the T9Hacks team was faced with can help inform other hackathon designs as well.

Chapter 3

Branding

3.1 Introduction

The chapter discusses three branding elements of T9Hacks (its name, graphic design, and labels) and how the hackathon came to embody the ideologies that were associated with these branding choices. Branding is an important element of event design that affects whom the event appeals to (and whom it does not), how people interpret the event, and, ultimately, who chooses to attend [155]. Branding is a chance to communicate one’s vision about an event to the intended audience before they even attend the event. I use Butler’s expansion of Althusser’s theory of interpellation [25, 131, 141] to analyze the branding changes to T9Hacks. The primary branding elements that were impactful for T9Hacks were (1) naming the event, (2) the graphic design, and (3) labeling the event. I discuss the journey the T9Hacks team took to develop and iterate on these branding elements, how these design decisions changed our interpretation of the event, and how it affected our participants. One of the largest tensions we faced was deciding how to brand ourselves as a type of “reprieve space” for women in computing. One of our primary ways in accomplishing this goal was to demasculinize the hackathon environment by creating opportunities to include feminine branding. However, we recognized that representations of femininity can also bring their own sets of ideologies that we had to contend with. The process the T9Hacks team went through—iterating and changing our branding so it was fully representative of the hackathon we wanted to be—is a process that other hackathon organizers should be aware of and perform for their own events. Given how important branding is in event design and how it can have such a large

impact on the attendees, all hackathon organizers must be aware of the ideologies their branding represents to a wide audience, especially if they are looking to diversify their participant base.

3.2 Title IX: Naming the Hackathon

Naming the event was one of the first and most difficult tasks we had to do when creating a new hackathon. On a practical level, we needed a name for marketing and communication purposes. Once we had a name we could reserve a website domain, create a website, create logos, and create an initial marketing campaign,—all things we needed to get started on to begin advertising. On a team level, a name would give us an identity and would make it easier to recruit new organizers to the team. In Louis Althusser’s theory of interpellation, naming something gives it meaning and an identity. A name puts an idea into our heads about what a thing is; it communicates beliefs and values, often unconsciously. Choosing a name for an event can ascribe value to it before anyone knows what the event even is. Interpellation is the idea that a name or idea does not exist in a vacuum. A name can represent an existing ideology, role, or cultural representation that are offered to us (or assigned to us based on societal or cultural standing) which we are (implicitly) encouraged to accept. Althusser uses the term “hail” to describe how one can choose to accept the name given to them. The classic example used to describe the idea of hailing is calling out someone’s name on the street [141]. If that person chooses to turn around, they are also, even if subconsciously, choosing to accept the name and any meaning behind it. If they choose not to turn around, they have rejected the hail and the meaning associated with it. Someone can be considered fully “interpellated” when they have successfully accepted the hail given to them willingly.

When the team was considering a name for the hackathon, we were considering the connotations and meanings that a name might convey to our participants (and non-participants). One of our biggest considerations was deciding how feminine we wanted the name to be. We wanted the name to reflect that we were a women’s hackathon, but did not want it to be ostentatiously girly. We described this as wanting to be a “female event” but not “girly-girly”. We liked names that used feminine imagery (e.g. Technica [239], Diamond Hacks [52], or Pearl Hacks [193]), but

not female pronouns or nouns (e.g. HackHERS [87], SheHacks [212], or WomxnHacks [263]). As a team, we never discussed the distinction between “female event” and “girly-girly”; however, looking back, I think the team had preferred the more subdued feminine imagery that names like Diamond Hacks and Pearl Hacks conveyed, despite that these names could have some sexist ideological messaging associated with them. For instance, pearl necklaces or diamond engagement rings can be a feminine indication status, wealth, or privilege. The phrase “diamonds are a girl’s best friend” both infantilizes women as “girls” and assumes that women are shallow or materialistic. These hackathon names can be signaling a message that women are materialistic and petty (i.e. women are attracted to the event because all women are attracted to these gems), that women’s events must be associated with items stereotypical associated with women (i.e women’s events must have a feminine name or else women won’t be interested in the event), or possibly ownership of women (i.e. these are items men are supposed to buy for women as gifts). However, I think the T9Hacks team had a different interpretation of these names at the beginning.

Many members of our team liked the names Pearl Hacks and Diamond Hacks. We liked them despite the negative stereotypes their names brought up about women. We did not think the women who created, named, and were hosting these hackathons were buying into these stereotypes either. We looked at their websites and saw the way they were talking about the female participants, they were promoting a message of empowerment for women to learn about computing at their events. We saw the use of these gems in their names as a way to reclaim these feminine images and proudly display them as the names of their events. Pearls and diamonds were not objects that the organizers thought women might be materialistically attracted to, they were images of beauty, femininity, and female strength, items that are not usually present in the male-dominated and masculine-oriented computing field. By adding these images to this space, they are inherently changing the imagery used in hackathon spaces. These gems can be seen as images of female ownership, as they are often given as gifts to women by men, and (if we ignore the heteronormative assumptions this phrase makes about the relationships between women and men) these names can be interpreted as women taking ownership of themselves by creating space and opportunity for women like them.

The team interpreted Diamond Hacks and Pearl Hacks as names that have been reclaimed from stereotypical imagery, and in Judith Butler’s response and expansion of Althusser’s interpellation theory, she discusses a similar idea to reclaiming [25]. Butler discusses how a name or idea may be assigned or interpreted to have cultural meaning, but an idea is more than just the hail, it can hold additional meaning or identities. If we go back to the example of a person answering to a hail on the street, that person may accept the terms of the hail at that moment, but that does not mean it is the only hail they answer to or that their identity is comprised of the meaning attributed to one hail. Identity, ideologies, and names, are multi-faceted and can hold dual-meaning, Butler describes this as a “resistance” to an ideological hail. Resistance has two parts: first a “critical desubjectivation” which involves embracing the “incoherence of identity,” or acknowledging that even fully interpellated hails may not fully capture one’s “real” self; and, secondly, “resignification” or reassigning new meaning to old signifiers, which can include “taking-back” or reclaiming an idea by creating new connections or meanings from the hail [25, 131]. An example of resistance can be seen in some LGBTQIA+ spaces, where the term “queer”, when used by a member of that community, is not interpreted as a derogatory slur, but has been reclaimed, or reappropriated, as an umbrella term for people who fall into the LGBTQIA+ spectrum [72]. This does not mean that all members of the community assign this new meaning to the term, and there still are LGBTQIA+ people who associate the term queer with its mainstream meaning. Butler’s revised theory of interpellation allows for multiple meanings and ideologies to be ascribed to one hail, affording the space for a group to reclaim and assign additional meaning to a name or idea, while simultaneously making interpretations of a hail more ambiguous, as they hold contextual meaning.

Though the T9Hacks team was not aware of the theory of interpellation or resignification of names, the ways in which we were interpreting the names of other hackathons aligned with the theory. We wanted a name that signaled femininity and female empowerment and we were interested in names that reappropriated feminine imagery, even if it was stereotypical. We spent hours discussing the name. In the end, Aileen, T9Hacks’ faculty advisor, was the one who recommended naming the hackathon after Title IX of the Education Amendments Act of 1972, a title guaranteeing

gender equality in educational programs. Embarrassingly, no one else on the team knew exactly what Title IX was. A few members of the team heard about Title IX as it was currently being discussed in relation to how schools investigate and prosecute campus sexual assault cases. But we were unsure what the title was or how it helped in assault cases. Aileen had to look up Title IX for us. It states: [245]:

No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance.

We liked naming the hackathon after a law that was working towards a gender equality mission. We played around with ways to represent Title IX in a name, mostly by discussing if we would keep the entire name or represent it through acronyms. Someone suggested shortening Title IX to “T9” and we all loved it. This “T9” name accomplished two things: First, it shortened the name, which we thought was beneficial because a shorter name might be easier to remember. But this also obscured the referent’s name so it was difficult to discern our name’s origins at first glance. Althusser’s interpellation theory would see this as an act of noncompliance to the values the name “Title IX” would have given us, a rejection of the terms of the “hail”. By changing the way “Title IX” was represented, we were obscuring the cultural meaning and value the term had. Now, that is not to say that “T9” has lost all cultural association with Title IX; those who know what the name “T9” stands for can still assign cultural meaning to it because they are aware of the underlying referent of the name. The value they put on the name is because of the extra information they have about the event. When we decided to shorten the name, we also agreed to add a small section at the very bottom of our website that told the story of what “T9” stood for, but I doubt that every visitor of the website has scrolled far down enough to read about it. I would guess that very few people know what “T9” stands for, so the meaning assigned to the name is more personal for our team and the meaning we assigned to the name.

“T9” also invokes other technical interpretations for the event. When many organizers on the team heard “T9” they thought of the (now defunct) nine-key text messaging function T9. We didn’t

want people to think we were naming the hackathon after the texting language, but we were willing to accept that that association might happen anyway. We were also concerned that “T9” would have made our hackathon difficult to search for, especially if people thought the “9” was written as “nine,” but we thought people might be more inclined to type in the one character “9” than the four character “nine” when searching for us, so this was also an acceptable potential drawback. We really liked the “T9” name because it had a certain “cool” factor. We liked the alpha-numeric combination of the name and thought it felt technology-inspired and fun. Our reaction to the alpha-numeric name “T9” is not unique. In Pavia and Costa’s work, they researched brand names with alpha-numeric combinations and found that these types of names were most appealing for technical products when compared to food, household, or personal products. Participants of the study demonstrated a deeply-held set of beliefs that alpha-numeric names are representative of technical, mechanical, or computer products.

In addition to the name “T9,” we also had to make a decision if we wanted the word “Hacks” or “Hack” in the name. This was an extremely popular thing to do at other student hackathons (e.g.: HackCU [83], HackNYU [93], HackMIT [91], BrickHack [21], MangoHacks [146], etc.) but we were afraid of the connotation that “hackathon” or “hack” may have. That year we discussed avoiding the label “hackathon” altogether and calling the event a “building marathon” or something similar. However, we quickly decided that adopting the label “hackathon” gave us an identity and a community belong to. We added the suffix “Hacks” to the name. Our debate about avoiding the use of the term hackathon came from a place that assumed that terms like “hackathon” could represent a negative ideology about hacking. This is not a unique perspective; other computer science researchers have discussed the negative connotations of hackathons as well, suggesting that students would assume the event was associated with “people committing crimes” [207], emphasizing the “Geek” stereotype [74, 204, 250], assuming that the term appeals mostly to male computer scientists [71], or that it is intimidating to women [45]. Branding an event with a term that has such a loaded meaning was a choice we were prepared to make, especially since this was used in many other mainstream hackathon names.

As the lead coordinator of a women’s event, I was always conscious of how our event compared to other mainstream hackathons and scrutinized the differences in event design. In this case, I’m not sure that the addition of “Hacks” to the name and conforming to mainstream naming conventions was really beneficial to our participants. The name could still signal negative stereotypes or ideologies about the computing field. However, what this name did was signal to *other hackathons* and *other hackathon organizers* that we were a mainstream event, that we were a “real hackathon.” We were joining a large community of other student hackathons and other women hackathons. We followed each other on social media and attended each other’s events. By adding “hacks” to the name of the event, we were choosing to accept the most basic label of the “hackathon” hail and placing our event among other mainstream student hackathons events. This tension between accepting mainstream ideology and trying to represent ourselves as a women’s event continued with our graphic design decisions.

3.3 Pink is Out, Pink is In: Creating Graphic Design

Once we had a name for the hackathon, we immediately started planning the graphic design for the event. We first settled on the theme color and color palette we wanted. A theme color would impact the color of the logo, stickers, website, and the marketing materials (posters, handouts, flyers). Selecting a theme color early would enable us to create an online presence and begin advertising the event. The theme color and the color palette used in the branding and marketing of an event can have a major impact on the visitor [178, 208]. Often, the graphic design is the first thing a person notices about an event, they notice the design of the website, they are attracted to the colors of a sticker, they notice the design of a poster, etc. The graphic design can form an impression in someone’s mind about the type of event it is, the environment it might have, and who might be attending the event, before they even read a description of the event itself [155].

3.3.1 Avoiding Barbie Pink

From the beginning we wanted to avoid the color pink and, to a lesser extent, blue. The entire team was against using pink for the graphic design because we all associated the color pink for things that are branded “for girls.” Pink as a “girl’s” color is extremely pervasive in American culture and marketing. This is the “Barbie pink effect,” where women and girls are bombarded with pink items because they are supposed to be more appealing. In childhood, girls wear pink clothing, put pink pencils and folders inside pink backpacks, go to school where their name tags are written in pink, eat lunch out of pink lunch boxes, ride home on pink bicycles, watch TV with shows and commercials with pink in them, and play with toys that are all pink colored. Girls’ products are often advertised using pink packaging, pink advertising, or pink toys [26, 63]. When the girls grow into women, they experience a “pink tax” where everyday products, like razors or pens, marketed as “for women,” which really means they are pink colored and are more expensive than “men’s”/gender-unmarked products [116, ?]. After living a life where one is forced to accept this color from products and items, just because of one’s gender, it is no wonder that so many women now reject the color pink and avoid its use [116]. Pink can be a stereotypically feminine color and can recall negative stereotypes about women like portraying them as childlike and immature people dependent on others’ help [199], or portraying a hyper-feminine image of women who are materialistic, vapid or stupid [199], or by portraying a gender essentialist notion that women cannot use “normal” items and they need items that are specifically marketed to them [103]. If pink is used in branding, it could indicate an acceptance of these negative beliefs and ideologies about women and girls.

The organizing team was also cautious about our use of the color blue. Blue was a “boy’s color” as much as pink was a girl’s color and represented a more masculine ideology. We also thought that blue was heavily used in technology and computing marketing and would associate us with a technological image. Using the color blue in our hackathon branding could give off a masculine vibe, something we were trying to avoid in building the women’s hackathon. Bringing

in feminine imagery to the male-dominated field of computing was one of our goals. A blue theme could also indicate that the event was technology-focused, an ideology we did not mind adopting, but did not want to make the primary focus of the event. These judgments we had about color were motivated by what we thought our intended participants might think of the event. We were trying to attract students to the event who may be intimidated by attending a mainstream hackathon or who distance themselves from mainstream computing culture, so we had to be very intentional with our use of color.

We chose the color purple as our theme, partially because it was the favorite color of three of our team members (including myself), but also because it was a “feminine” color that wasn’t pink. Figure 3.1 shows a visual of the color palette and logos for the first three years. Though purple can be a stereotypical “girl” color [35], it also is considered a feminine color [35]. Though we used other colors in the color palette for each year, purple was our main theme color and was dominant in logos, stickers, and marketing materials. We even used this color in other parts of the hackathon. We hosted a contest called the “Purple Prize,” which was given away to the team/individual who had the “best use of the color purple” in their project. Using purple in feminine branding can be seen as a “transgression” to expected branding choices for a women’s event and subverts stereotypes associated with the color pink [26]. However, in our third year, my thoughts about the use of pink began to shift.

3.3.2 Embracing Millennial Pink

A week after T9Hacks was held, I went to another women’s hackathon, WiCHacks (WiC: Women in Computing) [259], held at RIT. When I checked into the event, I was given a long-sleeve t-shirt with their hackathon logo printed in large font on the front. The shirt was bright purple. I thought a lot about that shirt during the event. I spoke with the organizers after the event and asked why they chose purple as their theme color. The lead organizer said they chose it because it was multiple organizers’ favorite color. I laughed with her over the fact that this was the same reasoning why T9Hacks was purple as well. After WiCHacks, I began to look out for

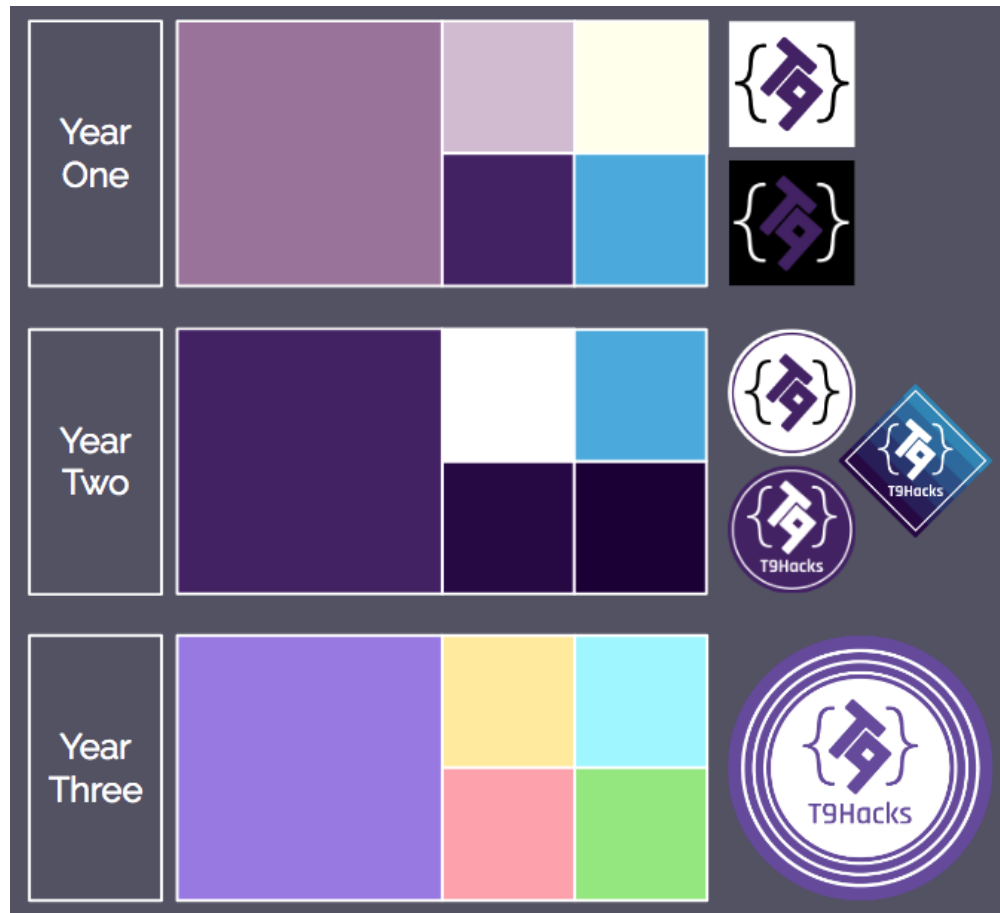


Figure 3.1: This shows the main theme color, the primary color palette, and the logos for T9Hacks each year. Purple was our main theme color each year and the color used primarily in our logos. The first two years we used mainly purple colors with blue as an accent color. But in the third year we used a color spectrum that included pink and blue in it.

other women’s hackathons and saw a trend that a number of other women’s hackathons were using purple; WiCHacks [256], She Innovates [105], HackHERS [84], Pearl Hacks [95], and T9Hacks all used purple as a theme color. I saw very few hackathons using pink in their branding.

I became interested in following the theme colors of other women’s hackathons and started following what colors they used and how their branding changed from year to year. Figure 3.2 shows the graphic designs of these women’s hackathons, organized by the first three years T9Hacks was running.¹ In the beginning, I saw a lot of purples and yellows and a few pinks and blues

¹ [7, 8, 51, 56, 57, 75, 76, 77, 84, 85, 86, 88, 89, 90, 152, 95, 96, 97, 211, 105, 106, 107, 220, 221, 224, 227, 229, 236, 237, 238, 253, 254, 255, 256, 257, 258]

being used. But as the years went on and more women’s hackathons were being created, the colors being used in other women’s hackathons started to show more color diversity. By T9Hacks’ third year, there were a number of women’s hackathons using pink as their primary color and a number of events using pink as secondary colors as well, including T9Hacks.

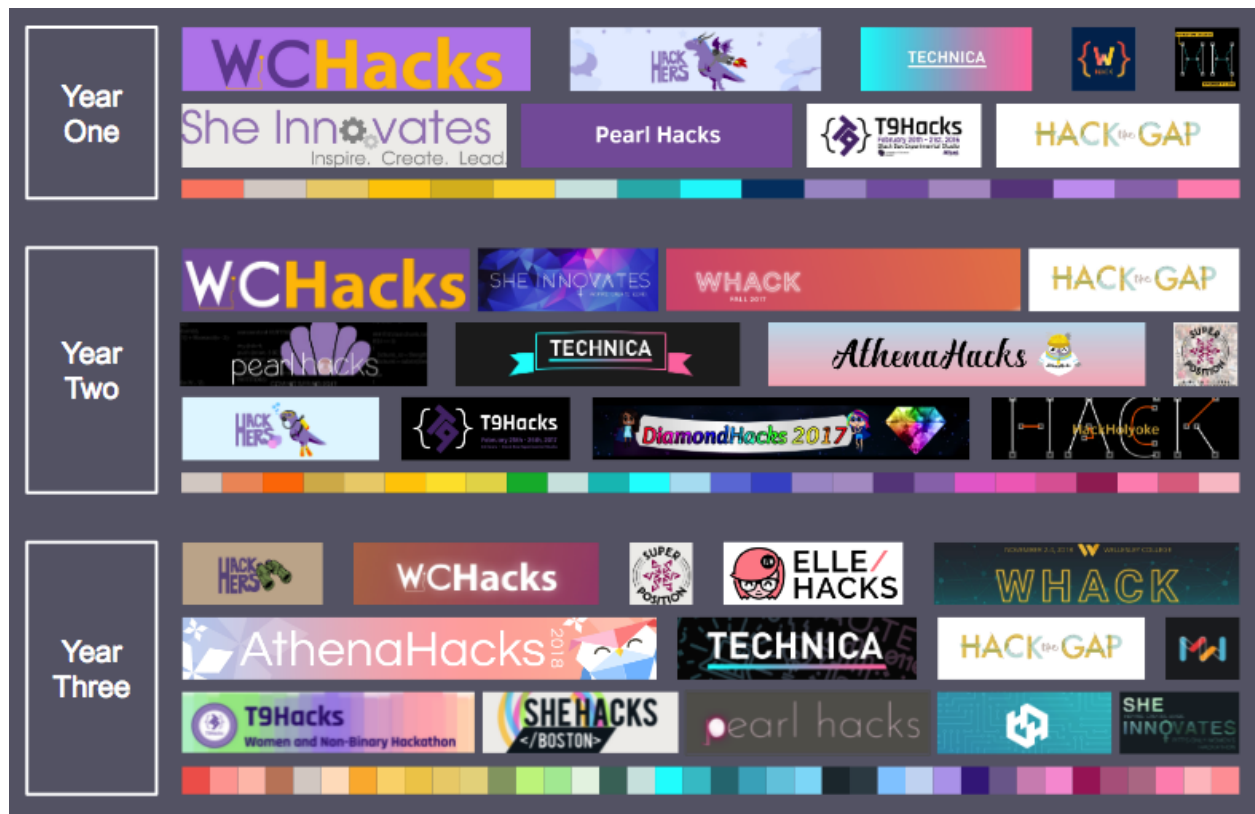


Figure 3.2: This show the designs and color palettes of different women’s hackathons during the first three years of T9Hacks.

During the second and third year of T9Hacks I was in charge of the branding and marketing of the event. In the second year, I choose a dark purple monochromatic theme, with bright blue as an accent color. This choice represented the same mentality we had in the first year about liking purple for it’s feminine, but not pink, qualities and incorporated a technology-focused color. In the third year, however, I began questioning our choices to avoid using pink in the branding. After two years as the lead organizer and evaluating the type of event we were trying to be, I thought it was a little silly to avoid using one particular color in our branding just because we were a

women-focused event, so I added pink as a secondary color. In the third year, we also became a “women and non-binary hackathon” (a change I’ll discuss later in this chapter) and wanted to use a rainbow-inspired palette to represent this ideological change in the hackathon. I did not use the LGBTQIA+ “gay rainbow,” which uses six colors in a specific order (red, orange, yellow, green, blue, purple) [112], but a variety of five colors (blue, green, purple, pink, and yellow) that alluded to the gay rainbow, but was not an exact copy. This rainbow design placed the purple and pink colors in the center of the design, giving it a more feminine feel, while also including lighter (and more feminine-feeling [26]) shades of the more masculine colors of blue and green.

When I chose to adopt pink into our graphic design, I was unknowingly following current color trends of reclaiming pink as an acceptable color for women to use again. We can see this trend’s effects in popular culture, where pink is becoming a popular color for consumer items. “Millennial pink” is a lighter shade of pink—sort of like baby pink or the iPhone’s Rose Gold or Pantone’s 2016 Color of the Year Rose Quartz—which is seeing a high spike in popularity [104, 157, 217]. Millennial pink is supposed to be an actual color, but no one can really agree what shade of pink this is (see Figure 3.3) [217]; however, we know what it is supposed to represent: a kind of “ironic prettiness” [217]. The color embodies traditional femininity, in a sophisticated way, keeping an intellectual attachment [157]. This tension between representations of female strength and images of traditional femininity have been discussed in feminist literature as well. Dole [53] is a researcher who has studied the representation of women in popular culture from advertisements to movies. She discusses the dissonance between femininity and feminism and remarks on the 21st century trend of women embracing a simultaneous “sexy” and “hard core” self-image, reclaiming the use of pink to represent female strength and femininity that exist outside of typical gender stereotypes. This current trend extends the conventional associations of the color pink and uses a counter-cultural ideology that women are creating for themselves [125].

As a women’s hackathon, T9Hacks had to contend with the stereotypical imagery certain colors gave to our event while also trying to create a feminine-branded event. We initially wanted to avoid using pink because of the girly and negative image it could bring to our hackathon, assuming

Possible shades of "Millennial Pink"

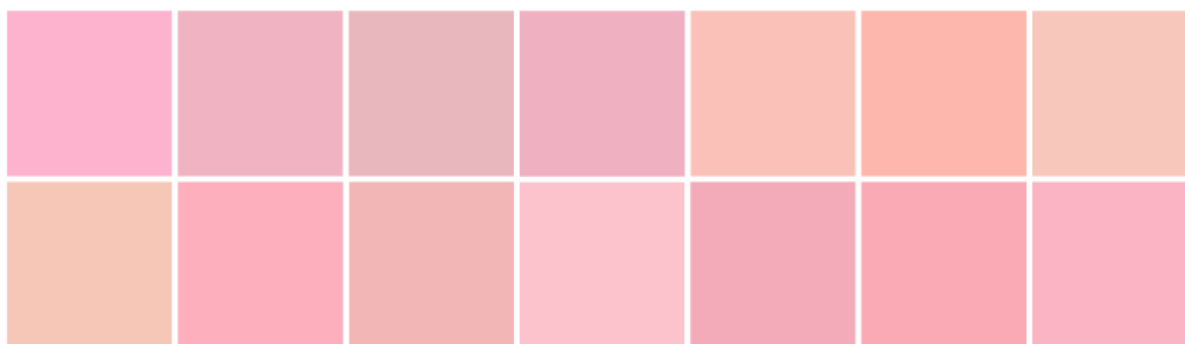


Figure 3.3: No one can agree on the exact shade of pink “millennial pink,” but it is within this color palette.

that women needed pink-colored branding to attract them to the event. We were cautious about using blue because of its mainstream use in computing and technology and wanted to distinguish our hackathon as an event that created a different cultural image than mainstream hackathons. In our third year, I pushed the branding to adopt a wider evaluation of the color pink, while still using purple as the primary color, by incorporating pink into a rainbow-style theme that also alluded to queer imagery, an effort to support the rebrand of the event to a “women and non-binary hackathon.” These branding choices were deliberate and built an image of the hackathon that we wanted others to see us as. When organizers of student hackathons (not just women’s hackathons) make branding decisions, they must be aware of the imagery their color palette portrays to their potential participants. Since we were women’s hackathon, and later a women and non-binary hackathon, we spent a lot of time debating the use of the color pink and trying to use other colors to represent the feminine image we wanted to portray. Mainstream hackathons that wish to be inclusive of a wider audience may have other concerns with the branding of their events, such as the overuse of traditionally masculine colors or using colors that are overused within technology and computing fields, since they come with their own cultural signifiers. Designing a hackathon that is appealing to a wider audience may require stepping outside of “typical” hackathon or computing

branding.

3.4 The Road to a “Women and Non-Binary Hackathon”

The final part of the branding process that T9Hacks went through was the label we used to describe the event. We had the name of T9Hacks, but we wanted a label or tagline that would describe the nature of the event, succinctly and accurately. We used the “Twitter bio” as a litmus test for the label: It needed to be descriptive enough to give some detail about the kind of event we were, but also short enough to be included in our 140-character bio, which would also include our name, date, and location of the event. This tagline would also appear on the front page of the website and was displayed prominently in our marketing materials (posters, handouts, flyers, advertisements, etc.). This label changed four times in our first year and twice in our second year before we settled on the label of “Women and Non-Binary Hackathon.” Our labeling journey went through multiple iterations because we were undecided about how to claim a feminine label for the event and how prominent we wanted to show that we were a women’s hackathon.

3.4.1 Year One: Rejecting and Accepting a Feminine Name

This was our first year hosting the hackathon and all felt like we didn’t know what we were doing. We knew that we wanted to be some type of women’s hackathon, but we were unsure on how to represent that in our label. The label for T9Hacks went through four changes this year, from “Female Hackathon” to “A student hackathon” to “A student hackathon promoting gender diversity in creative technology” to, finally, “A Women’s Hackathon.”

About Us

T9Hacks is a 24-hour all-female hackathon at the University of Colorado Boulder's ATLAS Institute that

“Female Hackathon”

When Aileen and I first created T9Hacks, we were calling it a “women’s hackathon” or a “female hackathon” and recruited other organizers to the team with emails that called the event an “ATLAS Hackathon: Women’s Edition” (yikes).² I was the primary web developer and my first instinct was to brand T9Hacks as a women’s hackathon, so in the first version of our website, I used the label “female hackathon” and called T9Hacks a “women’s hackathon” and a “female hackathon” throughout the website. I knew we would receive some pushback about creating a women’s hackathon, so I also added a “Why a Women’s Hackathon?” section to the website (see Figure 3.4). This section was brief, covering why we thought hackathons were important but saw low participation from women, and declaring the purpose of T9Hacks to provide space and opportunity for women to explore computing. However, I’m not sure how effective this section was at explaining our position as a women’s hackathon or how many people bothered to scroll to the bottom of the website to even read the section. (In later years I added this as a question in the FAQ section of the website.) Looking back, I think my actions bring up an interesting philosophical question: Why do women’s hackathons have to justify their existence?

The answer, I think, is fairly straightforward: because some people think that women’s events are unnecessary or do not help solve a problem. We encountered plenty of this behavior every year at T9Hacks. When we were advertising the hackathon on Reddit, we received comments telling us, “the emphasis should be on people interested in technology . . . I agree that there are more men in CS, but plenty of professions have skewed gender ratios. Also, more women are graduating

² ATLAS (Alliance for Technology, Learning and Society) is the interdisciplinary department Aileen and I worked in and a sponsor of T9Hacks.



Figure 3.4: A screenshot of the “Why a Women’s Hackathon” section of the website.

from college than men in these times. If they want to select rigorous majors or not, that choice is theirs to make” [223]. In hindsight, advertising T9Hacks on Reddit was a doomed idea from the start. I should have expected that kind of response from an online community that has been shown to continually uphold and support misogynistic and prejudiced ideals [149, 148]. At Hackcon 2016,³ other women’s hackathon organizers and I got into a heated argument with a group of men, who claimed that our hackathons were promoting “reverse-sexism,” since it was unfair we were creating all-women hackathons and they weren’t allowed to create all-male hackathons. When the men learned T9Hacks was a women’s hackathon in name, but still allowed men to come, they gave me a “pass” by “approving of” my event and telling me that I was one of the “good women” who supported “real equality.” On a (now half-deleted) Twitter thread, a man tried to argue (in paraphrase) that it was a good thing we were hosting a women’s event since we must think women have smaller brains and need a special event to learn technology. Aileen and I discussed how we wanted to respond to this person, but before we got the chance, two professors I knew jumped in to defend T9Hacks and support the purpose of women’s hackathons as valuable spaces. I was

³ Hackcon is a student hackathon organizer conference, aimed at students who host hackathons at their schools. It happens annually and is open for all student organizers to attend. The conference is hosted and organized by MLH.

happy to see that these professors' responses at least shamed the Twitter user into deleting all his tweets from the thread, though he did end up blocking the two professors and the T9Hacks' Twitter accounts. These types of comments are frustrating to hear, especially about an event I have put so much time and energy into creating and building, but at the same time, I've come to expect these types of comments and arguments. All of these anecdotes happened after we decided to label our hackathon a "female hackathon." however, I knew that they were possible beforehand.

One of the first pieces of content I added to the T9Hacks website was a justification for the gender focus of the event. It shouldn't have been necessary and did little to stem the wave of criticisms we received, but it did begin to create language around what our motivations for creating the event were and why we chose to be a women's event. I suppose the real answer as to why women's hackathons have to justify themselves was because *I* thought it was necessary. I realized that everyone who saw that we were a "female hackathon" would have an opinion and there was a strong potential that some people would interpret the name as a negative thing. By creating a "Why a Women's Hackathon?" section on the website, I intended to clarify (or possibly persuade) people to our mission. We could not control what people's first impression of the hackathon was, but we could explain what the term means for us. We were a female hackathon because we believed in creating an event for women. To me, this seemed like an obvious choice for our label; however, it soon became apparent that not everyone on the team agreed with me.

About Us

T9Hacks is a 24-hour student hackathon at the University of Colorado Boulder's ATLAS Institute that brings together

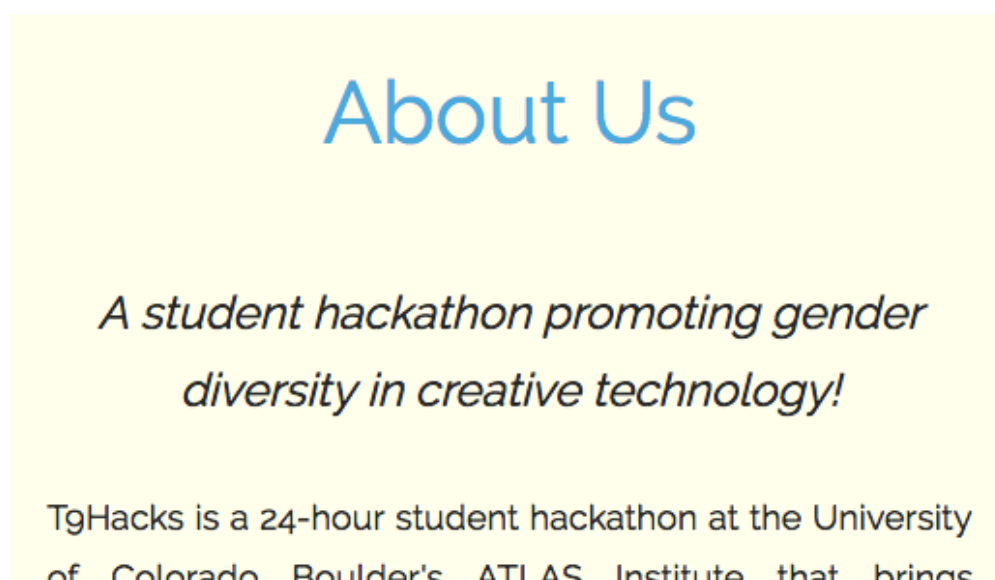
"Student Hackathon"

All the organizers on the team did not agree with the label of “female hackathon”. There were a few organizers who were worried that a women’s hackathon would seem non-inclusive or exclusionary toward men. At this point in our planning, our team decided that T9Hacks was a co-ed hackathon and all students were invited to participate. However, these organizers were concerned that the language and labels we used for the event would automatically dissuade sponsors from partnering with us. So, our branding changed. We changed our label to “student hackathon” and added this new label to the website and on our social media platforms. On the website the “Why a Women’s Hackathon?” section was removed and any text that referred to T9Hacks as a women’s hackathon was changed.

The cautionary reaction that members of our team displayed against the phrase “women’s hackathon,” I believe, demonstrated an aversion to feminist terminology and labeling. Feminist scholars have discussed how adopting feminist or women-centric labels can be interpreted as radical and isolating, even if those terms accurately describe the theme or evaluation of an event [14]. Undergraduate students have been shown to distance themselves from feminist labels for a number of reasons; to avoid negative reactions or backlash from people who disagree with feminist imagery [3, 262]; negative experiences they had when labeling themselves a feminist [14]; and avoiding feminist labels as a coping mechanism to surviving in a male-dominated field [134]. Even though women may agree with the goals of feminism and believe in gender equality, they may resist labeling themselves as “feminists” and resist engaging in overtly feminist spaces [99, 126, 182]. The term “feminist” and using feminine imagery are ideas that are packed with layers of ideologies and cultural meaning, so labeling an event a “women’s hackathon,” I think, brings up some of these same hesitations and members of our team did not want to be associated with this particular ideology.

The debate whether to keep the label of “female hackathon” caused tension between the organizers and for a few weeks team was at an impasse as to what to call the hackathon. The term “women’s hackathon” does not always elicit positive reactions from people; it was a polarizing term that not everyone was comfortable with and ran the risk of misrepresenting the message we were

trying to send. Meanwhile, other members of the team (myself included) were willing to adopt the women’s hackathon label and, inevitably, accept any negative reactions that would come with it. I thought that our potential female participants would assume we intended the term as a description of our target audience. This schism on our team was a product of the contentious hail “women’s hackathon” possessed. In interpellation theory, accepting a hail and the meanings behind it must be consensual process, it is something one must choose to do of their own free will [25, 141].⁴ The T9Hacks team was in a stalemate about the use of “female hackathon”, so we tried to compromise and create a more descriptive label for the event.



“A student hackathon promoting gender diversity in creative technology”

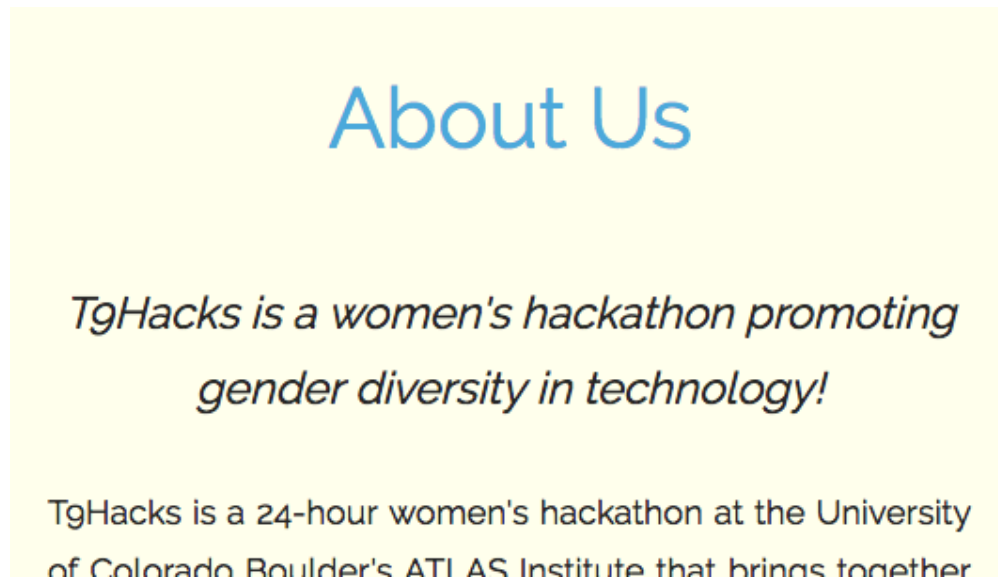
We all agreed with the mission of increasing women’s representation at hackathons, especially at T9Hacks, but if we were not a women-only hackathon, could we really describe ourselves as a

⁴ I do want to make one caveat for this statement, though: Accepting a hail is a consensual process when the two parties, the one who gives the hail and the one who accepts, are equal. There can be a power imbalance between the hailer and the intended audience, which would not give the receiver the power or ability to reject the hail. Butler uses an extended example of calling someone on the street; when the hailer is a police officer, the person responding may not be in a position to reject the hail and may answer because they have no other choice. However, since this discussion is about the T9Hacks team labeling ourselves, the hail we are trying to adopt is a personal one, one that we want to accept for ourselves. Though we had sponsors, for example, who may be in a position of power over us (we needed sponsorship and partners to successfully run the event), our discussion over the use of the term “women’s hackathon” was between members of our own team and trying to decide which term, or hail, worked best for the type of event we were trying to build.

women's event? Informally, in conversations or during team meetings, we would call T9Hacks a women's hackathon, but were hesitant about adopting it as the official label for the event. We spend two planning meetings brainstorming another label for ourselves and decided to use our mission statement as our label and we began calling ourselves a "student hackathon promoting gender diversity in creative technology." So we re-branded again, adding this new label to the website and social media. However, we found that this label was still unclear and was uninformative. I received emails asking if men could come; asking if the hackathon was about building projects that promoted gender diversity; asking what creative technology was; asking why we weren't a "female hackathon" anymore; asking us to clarify what the label meant. I felt that we needed to be more clear that T9Hacks was a women's hackathon. It seemed no one was reading the website and if they did, it only brought up more questions. What kind of hackathon were we? Were we a women's hackathon, as we sometimes described ourselves in other parts of the website? Or were we a hackathon with a diversity mission, but not explicitly a "women's hackathon"? We were trying to compromise and appease both the organizers who wanted to call T9Hacks a "women's hackathon" and those who wanted to avoid the phrase all together, but it was making our branding confusing. This new tagline seemed to confuse people more than it provided a description of our event.

The main problem with this new tagline was that it was not clear or concise. In event marketing, the description of an event needs to be easily understandable and obvious or else an event runs the risk of alienating or confusing visitors and lowering participation and engagement in the event [155]. Our new label was also very long, something that event marketers recommend avoiding because it takes longer for someone to read and comprehend [155]. If someone saw the label in a tweet of ours, they may not take the time to try and parse through what we meant by a "hackathon promoting gender diversity" or "creative technology," so they might skip over the tweet and not engage with the event. If a student saw this label on a poster hanging on a crowded university bulletin board, they might not take the time to fully read the label when they are passing by and would run the risk of not appealing to the female students we wanted to attend the event. This new tagline, though descriptive of our mission, was written in the business-like language of a

mission statement. It was a good mission statement but was not useful as a label. So we rebranded once again.



“A Women’s Hackathon”

Roughly six weeks before the event, I made an executive decision as the lead organizer to change the label of the event once again and started called T9Hacks a “women’s hackathon.” The change was swift and far-reaching. The tagline was changed on the website and all social media and begun to be incorporated into our marketing push that we had just began. In classroom visits we called the event a “women’s hackathon” and in advertising emails we sent out, we would call the T9Hacks a “women’s hackathon” in the email subject lines and in the body of the emails. But, in a not-so-great move as a lead organizer, I made a lot of these changes in secret and did not inform the organizers on the team who did not like the “women’s hackathon” label. In hindsight, I should have acted differently and told the whole team about this change, so this is something that I tried to improve on in the next two years by consulting the team about changes to the event label. Eventually, the organizers who did not like the label learned about the change through visiting the website and seeing the new label. These organizers were understandably upset with the change and still preferred T9Hacks to be called a “hackathon promoting gender equality.” The

team had additional discussions over the new label and a majority of the organizers chose to keep the new label, outnumbering dissenting organizers. We did compromise by choosing two labels for the event: We used “women’s hackathon” as a label for times when we needed a short term, like in the 140-character Twitter bio or tweets and in paragraph-style descriptions of the event, and we used “a women’s hackathon promoting gender diversity in technology” as a long label that we could use as the tagline on the website.

The sponsors and mentors also noticed the change in the branding. I remember one comment made from a potential male mentor. As the story was told to the team from an organizer who interacted with this person, the potential mentor visited the website to sign-up as a mentor, but as soon as he saw the tagline that we were a women’s hackathon, he exited the page and emailed a member of the organizing team asking when we became a “women’s hackathon.” He said he wouldn’t be attending as a mentor because he felt uncomfortable in an environment with a majority of women. This was despite the fact that an organizer on the team directly invited him to be a mentor and he knew the event was not women-only and allowed men to attend and participate as mentors. The team discussed this interaction in another meeting and the general consensus was that we felt that it was highly ironic a man would feel so uncomfortable with the prospect of being in a female-dominated environment that he would rather not attend the event altogether, especially when that was the type of environment women were facing every day in the male-dominated computing field. I’m sure there was the possibility that other men (and women too) were also deterred from attending the event because of the label, but as a team we decided that the people who were uncomfortable with the name were not the people we were trying to target for the event.

We also received feedback from a sponsor that the women’s hackathon label was confusing, mainly because we were not a women-only hackathon and we allowed male students to attend. We were given the suggestion that we should rebrand again and call T9Hacks a “female-focused hackathon.” In another executive move as the lead organizer, I choose to ignore this piece of advice. The term “female-focused” was more descriptive to what our event was (we were focusing on women’s participation at hackathons, but allowed all students to attend), but this was, and still

is not, a popular term. The prospect of re-branding the event for a fifth time and adopting a label that carried a risk of unclear messaging (again) was not the direction I wanted to take for the event. The label of a women's hackathon was well-recognized, even it was not immediately clear what we meant.

The new "women's hackathon" label did have one very large positive effect: more women were registering for the event. At this point during the planning phase, the students who had registered for the event were about 50% women and 50% men. After we re-branded the event to be a women's hackathon, the number of women registering jumped, we had around 60% female participants within a few days, and this trend continued. When registration closed a few days before the event, we had around 70% female participants registered. In the meeting when the team was discussing the loss of the potential mentor and the new registration numbers, a majority of us supported the new label and did not want to change it. In our meeting notes, we wrote down three reasons why we were keeping the "women's hackathon" label:

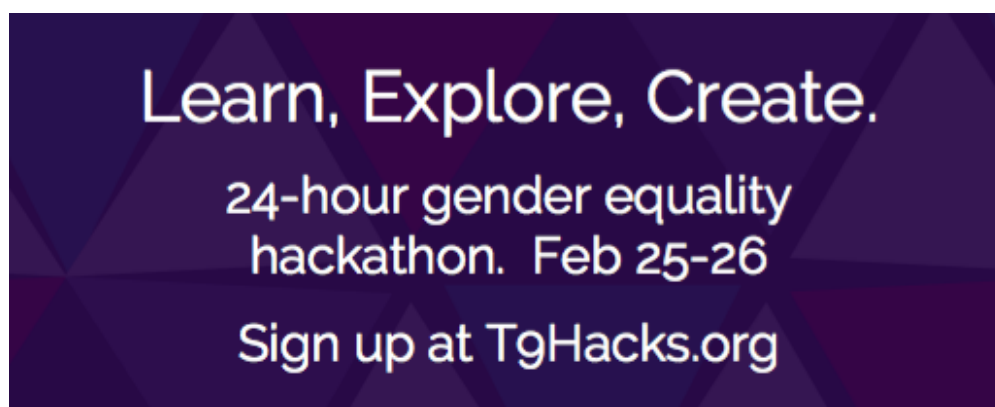
- (1) This is how our group decided to brand ourselves.
- (2) We are aiming for 80% women at the hackathon and we only have around 50% signed up. Our current wording is not attracting enough women, so changing the wording again to be less aggressive does not help our cause.
- (3) We do not want to change our branding for one sponsor out of 11, especially since the other ten are excited to sponsor a women's hackathon.

The team realized that the reactions we saw from the potential mentor and the sponsor suggesting the "female-focused" name were instances of the type of reactions an event with this label would have on people. The name made some people uncomfortable, people could feel ostracized or excluded, people would misinterpret the word, or they would disagree with the concept altogether. It was a case of "damned if we did, damned if we didn't." Despite these unfavorable interpretations women's hackathon held, the name was having a positive effect on our participants, which ended up being the most important thing for our team. It is at this point in determining the name of the event, we can see the team becoming "fully interpellated" with the effects of the label women's hackathon. The first reason we listed why we were keeping the label was a statement of

intent. This was a label we choose for ourselves and wanted to adopt as part of the branding and identity of the hackathon. We were fully accepting of the hail and all the positive and negative ideologies associated with it. The assumptions and values placed on the term women's hackathon were empowering (more women were registering and felt comfortable with the name), contradictory (the term suggested that we were an all-women event, though we were not), and negative (the label also elicited negative reactions from people at the prospect of having a separate, segregated, non-mainstreamed event aimed at women). By adopting the term women's hackathon for T9Hacks, we were in a constant act of resisting the incorrect or negative beliefs about the term while openly accepting the positive connotations the term had.

3.4.2 Year Two: Trying to Adapt a Feminine Name

After the first year, our team went through a number of restructuring changes. The organizers who disagreed with the use of calling the event a "women's hackathon" left the team and the other organizers on the team either graduated or became seniors and were too busy to help organizing for a second year. Aileen and I tried to build a larger team, but only found one other person to join, someone who was a mentor from the first year. From October to January, we planned T9Hacks with only three team members, but in February, four weeks before the event, the other organizer on the team was able to recruit three other students to the team. This led to a lot of planning decisions being made by the three original team members and the later event planning, like carrying out the advertising and hosting the event, was performed by all six members of the team.

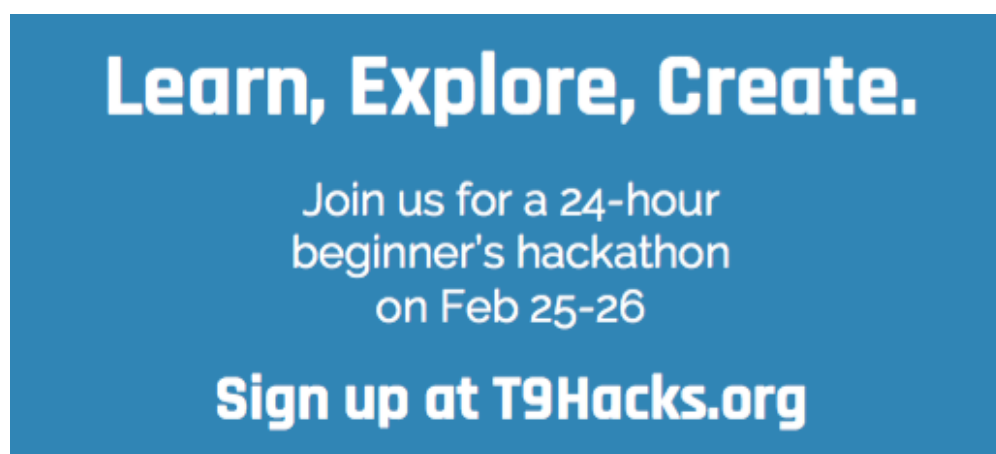


“Gender Equality Hackathon”

Once we began planning T9Hacks and creating the second event, we had to make an evaluation about whether to keep labeling the event a “women’s hackathon.” I understood and saw the impacts that the women’s hackathon label gave us. Some people were confused, felt excluded, and did not like that we had adopted this gendered label. On the other hand, 70% of our attendees were women. I wondered if we could create the same positive feeling from an event with a different label that would also avoid some of the problems we encountered with the women’s label. So, I replaced the “women’s hackathon” label with a “gender equality hackathon” label. The other two organizers tentatively accepted the new label and we all decided to see how this new label would work out for the event. This year, in addition to the website designer duties I carried over from the first year, I was also in charge of the marketing, which gave me control over how the label was marketed. I added the “gender equality hackathon” label was added to the website and social media in November and when we began advertising the hackathon, which began with the start of the spring semester in January, I used the label for marketing materials (posters, flyers, handouts, etc).

The “gender equality” label was intended to be a mission-driven label, it described the overall goal our team had, which was to increase the representation of women in the field of computing. It was intended to be a departure from the demographic-based label of a “women’s hackathon” that was meant to appeal to our target audience. However, we encountered the same problem we had in the previous year, with adopting a confusing and unclear label. We were happy with

the gender ratio from the first year and wanted to have close to 70% women attending the event again, but the unequal gender ratio we were aiming for and the “equality” label of the event caused some dissonance in our participants. One salient example of this reaction came from a comment left in the post-event feedback survey, a participant that said they were confused about the goals and branding of the event, they expected to see 50% women and 50% men at the event, not a majority women. This new label represented our overall mission for women in computing, but was not representative of the goals we had for T9Hacks. However, the “gender equality” label was not the only new label we added to the event the second year.



“Beginner Hackathon”

The team also discussed our position as a beginner’s hackathon. This was something that we discussed in the first year, but did not officially adopt as a label for the event. Instead, we added language on the website that said the hackathon was open to beginner and participants didn’t need experience programming to attend. Luckily, all three members of our team attended the first year’s hackathon and gained a deeper understanding of the participants who attended. There were a large number of beginner programmers who attended the event in the first year, largely students who had no programming experience or had only taken one programming class previously. They had attended the event because they saw it was welcoming and accessible to beginners. The team did not want to lose this audience of participants and we felt that T9Hacks served a purpose as

a beginner's event. So, in our second year, we decided in the fall before the February event to label T9Hacks a "beginner hackathon" and build an event that would cater to beginner hackers. (Chapter 5 describes how we adapted the structure of the event to appeal beginners.)

One of the concerns we had with adopting the "beginner hackathon" label was equating it to a "women's hackathon." Though we were not labeling ourselves a women's hackathon this year, people might remember our label from the previous year or could interpret the "gender equality" label to mean something similar. We were concerned with two things about adopting the beginner label: (1) the implications of being a women's hackathon and a beginner hackathon, that could lead to ideologically conflating these audiences, devaluing the event, or suggesting that we thought the two groups were equivalent; and (2) not appealing to experienced students. We were running into similar problems with the beginner label as we did with the "women's hackathon" label in the first year: we wanted to be clear about who we were targeting, but this did not mean what was the only type of participants we wanted to attend. We understood the impact these labels had would have both including and excluding participants and had to make a decision about how we wanted to be perceived.

My goal for the marketing in the second year was to advertise the event as a beginner hackathon that had a gender diversity goal, but was not explicitly a women's hackathon. I thought that we could appeal to a similar demographic of students as in our first year, but while changing the marketing to push a gender equality mission and targeting beginners. Boy, was I wrong.



“Women’s Hackathon”

The hackathon was scheduled to be held on February 25-26. On January 25 I sent an email to the two other organizers on the team stating “the T9Hacks gender ratio was shit.” We had roughly a 25/75% women/men split, the opposite gender ratio we wanted. The “gender equality” branding didn’t seem to be working. It wasn’t attracting as many women as we wanted and some men were confused why we referred to ourselves as a women’s hackathon occasionally, either in-person or on social media. I received an email that year from a male participant who asked if the hackathon actually was a women’s hackathon and why we allowed him to register since he was a man. Since we were weeks away from the event, I wasn’t confident that these numbers would change with the current branding, so I took this problem to my team. Over the course of one weekend we decided to completely overhaul the branding of the hackathon, I proposed a number of changes that we could make to the branding and the team decided to change two things: (1) re-label the hackathon as a “women’s hackathon” like we did in the first year; and (2) implement a “Sadie Hawkins” registration policy.

The Sadie Hawkins policy stated that “women, nonbinary, and transgender students can register for the hackathon themselves, and they can invite one male teammate if they wish.” This was intended to limit the number of men registering for the event and try to increase the number of women registering. We also chose to adopt the “women’s hackathon” label again because of

the impact we saw it had on the number of women registering in the first year. We also thought that labeling the event with a gendered label was more effective at representing the nature of the event we were hosting. It was not a perfect name, but it appealed to the type of participants we wanted to attend. One problem that the “women’s hackathon” label had, a problem we did not consider in our first year, was how it excluded non-binary, transgender, and genderqueer participants. We thought about how we could adapt the label of “women’s hackathon” to include other marginalized groups: “Women, Non-Binary, and Transgender Hackathon”? “Women and Non-Binary Hackathon”? “Women and Genderqueer Hackathon”? “Femme Hackathon”? When the three organizers of the team discussed adapting the “women’s hackathon” label, we were unsure how to refer to non-binary participants and were afraid of using a label that would not accurately represent this population or using labels that were not commonly used, so we kept the “women’s hackathon” label.

The Sadie Hawkins policy and “women’s hackathon” label, as far as T9Hacks was concerned, was successful. We had a higher number of women attend than the previous year and we had our first non-binary participants attending. However, we did receive critical feedback about the difference in including non-binary and transgender participants in the Sadie Hawkins policy, but keeping the label of a “women’s hackathon.” In a post-event survey, one participant commented that they felt like our inclusion of non-binary participants was “an afterthought” to a women’s event and we could have done more to have been more inclusive to that demographic. Another person gave us feedback that they were surprised that there were men at the hackathon, since they thought we were women-only. We took all this feedback and created a different label for ourselves the next year.

3.4.3 Year Three: Women and Non-Binary Hackathon

In our third year, the team consisted of myself, Aileen, one organizer from the previous year, and two more organizers who attended T9Hacks for the first time in the second year. The team was also all on the same page about what to label the event.



“Women and Non-Binary Hackathon”

Once the third year started, we once again began the process of determining the label of the event. Everybody on the team was interested in reevaluating the label of the event to be more inclusive of non-binary participants. We brainstormed different labels and ways to include non-binary participants into the hackathon. Eventually, someone mentioned “Women and Non-Binary Hackathon.” We were still unsure of the name, partially because non-binary is a gender and we did not want to suggest a name that included one other gender, but still excluded other participants. However, “non-binary” is also used as an umbrella term for other queer genders. Would people understand that we were using non-binary as an umbrella term or think we were specifically referring to non-binary-gendered people? We had to answer this question for ourselves and guess which phrase was used as an umbrella term more often, so we could maximize the number of people who interpreted the word correctly.

There was something else that the “women and non-binary hackathon” label did for us that I think is interesting. More than just creating an inclusive label for a wider demographic of participants, it also signaled that we were thinking about gender outside of the gender binary (women and men). By including the “non-binary” term to our label, we were acknowledging that we were an event from an LGBTQIA+–affirmative lens and, at the very least, we were making efforts towards including non-binary participants in the event.

This “women and non-binary hackathon” label also gave us more leeway to create policy around the norms of the space. In our second year, we encountered an issue with one the “mentors.” (I put “mentor” in quotes here, because this person came to the event, ate the food, never helped any teams, and did his homework the whole time; he never really acted as a “mentor.” I also gender the “mentor” as male because he was a distant acquaintance of mine and we were connected on

social media, and in all previous interactions I had with him, he would refer to himself with male pronouns.) On the mentor sign-up form, we had an empty textbox that asked people to write-in their gender. This “mentor” wrote-in “attack helicopter” as his gender. “Attack helicopter” is a common derogatory meme that is used online in place of a real gender [114]. The use of this term usually indicates bigotry and intolerance towards queer gendered people and represents the mentality that a person who does not feel like a man or a woman and chooses to identify as “non-binary” is the equivalent to identifying as a military-style war-machine. Using this term shows, at minimum, a callousness towards other people and, at most, a hateful attack on a marginalized group. I contacted two offices of diversity and inclusion at my institution to ask what I could do about this incident, but I was told that this was an act of free speech and it was discriminatory if we banned the “mentor” from attending the event. To this day, I still think that response was bullshit. The “mentor” had shown blatant disrespect and hostility towards non-binary people and, as a mentor, would have been in a position of power and authority over the participants. I thought about the non-binary participants we were trying to appeal to and how powerless I was to stop this “mentor” from attending the event and interacting with them. T9Hacks was supposed to be a safe and welcoming space, but I felt like I was lying to my participants because I couldn’t even stop this one person from attending the event. Luckily, the “mentor” didn’t interact much with the participants, so we never saw or heard about any other issues with him. But this incident from our second year prompted us to think of other ways we could prevent things like this from happening in the current, third, year.

Since we had adopted the “women and non-binary” label, we also felt more empowered to be clearer about the values of our hackathon and the expectations of everyone attending the event. Respecting gender became a key part of our code of conduct. I changed the way we asked for gender on the registration form, the option for gender to be multiple choice with an option to write in a response. I was hoping someone was more likely to click a button than spend the time writing in disrespectful answers. I also added a disclaimer registration form, whenever we asked for gender, that stated:

At T9Hacks, we value inclusion and strive to create a safe and welcoming space for people of all genders. Lying about your gender or writing in inappropriate or distasteful responses are grounds for immediate expulsion from T9Hacks and a permanent ban from all future events.

This “women and non-binary hackathon” label and clear code of conduct had an impact on the participants of the hackathon as well. I had a conversation with a non-binary participant, who expressed how happy they were to see the code of conduct in the registration form. They said it was common for them to hear and experience people disregarding their gender and it was nice to see that a hackathon cared enough to make a policy against that behavior and was clear about the consequences. They said it was one of the main reasons they attended T9Hacks, because they felt welcome and safe at the hackathon. I also spoke to a team of two participants, another non-binary student and a self-identified queer woman, who said the name and direct inclusion of “non-binary” in the label changed how they thought of the event, making them feel comfortable coming to a hackathon with that name. The non-binary participant said they actually felt included in a space that was labeled as “non-binary.” They were often interested in other women-in-computing events, but did not feel comfortable in those spaces because they felt that they were only made for women and not non-binary students. The queer woman said that she was often wary of women’s spaces, because they often produced a negative stereotype image of girls for her, which included heteronormative values (e.g. the assumption the women would have boyfriends), but the inclusion of non-binary participant made the event a more queer space she felt comfortable in. The testimonies these students told me about how the label of the event impacted them, in my opinion, made the labeling change that much more worth it.

We also had a decision to make about the label “a beginner hackathon.” The team thought that the focus on beginner programmers was good, but we did not want to confuse labels or add a second label when we were trying to clearly brand ourselves as a “women and non-binary hackathon.” We kept the beginner focus, but changed part of the marketing strategy to include beginners. We created three advertising posters this year, and one of them was directly at beginners, informing them of the tracks and workshops that we had for them. We also had posters targeted

to more advanced students, and a poster targeted to a general audience. Like in previous years, we had a large number of first-time hackathon participants and beginner programmers who attended the event. I thought focusing on beginner participants in the marketing and not in the branding was a good move, since it felt that it was accommodating to all types and levels of participants.

3.5 Conclusion

This chapter discussed the design choices the T9Hacks made for three branding elements: the name of the event, the graphic design, and the labels for the event. We discovered that each branding decision we made had a series of ideologies and values associated with it. These ideologies had implications in the way our participants perceived the event and who chose to attend. The name “T9” in T9Hacks stands for “Title IX,” which represents our mission to increase the representation of women and non-binary people in computing and the alpha-numeric shortened name alludes to the technology-focus of the event. We initially wanted to avoid the stereotypical color of pink for our graphic design, and chose purple instead, but we became interested in using pink in the graphic design as a way to reclaim the color from its negative stereotypes. The label for the event went through multiple changes, but eventually, we settled on “Women and Non-Binary Hackathon” because it had the greatest impact on our participants and was the most effective way to recruit our target participants.

Branding of a hackathon is about designing and shaping a branding image that signifies the type of ideology that the organization wants to promote. The branding choices outlined in this chapter are particular to T9Hacks, but the process the team went through to reach those choices was not. T9Hacks was built to target women and non-binary students, but building inclusive hackathons is a topic for mainstream events as well. As the T9Hacks team learned, we had to be intentional about our branding decisions. Simple things like the name of the event, color scheme, or labels sent impressions to our participants about who we were as an organization and what kind of event we were. Student hackathons, if they are looking to be inclusive of a wider audience, should be aware of the kinds of messaging and values that their branding represents a range of

participants. Certain branding choices may appeal to a specific group but may deter other groups. Organizers should know who their target audience is and create branding that appeals to them, with the understanding that this may simultaneously appeal and deter people outside of their target audience.

Chapter 4

Competition

4.1 Introduction

This chapter discusses the competitive elements of T9Hacks, which were designed to host a series of low-stakes contests for the participants. Competition is a very important element to hackathons [69] and the mainstream hackathon model (as described in Chapter 2) assumes the event will host some form of competition for the participants [163]. This chapter reviews competition research, which suggests that competition affects the social environment, potentially causing tensions between participants in different social groups which can lead to increased identity threat (i.e. the threat that the identity someone holds within a group may be challenged by members of other groups). This can lead to risk-avoidance in some groups [39, 101] and aggression in others [33, 42]. Through this lens, I analyze the various types of contests we held at T9Hacks and how the participants engaged with or avoided these different styles of competition. The largest tension the team faced when designing the competitive elements of T9Hacks was creating low-stakes contests that were fun and unthreatening, but still engaging and interesting. We wanted to create a hackathon environment that did not replicate the stressful and aggressive competitive environments that we thought were common in the mainstream hackathon model. Since competition is such an important aspect to student hackathons and can have serious effects on the participants, student hackathon organizers should be aware of how they are designing competition at their events and how these choices can impact the environment for their participants. If organizers are interested in broadening the participation of their events to reach a wider audience, adapting certain competition

elements so that they do not produce identity threat among their participants might be necessary.

4.1.1 Competition in Mainstream Student Hackathons

The mainstream student hackathon model is the student hackathon model developed by MLH [163, 165, 173]. Major League Hacking (MLH) is a global organization that partners with student hackathons in North America and Europe and provides resources for organizers to help them host student hackathons, including an MLH team member that helps the organizers host their event. The mainstream hackathon model usually assumes that there are three types of contests at one event [163, 176].

The first type of contest hosted by MLH is a continental, or “league,” contest among the schools that host hackathons. T9Hacks was a part of the “North American league” and European hackathons are part of the “European league.” Every hackathon that partners with MLH—MLH calls them “member-events” [176]—is entered into one of the two leagues. If a student attends a member-event, they earn points for their school. The number of points each student earns at a hackathon is dependent on their “Event Participation” (one point for attending a hackathon at a student’s own school and two points for attending a hackathon at another school) and “Hack Merit” (500 points are distributed to winners of the placement contest or sponsor contests) [160]. MLH promotes the league contest at all their events. However, many MLH student hackathon organizers in Colorado, organizers of T9Hacks and HackCU, think it is extremely difficult for T9Hacks’ host school, the University of Colorado Boulder (CU), to be competitive in the continental league because it is nearly impossible for CU students to earn enough points to beat out other schools with larger hackathon communities and who host larger hackathons.¹

¹ Very few MLH-member events are held in Colorado; at the time of writing this dissertation, HackCU is the only MLH member-event in the entire state. (For our first three years, T9Hacks was an MLH member-event; however, MLH ended our partnership in our fourth year, a choice that will be discussed more in Chapter 6.) For students to be competitive in the league contest, they must travel to different MLH member-events. However, due to the distance and rarity of hackathons in Colorado or in the surrounding states, it takes a lot of effort, time, and expense to travel to other MLH member-event to earn points for CU. The organizers of T9Hacks and HackCU also believe that the student hackathon community is smaller in Colorado because the hackathon culture is not very intense here, we think there are fewer students who are knowledgeable and interested in attending hackathons. So, the hackathons that are hosted at CU are less well-known and have lower attendance than the student hackathons hosted in places like California, Florida, or states on the East Coast. HackCU is one of the largest hackathons in the Rocky Mountain

The other two contests expected at mainstream hackathons are a placement contest and at least one sponsor contest. A placement contest ranks the top three teams in 1st, 2nd, and 3rd place. Typically all the projects submitted to the hackathon are entered into the placement contest and the hackathon organizers pick who is judging the contest and determining the winners. MLH provides prizes for this contest, giving medals to all students who are ranked 1st, 2nd, or 3rd and expensive electronics for the 1st place winners [176]. Sponsor contests—referred to as “sponsor prizes” and/or “category prizes” by student hackathons—are usually hosted by the top-tier sponsors that the organizers partner with. These sponsor contests typically require participants to build projects that use the sponsor’s software or technology, (e.g. “Best use of Company XYZ’s software”). The employees that the sponsor brings to the event usually act as judges for the contest and the sponsors provide their own prizes [173].

At a competitive mainstream hackathon, the contests are usually announced before the hackathon begins, to build excitement and interest. At the event, during opening ceremonies, the hackathon organizers may introduce the various contests available to participants, or sponsors are given a chance to speak during opening ceremonies and promote their sponsor contest; then, the MLH team member present at the event are given a few minutes to speak. MLH has a standardized slide deck presentation they provide for all team members to use during the opening ceremonies; this presentation gives details the league contest and the various sponsor contests they are hosting. After opening ceremonies “hacking” begins and participants form teams and begin working on their projects. After the allowed time period, usually 24, 36, or 48-hours, hacking ends and the teams must submit their projects. Then “demos” begin. Deming usually happens in one of two ways, depending on the preferences of the the hackathon organizers: presentation-style, where students have a few minutes to present their projects to all participants, organizers, and sponsors at the end of the event, or science-fair-style, where students present their projects at a table and talk with

region (Colorado, Wyoming, North Dakota, South Dakota). It started out with 300 participants in their first year (a year before T9Hacks was created) and currently hosts an event for 600 students [83]. However, other east coast hackathons, like PennApps [115] or BitCamp [16] can host anywhere from 1,000-3,000 participants. All of these factors lead to fewer CU students participating in fewer MLH member-events, making it unlikely that CU will win the league competition.

observers who come by. MLH strongly encourages all students to participate in demoing [163]. The judges for the contests evaluate the projects during demos, then meet afterward to decide on the winners. During closing ceremonies the winners are announced and given prizes, either by the hackathon organizers or the sponsors who are hosting their own contests. And at the end of every school year, MLH announces each school that won their respective league contests.

Many of the contests that the mainstream hackathon model provides to students are based on extrinsic motivation. Motivation is often divided into two categories: *intrinsic motivation*, in which a person performed an activity to satisfy inherent interest, enjoyment in the activity, and innate psychological needs for competence and autonomy; and *extrinsic motivation* in which persons perform an activity to satisfy an external goals (e.g., a reward or other outcome) and which reflects a form of self-regulation [206]. For example, students at a hackathon are intrinsically motivated to enter a contest because they seek a learning opportunity or they are excited to build a specific project. In contrast, participants are extrinsically motivated at a hackathon when their main goal is to win the prizes and gain public recognition for winning. MLH has discussed the need to balance intrinsic and extrinsic motivations in contests, cautioning hackathon organizers to avoid designing contests that only provide large extrinsic motivators, such as contests with a large cash value, because they can turn people off from participating the hackathon [68]. MLH recognizes that many hackathon participants are motivated by winning contests, but argues that hackathon organizers should try to design their contests to develop intrinsic motivation in students. They push organizers to work with their sponsors to go beyond the typical sponsor contest of “Best use of Company ABC’s software” and design more meaningful engaging contests and practices at hackathons.

Although the mainstream hackathon model includes competition elements, the T9Hacks team initially did not want to host any contests at our hackathon. This chapter describes our reasons for resisting competition, research on how competition may challenge personal identity, the tensions our resistance to competition caused, and how we ultimately chose to introduce competition to T9Hacks, but in a way that we felt was appealing to our participants and worked towards building

the type of welcoming hackathon environment we wanted to create.

4.2 Understanding Competition

This section discusses competition from two views: what the T9Hacks team thought about competition during the first year and what the literature says about competition, particularly with regard to women in competitive environments.

4.2.1 T9Hacks' Hot Take: Competition is Intimidating

Throughout the first year of planning, we were adamant about having a T9Hacks. We had a number of reasons why, but the main reason was that we thought it was “intimidating.” The team had some specific ideas about what made competition intimidating, which came from our experiences with competition in computing and other student hackathons. Our meetings notes from the first year described competition as something that built “competitiveness and not community among participants” and developed an “unfriendly, stressful, or unwelcoming environment” for our participants. Below, I discuss five reasons we thought competition was intimidating. As it turns out, our opinions reflect findings from researchers studying student competition.

First, we were concerned about participants who were attending the hackathon who did not want to compete. What if students attended T9Hacks to just learn about computing and were not there to compete? We wanted to be open to any participants who wanted to attend the event without requiring everyone enter a contest. However, we were concerned that the presence of contests, even if they were optional and participants could choose to opt out, would undermine the experiences of the who were not competing. In hackathon research, competition has been found to motivate attendance. Richard [202] interviewed students who participated in a small wearable computing event (about 30 participants) within a large student hackathon (about 1200 participants), some of the students said that the competition aspect of the hackathon was fun, but they were also interested in the topic. Kearse [122] interviewed students who participated in a “Computer Science Olympiad” which was a computing competition that had students participate

in series of computer science challenges that had to do with different areas of CS (such as robotics or web development). Kearsse's students talked about how they liked the competition aspect of the event, but they also attended because they were interested and motivated to learn about computer science. Fowler [64] reviewed all types of computing events, from student hackathons to industry hackathons to game jams (which are project-building marathons where participants build different types of games, like video games or tabletop games). Fowler saw that winning prizes was only the fourth most popular motivating factor for participating at a hackathon. Chew [34] surveyed students at a robotics competition and found that only half of the students said they were motivated by the contests and prizes that the event offered. Warner [251] interviewed and surveyed students about student hackathons and found that winning a prize was low on the students' lists of reasons to attend an event and other factors such as friends, learning, and networking were listed as higher motivators. Though the T9Hacks was unaware of these findings at the time, the research shows that competition is not a primary reason for attending events for a number of students.

The Red Bull coding competition exemplifies our second concern with adding competition to the event. This was an event that was advertised heavily in the CS department, but everyone on the team (who were all CS or computing majors) chose not to attend. The posters and emails we saw of the event put a lot of emphasis on the large cash prize the top team would win. The event was structured as a coding challenge, where all attendees were working to solve the same problem. Since no one had attended this event, we assumed that the winners of the competition were determined by whichever team had the most efficient or clever solution to the problem (i.e. the solution was not computationally heavy, so it was quick to run, or the solution used unique or interesting methods). This lead us to think that this event only judged the participants on their technical-skill and knowledge of the problem domain. The sponsor, Red Bull, also evoked a "brogrammer" image in our minds, which only added to the hyper-competitive image the event was promoting. ("Brogrammer" symbolizes the male-oriented computing-intensive culture that can dominate the tech industry [130] and often alienates female programmers [213].) Some team organizers knew a few students who attended the event, who report the event was not as fun as it

could have been because the focus was on building the best and greatest project to win the contest, not on learning or enjoying themselves. The Red Bull coding competition evoked an image of the type of computing event that the T9Hacks team was trying to avoid. The focus of the event was on competition and winning, which affected the event environment and the projects the teams were building. The T9Hacks team did not want to introduce competition to the hackathon if it would run the risk of overtaking the event and becoming the only thing that the participants worked for. We wanted to build an event where our participants enjoyed the projects they were building because they thought they were interesting or fun to create.

The Red Bull coding competition also demonstrates a third reason the T9Hacks team wanted to avoid competition, which was the potential for competition to create an overly competitive atmosphere. Grace [69] describes hackathons, with their contests and end goal of ranking the participants, as creating a “competitive environment.” Grace contrasts this environment with game jams. He describes how the addition competition creates a competitive state for hackathons while game jams as create a play state. Grace argues that a play state better supports informal learning and mastery of skills. By adding a competitive element into a computing event, nearly every aspect of the participant’s experience at the event is influenced by the competition. This can be seen in the projects they create at the event, which teammates they choose to partner with, and what technologies they use. Though the influence may be subtle, the students are always aware they are in a competitive environment and their actions show that. So by Grace’s interpretation, hackathons always have a competitive environment because of the contests they host.

The fourth reason we removed competition was because we thought it was stressful and would have a negative effect on the environment of the hackathon. In one email I sent to a sponsor before the event, we were discussing competition and I wrote, “It has been a staple of our hackathon since the beginning that we aren’t having a competition, since it creates a stressful environment for our participants.” We were cognizant of the type of environment that a competition would have on our participants, even if they wanted to compete. We thought competition could add extra pressure to the participants, even if it is entered into willingly and the participants were excited about the

prospect of competing. We wanted to create a fun and upbeat hacking environment, not one where participants were stressed about this specific part of the event. In Warner's [251] review of student perceptions of hackathons, they found that some students felt like the presence of prizes made the atmosphere overly competitive. In retrospect, the T9Hacks team felt similarly to the participants in Warner's study; competition would create an environment that would place an additional strain on the participants to meet the requirements of the contests.

Finally, we were concerned about the impact competition would have on the teams. A placement contest ranks teams against each other which, we thought, set up an expectation that participants were divided and opposed to each other throughout the event. We thought this might cause aggression or hostilities to arise between teams, such as teams sabotaging each other's projects or discrediting the competition. We also had resources available to the participants, like hardware, mentors, and workshops, and a competition could incentivize students to consume more resources than they otherwise would to gain an advantage. A team would have to consider how aggressively they wanted to compete in a contest, which could affect who they allowed on a team (for example, if a student had less advanced technical skills, they may not be invited to the team) or the kinds of projects the team built (a team might decide to design a project that uses multiple pieces of software from different companies to maximize the number of sponsor contests they can enter into, instead of building a project that uses fewer components, but would reap fewer rewards in a competition). Hackathon researchers have also argued that competition can stifle collaboration between teams and participants, since students are also competing for resources and are pitted against each other in competition [69, 202]. The T9Hacks team thought that competition could create an antagonistic relationship between teams which was contradictory to the friendly environment we were trying to create. The T9Hacks team was primarily concerned with the environment and expectations we were creating for our participants and competition seemed to conflict with our goals, but the team was also evaluating competition from our own experiences and perceptions, the next section delves deeper into different theoretical views of competition.

4.2.2 Theoretical View: Competition is Social

Looking back, my team and I had a very limited view of what competition was in that first year. We never discussed the different types of competition we could have hosted at T9Hacks or how competition can be implemented differently or any of the complexity that comes with competition. We discussed the types of competition we faced and the negative reactions people could have to them, but we did not have a systematic way of describing or evaluating competition. Little did we know that there is an entire body of scholarship that might help us understand our feelings towards competition. In this section, I review literature that presents observational findings that women tend to shy away from competition when participating in mixed gender competitive environments [39]. This trend is understood to be a result of the social setting of competitive environments, where women are more “risk averse” than men [39]. The scholarship also represents competition as a multi-dimensional construct, which can affect a participant on different social dimensions as well as their personal identity [47]. Competition has the potential to create an environment that challenges group hierarchies, producing “identity threat” for the competitors [142]. Identity threat can lead to adverse outcomes for some competitors, such as some competitors becoming more aggressive [33] or some competitors leaving the competition [101].

Croson and Gneezy [39] reviewed scholarship on gender differences in experimental economic competition. Most of the sources they reviewed discussed an interesting observational phenomenon: that women choose not to participate in competition at the same rate as men. Croson and Gneezy review three factors that describe why this phenomenon may occur: risk preferences, social preferences, and reaction to competition. First, they reviewed scholarship on risk preferences and found research that suggested that women saw competition as a risk, which lead them to being more risk-averse, less likely to take chances if they were unsure about the competition, reported being less confident than their male peers, and perceived risk differently from their male peers. Croson and Gneezy write, “Males are more likely to see a risky situation as a challenge that calls for participation, while women interpret risky situations as threats that encourage avoidance” (p.

453). The second factor, social preferences, describes how women and men to perceive social cues differently. Croson and Gneezy describe competitions as social environments that can affect women more heavily than men. Context clues are extremely important. Environmental factors such as the experiment instructions, conditions, administrators, the size and type of the payoff, social and situational cues, and the other players' choices, gender, visibility, and social distance all impact women's decisions and choices in competitive settings. These environmental factors may lead to women avoiding competition, avoiding situations where they have to make competitive choices, and performing differently than men in competitive environments. The third factor, competition preferences, describes the negative ways competition can affect women. Croson and Gneezy review studies that show that women were more reluctant to participate in competition than men and women performed worse than men in mixed gender competitive environments. They describe different socialization factors—such as upbringing, social group, culture, and institutional power—that can impact a competitor's performance and desire to compete.

Croson and Gneezy's review of men's and women's experiences of and attitudes toward competition has two main shortcomings. First, all the literature review studies the effect of women in mixed gender competitions. Croson and Gneezy themselves describe gender as an environmental factor that may cause women to shy away from competition, but do not discuss how the findings from competition literature they review might have been influenced by this crucial social factor. Their review demonstrates that women may be more risk-averse in certain instances than men, but these findings could also be a result of the social context—competitions with men—rather than because women are inherently and essentially more risk-averse. The largest social factor that has been shown to impact women in competition is the presence of men. When women are shown to be in an all-female environment, their behaviors and attitudes towards competition change [17, 101]. Second, their review of competition suffers because it only reviews competition in experimental environments. Experimental studies on competition have been critiqued by other competition researchers; Tjovold [241] maintains that experimental studies do not allow competition to be researched in a multi-dimensional way and neglects the importance of interpersonal relationships

and the differences in how people behave in real-life competitive situations. Competition can be a complex and multi-dimensional, impacting different parts of a person's life.

4.2.2.1 Eight Dimensions of Competition

Unlike the economic scholarship reviewed by Croson and Gneezy, Dennehy sees competition as a multi-dimensional construct [47]. Dennehy's work focuses on the social environments of business competitions, with a particular focus on how women can experience competition. She developed an eight dimensional model for competition that illustrates the multifaceted and interconnected dynamic of competition, see Figure 4.1. The eight dimensions of competition are personal competition, interpersonal competition, internal competition, external competition, symbolic competition, temporal competition, positional competition, and collective competition; I briefly summarize these eight dimensions below. Each dimension represents a different context where a contest may occur; however, a person may simultaneously feel the effects of that contest in the other dimensions as well. The eight dimensions are not mutually exclusive, but overlap and affect each other, so in any competitive situation, one or all of these dimensions may be affected. Dennehy [48] maintains that categorizing competition into eight dimensions has two benefits. First, it defines the parameters of competition which can help researchers unravel the complexities in the processes and outcomes of competition. Second, it expands the notion of competition beyond the scarcity and challenge models of competition, which only describe how many people can win a competition. The combination of these eight dimensions provide a way to analyze how competition is perceived and experienced in different contexts.

- (1) **Personal competition** describes a person's sense of self and how it can be reinforced or challenged with competition.
- (2) **Interpersonal competition** describes social comparison and the judgments someone can make about themselves and their competitors.
- (3) **Internal competition** takes place in a local context, within an organization, department, or event.
- (4) **External competition** takes place at a wider level than the internal competition, this can be at a local, national, or global level.

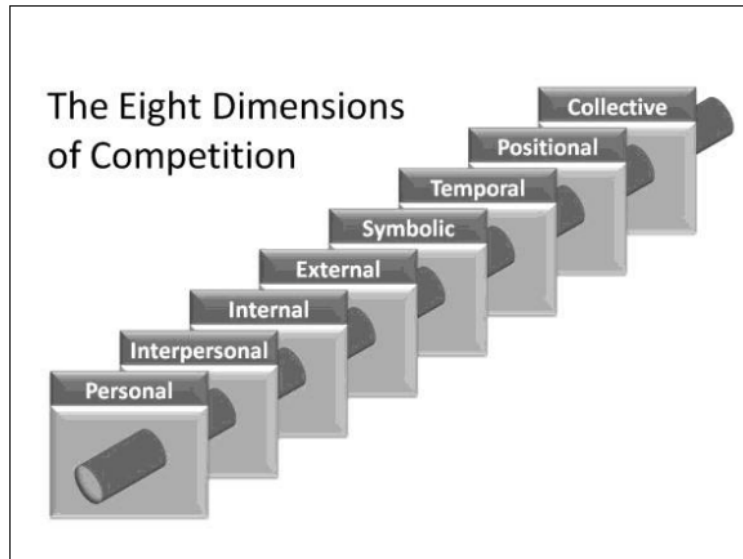


Figure 4.1: The eight dimensions of competition.

- (5) **Symbolic competition** is defined by the values or meaning someone can place on the situation.
- (6) **Temporal competition** is operationalized time as a resource that can indirectly or directly affect someone in a competition.
- (7) **Positional competition** relates to someone's position in a social or organizational hierarchy.
- (8) **Collective competition** relates to the group someone is a part of and leveraging the group's social power in competition.

We can use the eight dimensions of competition to explain some of the gender differences in preferences Croson and Gneezy saw in their review of competition [39]. One factor they discussed was risk preferences, claiming that women were more risk-averse than men. When we look at this data from a multidimensional competition construct, we can see that there are multiple competitions happening in any scenario, influencing and impacting the participants. For example, Croson and Gneezy reviewed high-stakes decisions, which were laboratory experiments, often financial in nature, they found that women perceived situations riskier and were more risk-averse than their male counterparts. However, if we look at the different pressures that men and women face financially, we start to see some of the differences in dimensions women and men may face in this type

of competition. For instance, women face income inequality compared to men, so risking monetary rewards could have a larger impact on women, whereas men may feel more social pressure to be breadwinners than women, influencing their decisions in this type of competition. Croson and Gneezy maintain that context is also a large influencer in women's preferences in competition, a position that is only strengthened when taking into account a multidimensional view of competition. They list environmental and socialization factors that can influence the social setting of a competition. These factors can be mapped onto the eight dimensions of competition, each providing an additional context in which women (and men) feel and face competition. Though researchers may observe that women shy away from competition more than men, the eight dimensions of competition provide a multifaceted and complex view of competition that accounts for socialization and situational context.

So, how might this model be relevant to the experiences and attitudes of the participants of student hackathons? The contests present within the mainstream hackathon model can be felt at nearly every dimension of competition. The competition that the event organizers set up was an internal competition because it is a competition within an organization. At MLH events, there is also an external competition, as every attendee's participation earns them points for their school, and at the end of the school year one school is awarded "winner" of the MLH student hackathon league. The two innermost levels of competition, personal and interpersonal, can tell us how a participant's self-identity and their social standing are also dimensions of the competition. For instance, if someone who thinks of themselves as a "hacker" wins a contest at an event, their personal identity is reinforced; whereas, if that person lost a contest their personal identity as a hacker may be challenged or become unstable (personal competition). Or someone who thinks that experienced and knowledgeable hackers do well at competition, may be surprised to see high school students winning the contest. In this case, the person has built a hierarchy of groups in their head, but an inexperienced group winning a contest disrupts that hierarchy and makes the status of each group unstable, posing a type of interpersonal competition between groups of participants.

Symbolic competition addresses the relationship between competition and success/failure in

terms of career development—how a participant might interpret their experience within a hackathon competition to symbolize their relationship to the larger computing field and their trajectory as a computer scientist. Temporal competition, though subliminal in the management competition this theory comes from, is visible in a hackathon as the entire event is time-constrained and competition occurs by essentially working to get as much done in the little amount of time available. Positional competition refers to the changing of rank as the result of competition, something that is affected little at a weekend hackathon. Participants enter as students and leave as students, there is no institutional change in their positional standing. The eighth dimensions of competition, collective competition, addresses how the relationships between collective groups may change with competition. Essentially, if someone is from a small or marginalized demographic, other participants from a larger or dominant demographic can see them as representations of their entire group. This can lead others to make valuation and judgments of an entire group based on the performance of one individual, Figure 4.2 shows a comic illustration of this effect [181]. These eight dimensions categorize the different contexts where competition can be felt and demonstrate the places where competition can challenge social settings or group status, an effect that may cause identity threat.

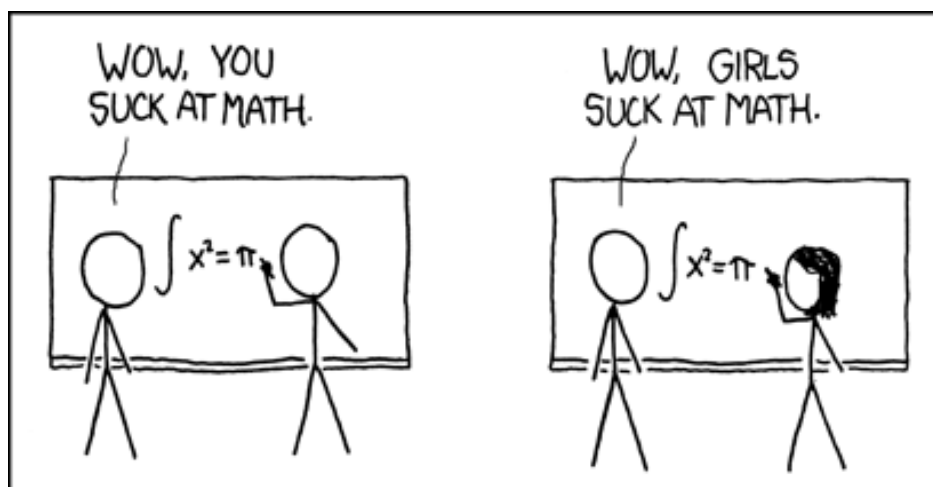


Figure 4.2: xkcd comic, “How it Works”, demonstrating how individual performance can be evaluated differently by gender. (www.xkcd.com/385)

4.2.2.2 Identity Threat

All eight dimensions of competition define different parts of our lives and a combination of these different dimensions can begin to describe a type of identity a person holds. However, when the tension of competition challenges someone on these different dimensions, their status and identity can feel challenged. When a person is in danger of losing or performing poorly at any dimension of competition, it can produce identity threat. Identity threat occurs when a person interprets a stigmatizing situation as potentially harmful to their social identity [142]. For example, in the comic Figure 4.2, both the male and female stick figures have written an incorrect equation and they both may experience a different type of identity threat; If both the male and female figures are in the same environment, the male figure may feel identity threat because of social expectations that men are more intelligent than women, while the female figure may feel like being incorrect may confirm negative stereotypes that women are bad at math, producing identity threat. Within competition, if the results have potential to threaten to upset the status quo or unbalance a social hierarchy, identity threat may occur. Major and O'Brien [142] describe two ways people may respond when faced with identity threat: involuntary reactions (such as anxiety, increased vigilance, and working memory load) and voluntary reactions (such as coping efforts). Possible coping mechanisms to competition can include leaving the competition and removing oneself from the threatening environment or becoming more aggressive in the competition to make sure status or identity is not lost.

When women are in male-dominated spaces and situations, they may face identity threat because of their status as a member of a marginalized group. Hirshfield argues that due to the low number of women in the STEM (Science, Technology, Engineering, and Math) fields, women become “hyper-visible” in classrooms and workspaces, which produces identity threat [101]. Hirshfield defines identity threat as a concern that one’s perceived inadequacies are attributed both to themselves and to their social group. As a coping mechanism, women may seek out “friendly” or less identity-threatening environments, like female-dominated groups or workspaces. This cop-

ing strategy can cause a negative reaction, in turn enforcing stereotypes that women are weaker or cannot “hack it” in a “regular” environment and need special spaces to coddle them. It’s a catch-22 situation, as women feel threatened in mainstream environments, so may self-segregate, but a hyper-visible group segregating themselves reinforces negative stereotypes about the group. Hirshfield is clear that this is not a “critical mass” problem, where we can begin to decrease identity threat in women by increasing the number of women in an environment; instead, the societal expectations for male-dominated and masculine fields of STEM should be challenged and cultural change is needed to produce an environment that produces lower identity threat to hyper-visible populations. Challenging negative stereotypes or questioning assumptions about who belongs in the field or how they exist in the field can impact the social setting and create a friendlier environment for everyone to participate in.

Identity threat is not limited to women; when groups with different social statuses compete, individuals from both groups may experience identity threat. Dahl [42] studied how men reacted when their perceived masculinity was threatened. Some of the men in the study became concerned with how they were perceived by others which lead to increased anger and social dominance over women. When the male subjects were told women outperformed them in traditionally masculine fields they interpreted the situation as a threat to their masculinity and responded by adopting more masculine traits; this also led some men to anger of the results and sexualization of the female competitors. Dahl’s findings suggest that threats to masculinity lead to coping mechanisms that “implicitly subordinate women.” Cheryan [33] also performed experimental students that studied the reactions of men when their masculinity was threatened. The findings of the study show when some men face threats to their masculinity, they may act more aggressively, reject feminine preferences, and claim more stereotypically masculine attributes. Cheryan’s work suggests that when men’s masculinity is threatened they may employ personal and interpersonal strategies to restore their questioned identities. Between Hirshfield, Dahl, and Cheryan studies, we can begin to form a picture of how men and women may react to identity threat in different ways, either by removing themselves from the situation or by trying to regain status through coping mechanisms.

I reviewed competition through multiple lenses which has built a complex and rich landscape of ways to categorize and theorize about competition. Competition can be an extrinsic motivator (e.g. students may be motivated to win prizes) but large extrinsic rewards can also be a deterrent to some participants because they are intimidating or give the impression that the event is only focused on competition. Competition can also be a multi-dimensional construct that has different contexts where a contest may occur or impact the participants. A competitor may feel the effects of competition from a micro-context, e.g. it may affect how they feel about themselves, or from a macro-context, e.g. it can affect their status as a member of a particular social group. Competition also as the potential to disrupt or challenge a competitor's personal identity or status in a social group, when this happens identity threat may be produced, which can lead competitors to coping with this threat in different ways, such as challenging the other competitors (discrediting them or performing increased aggressive behavior), changing the way they think they are perceived by others (adopting more stereotypical attributes to the identity they feel is threatened), or by removing themselves from the competitive environment (and seeking out less identity-threatening environments).

So, how can we use this theoretical view of competition to design contests at student hackathons that produce less identity threat—or become “low-stakes”—for the participants? When I look back on the various contests we held over the course of the first three years, I see a number of ways we designed competition to be “less threatening” for the participants. These competition design elements can be broadly categorized into four groups: the nature of the contests (i.e. are the contests fun or serious in nature, do they require programming knowledge, and do they give students freedom to build their own projects), the prizes for the contests (i.e. are the prizes expensive or valuable), how competitive the environment may feel (i.e. can the students track their progress in a contest and compare themselves to the other participants), and how the contests are framed as part of the hackathon (i.e. is winning the contests presented as the primary purpose of the event). In the next section, I describe the different types of contests we held at T9Hacks throughout the first three years and analyze how these contests may have produced identity threat among the participants.

I'll end this chapter with a summary of my findings and then I'll discuss how these findings can broaden the literature's understanding of hackathon competition and inform inclusive practices at other student hackathons.

4.3 The Road to a Low-Stakes Competition

This chapter began with a list of reasons why the T9Hacks team thought competition was intimidating for our participants; however, looking back, I believe our initial notion of competition lacked nuance. We did not discuss the different types of contests that were possible to host at hackathons (placement contests, sponsor contests, or the league contest) and we assumed that all types of competition would negatively affect the environment. Though we felt strongly about eliminating competition from T9Hacks, we felt pressure to conform to a more mainstream hackathon model and permit some competitions at the event. The team's attitudes about competition and the expectations from our sponsors and the hackathon community created a tension that we revisited year after year.

4.3.1 Year One: Accidental Competition

Though we intended to have no competition at T9Hacks during our first year, once the hackathon was being held, we found that was not the case; we had inadvertently allowed multiple contests to be held at the event. Even though the team was against competition this year, the pervasiveness of competition at student hackathons and our own mismanagement of the event lead to there being three types of competition at the event.

Four weeks before the first hackathon, the team had a brief discussion about our earlier decision to completely eliminate competition at the hackathon. A few organizers on the team had recently attended a hackathon without any competition, and this was the first time anyone on our team had heard about or experienced a hackathon without a competition, so we were interested to hear about the experiences of the organizers who attended this event. The hackathon the organizers attended was structured like a mainstream hackathon and was sponsored by MLH, but it did not

have sponsor contests or a placement contest. The organizers who attended the event said that a lot of the participants left the hackathon before it was over and very few students chose to present their projects in the science-fair style demos. These organizers were concerned about a similar situation happening at T9Hacks, where participants may not be motivated to stay in at the event if there was not something, like a competition, to keep them engaged and motivated until the end. This caused tensions within the team because other members of the team were still adamant about not including any type of competition at T9Hacks.

In our discussion about competition we began brainstorming different types of competition we could host at T9Hacks. Unfortunately, the hackathon contests we were all familiar with were the ones we had seen at other hackathons: placement contests and sponsor contests. We all agreed that we did not want a placement contest because we thought it would cause the hackathon to feel too competitive and we didn't want to create that type of environment. A few members of our team were open to including sponsor contests, but other team members brought up the fact that when we reached out to sponsors we did not offer them the opportunity to host a sponsor contest and the organizers did not want to change the sponsorship agreements a few weeks before the hackathon. We eventually came up with our own contest, which was similar to a sponsor contest except that T9Hacks was “sponsoring” it. Our meeting notes about this contest are scant there is only one mention of this contest in all our documentation:

Will we have prizes?. . . We will have the 1 fluffy prize ‘Best use of the color purple.’ This will be the only prize given out [to] the participants for the entire event.²

We created a “fluffy” contest—we called this the “Purple Prize”—that was awarded to the team with the “best use of the color purple” in their project. The team never really defined what we meant by “fluffy,” but it was a descriptor that we all agreed with at the time. Looking back, I think we were trying to describe the low-stakes nature of the contest; it was fun and light-hearted and

² A note on terminology: it is standard for student hackathons to call all their competitions and contests “prizes.” So when we state we were having a “prize,” readers should interpret this to mean we were hosting a contest. This also explains why this contest was named the “Purple Prize” by our team and we did not name it a contest or competition.

didn't require a lot of programming knowledge to enter into it. The team also did not consider the Purple Prize as a type of competition; later in the same meeting notes, we wrote, "we are having a competition at T9Hacks." This statement directly contradicts the fact that we were hosting the Purple Prize, and I think demonstrates the lack of refinement in the team's attitudes and understanding of competition. Many of the contests we saw at other hackathons were placement contests, where students were ranked against one another, or sponsor contests where companies were invested in getting teams to use their software or technology. The Purple Prize did not have an exterior motive behind it, but was a product of the T9Hacks team's desire to add a token contest to the event. I think we thought that a contest of this nature would not impact the competitive feel of the environment and was a less stressful type of competition for our participants. I say "I think" here because I don't really remember what we thought about the Purple Prize when we first created it. In fact, nobody on the team remembered it.

After this meeting the entire team immediately forgot about our decision to hold the Purple Prize.

We began advertising the hackathon.

We told participants and community members that we were not having any competitions at T9Hacks.

The school newspaper interviewed me about T9Hacks and I told them our event was different and less intimidating than other mainstream hackathons because it was non-competitive.

For the next four weeks leading up to the event, the entire team thought T9Hacks was not going to include any type of competition at the event.

But this was not the end of the Purple Prize. The team would remember we created this contest at the most inconvenient times possible, on the second day of the hackathon, two hours before closing ceremonies where we were supposed to announce the winner of the contest. The Purple

Prize was also not the only surprise competition we hosted at T9Hacks either, our partnership with MLH provided us with three other unexpected contests as well.

One other organizers and I were in charge of managing T9Hacks' partnership with MLH, which involved giving them updates about the progress of the event every few weeks and working with an MLH team member to adopt and implement their hackathon policies at T9Hacks. We told MLH about our decision to eliminate competition from our hackathon and they were supportive of this decision. We could tell that this was an unusual design change from other mainstream events, where placement contests are often advertised as a key part of the hackathon experience, but MLH was curious to see how this worked as a strategy for diversifying hackathons and building events that might attract different audiences or demographics. However, I think there was a further miscommunication between what T9Hacks and MLH considered a "competition."

Three days before the event, we received an email from MLH giving us information and instructions for the "prizes" they were hosting at T9Hacks. This email, which is shown below, told us that MLH was bringing medals and expensive prizes for the placement contest and hardware prizes for the sponsor contests they were hosting. We immediately responded to this email and inquired about the mention of the placement contest. We were told that the email we received was sent from a template and MLH did not change any of the text in it before sending it to us. They reassured us that we didn't want to host a placement contest, if we didn't have to.

Prizes: We're bringing medals. We'll have tablets for 1st place. We've also got a few extra prizes for some items in the software lab. 1TB hard drives for the best use of AWS and Away bags with Sparkfun Redboards for best Domain.

Hack Submission: Can you make sure that you include the MLH Hardware prizes (AWS + Domain.com on your submission system?)

However, the other "prizes" they mentioned were not a mistake. I think MLH interpreted our desire to eliminate competition to mean that we did not want a placement contest, without applying this to the contests they hosted at all their member-events: the AWS Prize and Punniest Domain Name sponsor contests. This left the team in a difficult position. I discussed these two sponsor contests with the other organizer who was helping me manage our partnership with MLH. We

had both attended MLH member-event student hackathons before and knew that MLH provided these sponsor contests at every one of their events and we were extremely frustrated with ourselves for forgetting about them. We eventually concluded that we should make an exception to our “no competition” rule and include these contests in the event, primarily because we were afraid of losing MLH as a sponsor if we didn’t. (I do not know if MLH would have been receptive to removing these sponsor contests from the event, we never asked.) We also thought that the two sponsor contests that MLH was hosting were fun and would not create an overly-competitive hackathon environment for our participants.

MLH hosted two sponsor contests, the “Punniest Domain Name” contest, where students created domain name (website urls) with puns in them, and the “Octocat Drawing Prize,” a drawing contest where students created original drawings of the GitHub “octocat” mascot and submitted them on Twitter.³ These two sponsor contests were silly and fun and were low-effort to enter into. They were contests that any team, no matter their skill level programming or the kind of project they were building, could enter into. We were more receptive to hosting MLH’s sponsor contests because we thought the contests were low-stakes for the students and low-impact for the event. Partnering with MLH also meant that an MLH team member was attending the event and they were in charge of hosting (advertising, answering teams’ questions, judging, and awarding the prizes) the sponsor contests, so adding these contests to the event also benefited the team because we wouldn’t have to do any work planning the contests. However, when MLH was advertising these sponsor contests in opening ceremonies, they also advertised *another* type of competition the T9Hacks team forgot about.

MLH stands for “Major League Hacking” an organization that provides international student hackathon leagues for their participants. “League” is literally in their name and the T9Hacks team forgot all about the league contest they hold. At the beginning of this chapter, I discussed this league contest in-depth, but it is basically an inter-school competition for the universities and colleges that host student hackathons in North America. Hackathon participants earn points for

³ GitHub is a cloud-based service where developers can publicly upload and download their code.

their school by attending MLH member-events and winning the contests hosted there; however, due to the smaller hackathon community at CU (the university where T9Hacks is based) and the scarcity of MLH member-events in the western and midwest US, CU is never a contender to win this contest. The hackathon organizers at CU tend to ignore or forget about this contest. However, the league contest is something that MLH advertises and promotes heavily and, during the opening ceremonies of T9Hacks, was the first contest they introduced when they discussed the different types of competitions they were hosting.

Since I was the lead organizer, I hosted opening ceremonies, which included a three-minute block for MLH to present any information they needed to. The MLH team member talked about who their organization was: the “official student hackathon league”. They told students, that by attending T9Hacks, they were automatically “earning points for their school” in an international competition. When I listened to MLH’s presentation I felt two things. First, I realized that despite the team’s attempts to eliminate competition from our hackathon, we didn’t take into account all the different contests that MLH automatically hosted at their events. Competition was now a part of this event whether we wanted it or not, and I wondered about the impact it would have on our participants.

Next, I looked out into the audience and tried to gauge their reactions to the league competition. I saw a few confused faces in the audience and some students who looked surprised to learn about this league. I was remembering what it was like for me when I attended my first hackathon and learned that this event, which I had thought was just another event held by the computer science department, was actually part of a global student hackathon community and the hackathon I was attending was one of hundreds of student hackathons hosted across the continent. I wondered if the participants at T9Hacks were thinking the same things I once did, asking themselves the same questions I had: If this event was a part of an international competition, how competitive was it going to be? Am I the only one who didn’t know that this was an international competition before registering?

The reactions I was anticipating from the participants were reactions to identity threat.

When participants learn that they are entering into a boarder hackathon competition, they may feel excited, intrigued, nervous, intimidated, or unsure. The wider hackathon community may bring up stereotypical ideas about who the other participants are. Though the participants may only see the projects from the hackathon they attend, they may also evaluate their projects to the kinds of projects they would expect to see at other hackathon events. T9Hacks was a women's hackathon and we had around 70% female participants, but the CS department at CU only has around 11% women [18] which is lower than the national average of 19%women [54]. This means that though T9Hacks was advertised as a female-focused event, the attendees were not just competing against other women; students were competing against a large population of men, which could produce identity threat and lead the students to change their projects to feel more competitive at a national level. They could choose to leave the event, thinking that this was not the departmental-based event they had been lead to believe it was. The male students at T9Hacks could respond positively to learning that there was a league contest and reinforce the ideals that CS and hackathons were intended for students like themselves. However, since the immediate event the male students were attending was female-dominated, they could also face a different type of identity threat, feeling like their identity and accomplishments within the computing field were challenged because of the potential to lose to female competitors. Earlier in this chapter, I discussed Dahl [42] and Cheryan's [33] research studies that found that when men were challenged in traditionally masculine fields, they implemented coping mechanisms that lead to increased aggression towards and the sexualization of their female competitors. These types of reactions were possible at T9Hacks if the male competitors, who were a minority population at the event, felt that their status or identity was threatened by the female participants.

At the hackathon, outside of opening ceremonies, it was difficult to tell how the students reacted to the presence of the league competition. When I talked to the students at the hackathon, they were focused on building their projects and few teams, if any at all, discussed the league competition. Some of the students told me that they were surprised to learn that there was a larger hackathon league that operated, since they had never heard about hackathons before the

event, but I did not observe teams who changed their projects as a direct result of learning about the league. The only tangible response I heard about was a female student having a positive reaction to the league competition. T9Hacks was her first hackathon and once she learned that there was a wider student hackathon community, she began traveling and attending hackathons on her free weekends. She attended T9Hacks her sophomore year and when I talked with her again, she had attended over ten other student hackathons, all out of state, because she loved hacking so much. This is an example of a student who left T9Hacks the first year with a newly discovered personal identity as a “hacker,” which was only reinforced by the wider hackathon community and the competitions she found within.

But there was still the Purple Prize to contend with.

On the second day of the event, hours before we were supposed to give away the Purple Prize, the team had the *joyful experience* of remembering that we were also hosting a contest (and as the lead organizer, I’m pretty sure suddenly remembering the Purple Prize at that moment took 10 years off my life). When the hackathon was nearing its completion, a few of the participants approached the T9Hacks team and asked us questions about the contest. How much purple did they have to include in their projects to qualify for the Purple Prize? What were the prizes we were giving away? Could they use the word “purple” in their projects instead of the color purple? Would there be a runner up?

Not only did we forget that about the Purple Prize, we all also forgot that we had also added a description of the contest on the website four weeks prior, so participants had learned about the contest from the website and not our team. About half of the participants knew about the contest and seemed excited to enter into the competition. I remember one group who wanted to learn how to program with an Oculus Rift (a virtual reality simulator headset), and, also interested in entering into the Purple Prize, they also learned how to change the environmental variables of the virtual reality game they made to be purple colored. Figure 4.3 [209] shows a screenshot of their game and we can see that almost every object within the game was a different shade of purple. Another student was learning how to build his first website and taught himself how to change text,

background, and border colors to the color purple so that he could enter into the Purple Prize. We were surprised so many students were interested and motivated by, what the T9Hacks team considered, a trivial contest. Even though we had not planned on hosting a competition at the hackathon, because there were so many students were anticipating the Purple Prize, we all felt that we had to follow-through with hosting this contest.

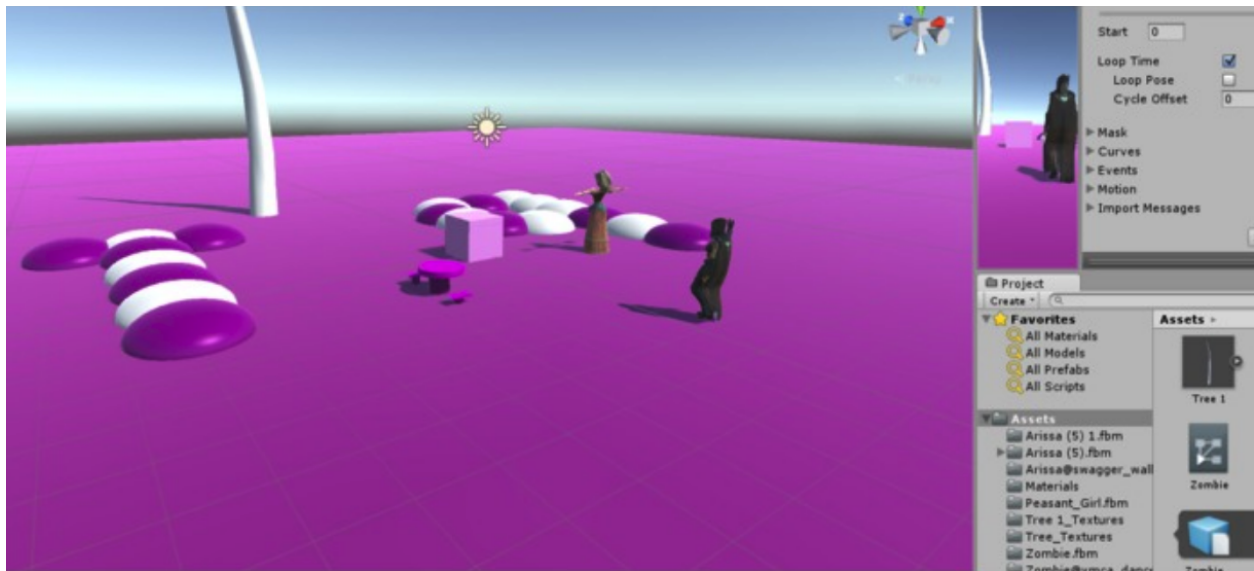


Figure 4.3: SEESharp, a project submitted to the Purple Prize. (www.devpost.com/software/seesharp)

However, we didn't have any prizes for the winners of the contest. Our budget was extremely tight and we literally could not spend more than \$50 total on all the prizes. We did not know who was going to win the prize, so we had to estimate that a team would have four students on it, we only had \$12.50 per prize, which wasn't a large amount to purchase much. We were also at the end of the event and there was no time to send someone shopping. I scrounged through every floor of the building we were hosting the event in, looking for something I could use as prizes. Much to my distress, I was not able to find any extra swag or goodies I could give away; however, my office mate at the time was selling Girl Scout cookies and she had eight boxes of Samoas left exactly enough for a team of four to get two purple boxes each. Our prize bags were small, two boxes of

Girl Scout cookies and a mentor-style T9Hacks t-shirt inside a T9Hacks-branded tote bag.⁴

The team also had in-depth discussions about who would win this contest, but because we were unprepared to host the contest, we did not have explicit criteria about how we were going to judge this contest. There were 10 projects entered into the contest and each used the color purple in different ways, so it was difficult for us to determine what the “best use” of this color was. In the end, we awarded the Purple Prize to the Roots to STEM team, who built a mentor matching system for women and girls in STEM and computing. Figure 4.4 [218] shows a screenshot of the front page of their website). They used purple as the theme color for the website, which we liked because that meant purple was incorporated throughout their project and not used in a small or minor way. We also liked the project idea and felt that it was a good project that also fit with the mission of T9Hacks.

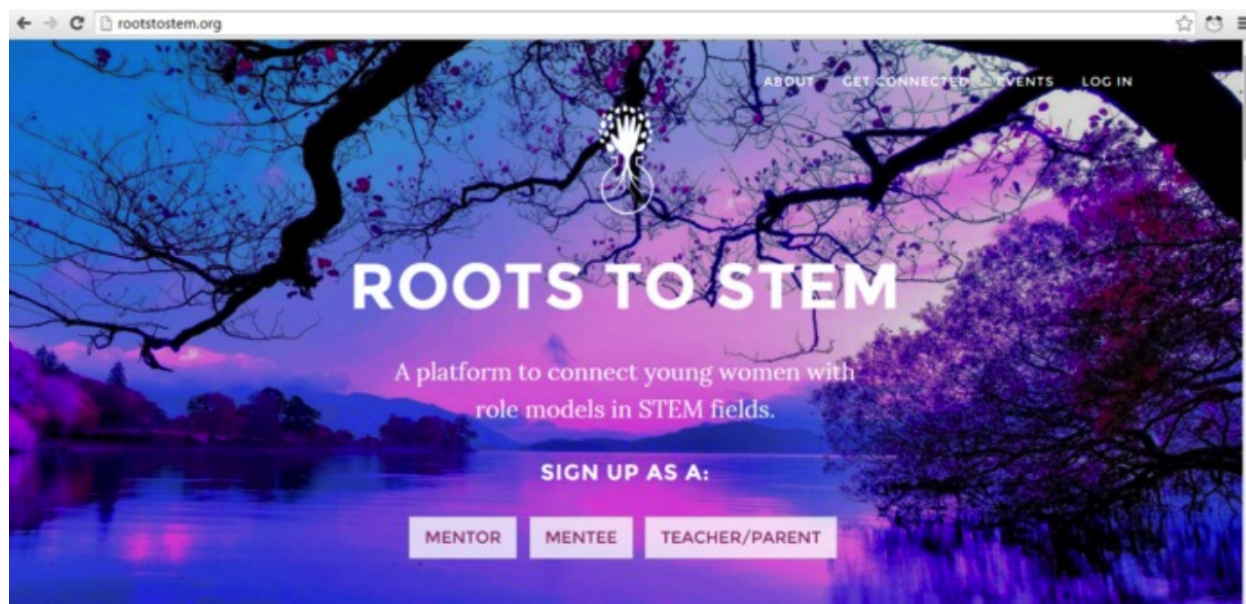


Figure 4.4: Roots to STEM, the winner of the Purple Prize. (www.devpost.com/software/roots-to-stem-chx4aw)

When we announced the winners of the Purple Prize at the end of closing ceremonies (a

⁴ We bought t-shirts for everyone who attended the hackathon. The t-shirts had the T9Hacks logo on the front and the date of the event and our sponsors’ logos on the back. All the participants received white shirts and the mentors and T9Hacks team received black shirts.

ceremony that I hosted), I also announced that the winners received Samoas as their prize. I didn't think that these prizes were that exciting, especially since MLH was handing out hardware as their prizes (items that I thought were slightly cooler and were more worth more money than \$8 boxes of Girl Scout Cookies). But I was happy to learn that the prizes were popular and well received by the winning team. The winners were excited to own t-shirts a different color than the other participants and said they all loved Samoas. Other participants also told me that they were disappointed they didn't win the Purple Prize because they wanted the "delicious Girl Scout cookies."

The Purple Prize, as well as the two sponsor contests that MLH hosted (the Punniest Domain Name and the Octocat Drawing Prize) are interesting contests to analyze. When I look at the impact these contests seemed to have on the participants and the hacking environment, I would argue that they were low-stakes contests. At the end of the "Understanding Competition" section, I described four ways that the T9Hacks designed our contests to be "less threatening" for the participants: the nature of the contests (e.g. are the contests fun or serious in nature, do they require programming knowledge, and do they give students freedom to build their own projects), the prizes for the contests (e.g. are the prizes expensive or valuable), how competitive the environment may feel (e.g. can the students track their progress in a contest and compare themselves to the other participants), and how the contests are framed as part of the hackathon (e.g.. is winning the contests presented as the primary purpose of the event). I'll be using these four elements to structure my discussion about how I think these sponsor contests were low-stakes and could have produced less identity threat among the participants.

The nature of the contests were fun and light-hearted. They were easy contests to enter because they required very little programming knowledge and did not require that students use specific software or technology, like many sponsor contests do. Though we observed that some of the students took these contests very seriously and put in a lot of work for the contests, the contests themselves required a nominal effort from the participants so the barrier to entry into these contests were minimal. The Octocat Drawing Prize was independent from the projects the students were building at the hackathon, so the students could enter into the contest regardless of what the

projects they were building. These contests did not reward students on technical ability, project complexity, or project completion. The contests were also disconnected from the nature of the hackathon, which was a software-heavy and technical event; the Purple Prize was a design-based contest, the Octocat Drawing Prize was about artistic ability, and the Punniest Domain Name was about creating witty domain names. Overall, I would classify these contests as non-technical competitions, which could lead to them producing less identity threat among participants. In the computing-based event that was T9Hacks, these contests were not technical themselves, so a participant's attitudes towards the competition might be different than if they participated in a contest that judged them on technical-merit. If a participant entered into one of the contests and lost, they might feel like a less accomplished designer or artist, but their identity as a computer scientist or technically-savvy person would not be scrutinized.

Next, I believe that the prizes that were handed out also worked to lessen the intimidation factor of the event. In opening ceremonies, MLH described the prizes that students would receive for their two sponsor contests. The winner of the Punniest Domain Name would win a "Domain.com swag bag filled with cool tech goodies," these were items like small portable chargers and a few months of free website hosting. The winner of Octocat Drawing Prize would win a small octocat figurine. MLH also listed these sponsor contests and their prizes on the project submission website as well, the same website where students would discover the forgotten Purple Prize. I think that the association with the small prizes that MLH offered benefited the Purple Prize because students were expecting prizes of a similar small caliber. These small prizes may have softened the impact of these contests because the rewards could have felt more like participation tokens instead of substantial payoffs. In turn, this could have decreased the competitiveness of the contests, possibly giving the students less of a chance to feel like their identities or social statuses were threatened.

When the participants brought the Purple Prize to the T9Hacks' teams attention, I did observe some competitive behavior between teams, but this seemed to be friendly in nature. There were two teams who approached me to ask questions about the Purple Prize. In that interaction, the two teams exchanged some friendly banter about who was going to win the contest. They criticized

each other's use of the color purple in their projects and boasted about their own projects. There was a playful argument about how a project should "correctly" use the color purple in their projects, one team maintained that an entire project should be an "explosion of purple", while the other team argued that purple should be used sparingly and strategically in a website so it "wouldn't overwhelm the senses." These students were enjoying the design challenge that this contest provided them, they created their own rules for the contest and were engaged with other participants over the contest. If we pull from Dennehy's dimensions of competition [47], these students were engaged in a *personal* and *interpersonal competition* with each other. Though these types of competition have the potential to cause identity threat due to a potential loss of group status or sense of self, the friendly interactions between the teams demonstrates that the Purple Prize was motivating and engaging for the teams, which may have lead them to not internalize the competition as much, possibly producing little identity threat.

The last two design elements that I think are impactful for identity threat have to do with the way the competition is framed within the event and how competitive the environment feels. Since T9Hacks only had three non-technical and minimally rewarding sponsor contests, I'm going to discuss these two elements in tandem because I believe that the way these contests were framed within the hackathon also resulted in a less competitive feel. Since the T9Hacks team forgot about the Purple Prize, it was never advertised or promoted at the event. The only contests that were advertised were the Punniest Domain Name and Octocat Drawing Contest, which MLH explained very quickly in the opening ceremonies. Throughout the event, the T9Hacks team did not discuss the contests with the participants, either because we were not aware of or were not knowledgeable of the contests, so there was no importance placed on these contests by the organizing team. When hacking was over and the start of demos was announced, the team continued to call this event "demos" and did not mention that judging would happen simultaneously. Demos were science-fair style and we separated the participants into two groups; the first group would present their projects and the second group was free to walk around and see what the other participants made, then after about 45 minutes, the groups switched and the second group presented and the first group observed.

This led to an active demo time where there were a number of people talking with teams, so it was not obvious who the judges were. I believe this shifted the focus away from the competitive aspect of the event. In closing ceremonies, I thanked sponsors and talked about how great it was hosting our first event was, then announced the Purple Prize last.

By minimizing the contests in opening ceremonies, throughout the event, during demos, and in closing ceremonies, we were trying to minimize the presence and feeling of competitiveness at the hackathon. The team instead focused on the learning opportunities that students could engage in, for example, helping mentor students with their projects and talking to them about what they were building or what problem they were trying to solve with their hacks. Offering an alternative focus for the event could have helped shape the hackathon environment to feel less competitive. After the event, we received feedback from a few students who were surprised to learn that there were even contests being held at the event. The minimal framing and advertising of these contests created a less competitive environment for the students. Overall, despite the fact that we were so adamant about not hosting any competition at T9Hacks and after accidentally hosting three sponsor contest and a league contest, I think the event turned out as well as it could have. Students seemed to have a good time and the effects of competition were minimal. This led us to changing our opinion about competition in our second year.

4.3.2 Year Two: Fun and Serious Contests

After the first year of the hackathon, we made a number of changes to the team and the event. None of the other organizers besides Aileen, T9Hacks' faculty advisor, and myself were able to stay on the team for the second year. This meant that I made a lot of the initial planning decisions, particularly about the structure and how we were going to implement competition. Competition was something the team tried (and failed) to eliminate during our first year. We initially thought that competition was stressful and intimidating for students, but when we actually hosted three sponsor contests in our first year, we found that some of the students were excited and motivated by the fun contests. We also saw how ingrained competition was to student hackathons and how difficult it

was to eliminate. I also took the fact that we were a women's hackathon into account, I was hyper-aware of how T9Hacks might be considered a weaker event because of the lack of competition that other mainstream hackathons had. All this information led me to change T9Hacks to a competitive event.

One of the things I was deeply concerned with during this second year was about how the lack of competition at T9Hacks could devalue the event. I was already thinking of ways that our event might be seen as "lesser" because we were a women's hackathon, a topic that is discussed in-depth in Chapter 3. Removing competition was a major change to the hackathon structure that made T9Hacks a "hackathon-lite." We were already creating a partially segregated event, but changing the event structure could bring up stereotypes about women in computing. Without competition, the event might be seen as easier, less rigorous, or less serious than other "normal," or mainstream, events. I held a lot of personal doubts about the event I created and questioned whether our initial reaction to competition ("it's intimidating") was true. I questioned if our reaction, to eliminate competition altogether from the event was a good one. I was trying to straddle the line between creating an event that was supportive and beneficial to female and non-binary students while keeping traditional elements of the hackathon. In the end, I decided that having the same structure and design of other student hackathons was best, because we could always change how our contests were designed and implemented.

One method for creating contests at a mainstream hackathon is to ask sponsors to host contests. So, a few months before the event, I changed the benefits of our top tier, the platinum tier, to include an opportunity to host a sponsor contest. Surprisingly, only one of our three platinum sponsors took advantage of this, tailoring their contest to the mission of the hackathon by asking students to use their company's API to build a project that "supported women".⁵ I worked with the sponsor to name the contest "Empowering Women." The other two platinum sponsors did not want to host sponsor contests. When I asked the second platinum sponsor if they wanted to

⁵ API stands for "application programming interface." It is set of defined software methods, usually used to access data. For example, the Twitter API can be used to access tweets programmatically instead of looking at tweets through a phone app.

host a sponsor contest, they told me “we have no agenda at T9Hacks, we just want to support the mission of the event.” I thought this was an interesting response, because it implies that sponsors who host contests *do* have an agenda at hackathons, and it was refreshing to see that this sponsor partnered with us because they supported the event itself and did not intend to take advantage of the hackathon as a recruiting or marketing opportunity that only benefited them. Our third platinum sponsor was a returning sponsor from the first year and chose to host a “resume review” workshop instead of a sponsor contest. They hosted this resume workshop in the first year which was extremely popular with our participants, so we were interested in hosting it again. This resume workshop also influenced our choice to include several more workshops in our third year, discussed more in Chapter 5.

Another returning sponsor this second year was MLH, which meant they were hosting multiple sponsor contests and the league contest again. MLH hosted the same two sponsor contests that they did in the previous year, the Punniest Domain Name contest and the Octocat Drawing Prize contest. They also added two additional sponsor contests as well: Best Use of Amazon Web Services (AWS), also called the AWS Prize,⁶ and Best Hack to Reduce Online Harassment, also called the #HackHarassment Prize. These two sponsor contests were more in-line with the type of typical sponsor contest that was hosted at student hackathons: They were difficult projects that required the use of a particular software (the AWS Prize) or they were solving a difficult problem (the #HackHarassment Prize). These contests were extremely different from the Punniest Domain Name and Octocat Drawing Prize contest. Due to the complexity of the projects they were asking students to build, they were not beginner-friendly and limited the type of projects that students could build. They also had larger prizes that were worth more money, the #HackHarassment Prize winners were given large portable battery packs and the AWS Prize winners were given \$250 in AWS credit.⁷

By the time the partnerships with MLH and our three platinum sponsors were finalized, it

⁶ Amazon Web Services (AWS) is a subsidiary of Amazon that provides cloud computing services on a subscription basis.

⁷ This credit is used to pay for AWS services.

was a few weeks before the second event. By then, new organizers had been recruited to help plan the event and T9Hacks had a total of six organizers on the team. As a team, we began the process of organizing the sponsors and the contests they were hosting. We sorted the contests into two categories: “serious” and “fun.” The distinction between the contests was subjective and used for internal purposes for the T9Hacks team. The “serious” category had the two new sponsor contests from MLH and the one sponsor contest from our platinum sponsor. There were only two contests in the “fun” category: Punniest Domain Name and Octocat Drawing Prize. Once the team had finalized the sponsor contests, we began discussing the additional contests we wanted to host.

Our primary concern when we were creating contests was making sure that they worked towards building the welcoming and fun hackathon environment we wanted to create. Based on how well the Purple Prize was received in our first year, we chose to include this contest again in our second year; we categorized it as another “fun” contest because of how similar it was to the Punniest Domain Name and Octocat Drawing Prize contests from the first year. We were also interested in providing a wider variety of contests for the participants. The serious contests either required the participants to be technically-advanced or asked the participants to solve tough social issues, they did not feel particularly beginner friendly, nor did they allow for much project freedom, two things we liked about the contests from the first year. We created a third category of contests, called “challenges,” and developed four contests for it: Best Beginner Hack (best project created by an all-beginner programming team), Best Marketing of a Hack (best presentation of a project during demos), Most Creative Hack (best project that “thought outside of the box”), and the No Coding Hack (best non-programming-based project). The goal for these four contests was to create a variety of contests for the participants to enter in. These “challenges” allowed for more project freedom than the “serious” contests, but they were more skill-based than the “fun” categories. Once the team finalized the various contests we were hosting in our second year, we began brainstorming ideas for the prizes.

We used the previous year’s Purple Prize as a model for what kinds of prizes we wanted to give away. The Girl Scout Cookies were a great prize that was low-cost, low-stakes, matched the

purple theme of the competition, and supported local girls' programming. We also reviewed MLH's suggestions for hackathon prizes. They suggest that organizers do not give away cash money or items with large value amounts, but instead give prizes that build community, encourage student learning beyond the hackathon, and create a positive association with the hackathon [68]. Some of their prize suggestions include electronics, such as battery packs and drones, or experiential prizes, such as movie tickets and amusement park tickets; a full list of their prize suggestions are listed below. We took this advice and purchased prizes such as learn-to-solder kits, art supplies, electronics, and small toys. We thought part of creating a less stressful environment was also having low-stakes prizes. This meant that we wanted the prizes to be fun and interesting for the participants, but nothing that was of a large or significant value.

- Gear – Cool items to use with future hacks (examples: microcontroller kits, rechargeable battery packs, laptops, tablets, drones, etc)
- Experiences – Have a memorable, one-time adventure with your friends (examples: movie tickets, amusement park tickets, conference tickets, etc)
- Novelty – Things you might love, but might not buy for yourself (retro video games, Custom Trophies, limited edition swag, geeky posters, etc)

Once the team started marketing the hackathon, I also became concerned with the large number of contests we were hosting this year (ten in total). I did not want the high number of contests to create an overly competitive image of T9Hacks, so I tried to make the competition elements of the hackathon less visible to potential participants as we had the previous year. A common practice at mainstream hackathons is to list the event judges on the hackathon's website; however, I felt that this was a practice that could produce increased identity threat in students. For example, If a student is not confident in their programming skills or is a member of a non-dominant group, they may not want to risk attending an event where they compete against other students and may, instead, avoid the event. I believe that listing judges on the hackathon website

also frames competition as an important element of the event, which was not the image of T9Hacks I was trying to promote. I also designed the marketing materials (posters, flyers, handouts, etc) to promote the learning and project exploration opportunities the hackathon offered. The only time I advertised that we were hosting a competition was a week before the event, when I posted two pictures of our prizes, see Figure 4.5 [232]. In the first social media post, I also added a link to our list of contests we were hosting. My intention was to downplay the competition as much as possible. I wanted students to attend T9Hacks because they were interested in learning about computing and building projects, not to compete in contests.

Overall, I would say that the many contests we hosted in our second year were successful. The Purple Prize was the most popular: 15 out of the 25 projects submitted to the hackathon were entered into this contest. However, other contests like the #HackHarassment Prize and the No Coding Hack were less popular and only had one submission each. The team felt that the nature of the No Coding Hack was a mismatch with T9Hacks' goals. Our explicit mission at T9Hacks is to create an event for students to explore computing, so offering a contest that asked students to spend their time at a technical event not doing a technical task was counterintuitive. In contrast, looking at the contests from the first year, the three sponsor contests we hosted were successful because they were non-technical, but they *also* allowed for complete project freedom. I believe the No Coding Hack failed, not because it was a non-technical contest, but because it was a non-technical contest *and* it restricted the kinds of projects the students could create at a technical event.

I was surprised to see how few students entered into the #HackHarassment Prize. This was one of the new sponsor contests from MLH, which asked students to *“Use your tech skills for good and hack online harassment! Build a software solution that can help reduce the frequency and/or severity of online harassment.”* There was only one project submitted to this contest, only because a team had submitted their project to as many contests as possible. Initially, I was excited to host this contest at T9Hacks since it seemed to be in line with the types of projects that I saw the participants building in the first year (projects intended to support or help women); however,

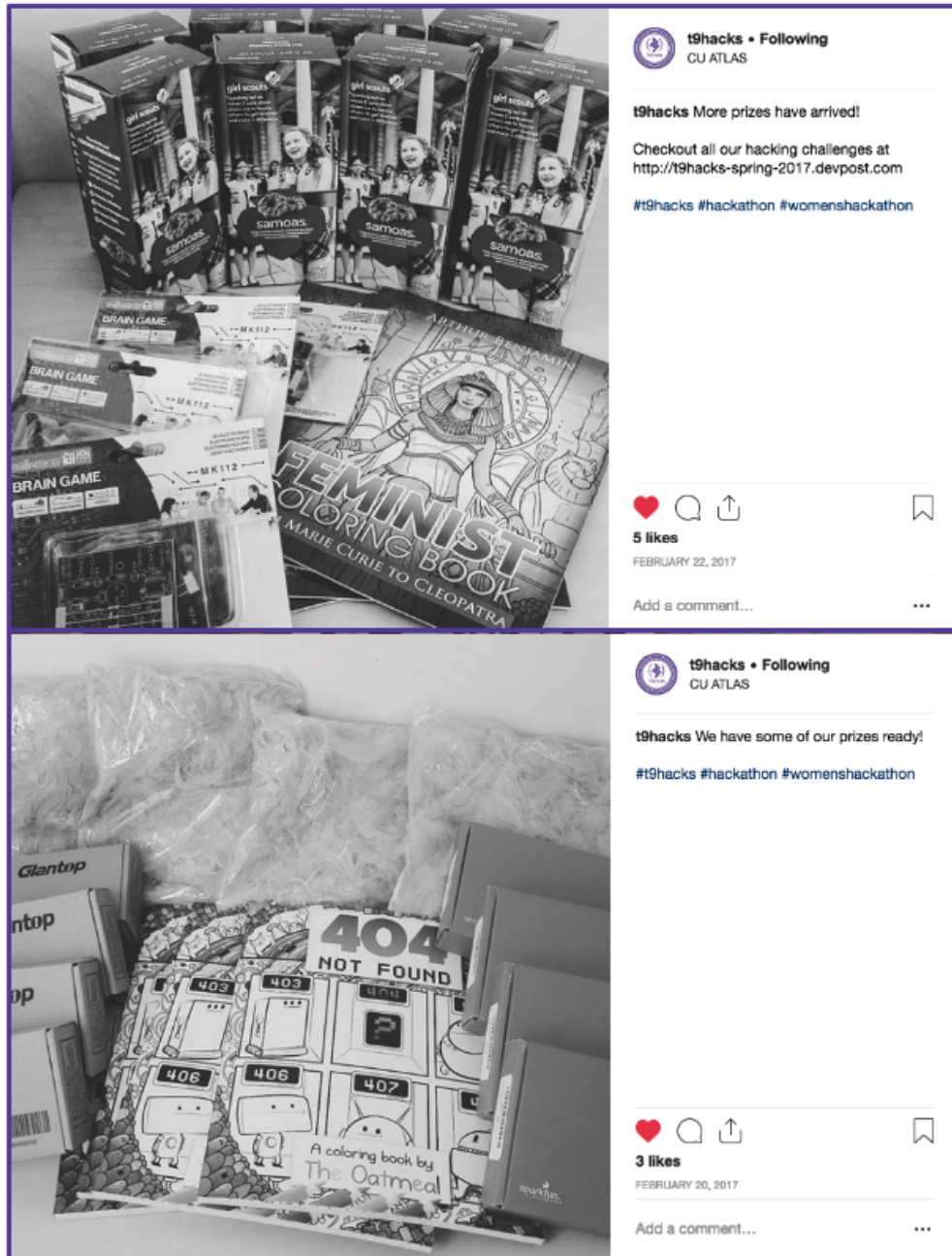


Figure 4.5: The only social media posts we made advertising the competition during the second year. (www.instagram.com/T9Hacks)

looking back, I think this contest's theme (to reduce online harassment) was too specific to allow for project freedom and exploration. The demands of the narrow theme may have also lead to increased identity threat which may have caused students to avoid this contest.

When I talked to participants at this event, the most common reason I heard for not entering into the #HackHarassment Prize contest was that its theme presented a problem that was too difficult to solve in a 24-hour event. Students were concerned that their solutions wouldn't be effective or practical. I remember talking with one woman who said that she was interested in a contest that helped women, but felt unsure how to even create a software solution to decrease online harassment. She talked about how this contest was placing the solution of the problem on technology, when it was really a human problem, so trying to create software to over-compensate for human behavior was a band-aid to the larger issue of online misogyny. I couldn't argue with the student's logic. I agreed with her, but, as the lead organizer of the event, this meant that there were still ways we could improve the contests we were holding at the event. Another team initially created a project idea that tried to maximize the number of contests they could enter into, so they tried to create a project that used AWS and the platinum sponsor's API, was a creative software solution to decrease the online harassment of women, and would have a good marketing strategy. When I spoke with the team, a few hours into the hackathon, they were starting over on a new project idea because their first one was too complicated. While brainstorming ways to decrease harassment, they came up with a different project idea, one that was still related to helping women, but wasn't about online harassment, so it wouldn't qualify for the #HackHarassment Prize. Since the platinum sponsor was hosting a contest that was broadly about helping women, they chose to opt out of the #HackHarassment Prize contest and only submit their project to the Empowering Women contest. These students illustrated a problem that the #HackHarassment Prize had; the theme created a difficult and narrow problem for the participants to work with.

In contrast, the Empowering Women sponsor contest that the platinum sponsor was hosting had a broader theme and had more projects submitted to it. The theme for this contest was broader and allowed for more freedom in the participants' projects. Participants could approach the contest's theme through any means they wanted. It was not asking them to work on a specific issue or problem domain. Some of the projects that were submitted to the Empowering Women contest covered topics like helping refugees find resources, helping women access healthcare information, and

providing a way for women to guarantee that their friends made it home safely when they would go out in public. The Empowering Women contest could have overshadowed the #HackHarassment Prize, since it had fewer restrictions. The narrow scope of the #HackHarassment Prize theme limited the students' ideas for their hacks and their subsequent project freedom.

Participants might interpret the theme of the #HackHarassment Prize as negative or depressing and interpret the theme of the Empowering Women as positive and uplifting. Building a project that focused on harassment for 24 hours could have felt demoralizing or emotionally taxing for the participants. Trying to reduce online harassment can also be a *really* difficult problem to solve. Mega online platforms like Facebook, YouTube, and Twitter are still working to reduce online harassment and abusive conduct [55, 138, 140] from their users and those companies have millions of dollars to throw at solving this problem, I'm not sure that the scope of this problem is something that can be adequately addressed in 24 hours. Still, I do not want to discount the ingenuity of hackathon participants. For example, a week before the second event, I read about a team who attended an MLH member-event and built a browser plugin that helped detect "Fake News" [124], a serious problem that is difficult to solve. And this is only one hack, I've seen and heard about students that have created unique solutions to intense problems all the time. Still, the severity of the theme could have felt intimidating or unpleasant for some students, leading to increased identity threat.

Due to how difficult and narrow the theme for the #HackHarassment Prize contest was, it quickly became a high-stakes competition that could have increased identity threat. The difficulty of the theme could lead students to feel unconfident or unsure about their project ideas. The theme was not fun like the Purple Prize or upbeat like the Empowering Women contest. Instead it was centered in a serious and intense problem. If a female team entered a project into this contest, they were essentially creating a solution for themselves and the other women attending the event. This could cause identity threat because they can become a visible representation of this contest at the hackathon. The team might also resist the notion of building a project for women at a women's hackathon, creating a women's project could create an image of the women team entering into the

women’s contests instead of the more technical or neutral contests. A male team might also face increased identity threat because they were creating a solution for a demographic they are not a part of and their project could face more scrutiny. The projects in this contest were not just a fun hackathon project, but had the potential to impact the lives of a majority of the attendees at the hackathon. The #HackHarassment Prize contest was a serious contest that could have serious implications for the participants. It was a high-stakes competition that led to low participation and possible identity threat.

The second year of T9Hacks was the first time the team planned for competition at the hackathon. The “fun” contests were the most popular out of all the contests. With the exception of the No Coding Hack, the “challenge” contests were the second most popular categories, and the “serious” categories were the least popular. I also think our plan to downplay the competition elements of the hackathon were successful for some students. In our post-event feedback survey, we received comments like, “everyone was a little more lax about the competition, no super insane competitiveness” and “this type of atmosphere felt more comfortable than a traditional hackathon, as it was less competitive and allowed people to collaborate and ask each other for help more.” In the next year, T9Hacks would incorporate what we learned about “fun” and “serious” categories and add a new element to the competition.

4.3.3 Year Three: Fun Contests and Tracks with Placement Contests

One of the biggest changes from the second to the third year was the change in the structure of the event. This year we had three tracks at the hackathon:

- Cybersecurity Track - students played an online educational game, Project Mars,⁸ to solve puzzles and play missions that simulated working as a cybersecurity engineer. This track had six placement contests.
- Humanitarian Technology Track - students built projects that tackled social good problems from the D-Prize website (www.d-prize.org).
- Creative Technology Track - this was open-ended and students could submit projects of any type.

⁸ This is a pseudonym.

The Cybersecurity Track had a series of placement contests that were awarded for achieving tasks within Project Mars; the Humanitarian Technology Track had one placement contest that awarded students first, second, and third place; and the Creative Technology Track had a variety of sponsor contests from MLH, T9Hacks, and a platinum sponsor. The Cybersecurity and Humanitarian Technology Tracks were sponsored by two partners, which gave them more control over how the track contests were run (as well as the theme, workshops, and overall environment for those tracks). Many of the sponsor contests were similar to the second year. New in our third year was the addition of placement contests for the first time. The tracks had extremely different hacking environments, which affected how the students reacted to the placement contests, it was possible the two tracks also produced differing amounts of identity threat in students.

4.3.3.1 Cybersecurity Track

The Cybersecurity Track was created specifically for a sponsor, a cybersecurity organization that was involved heavily within the CU community and interested in preparing and attracting students to careers in cybersecurity. They had experience with hackathons and student hackathons and were hosting hackathons at CU's campus in the fall and spring semester. I ended up working with the sponsor to design a track for them that would mimic other hackathons they had hosted before. I thought this was a good idea, since they had success with this structure at another event and we could adapt parts of their hackathon structure specifically for T9Hacks. The cybersecurity sponsor brought in another company who provided free trials of Project Mars for the students to use during the hackathon. Students were awarded points for completing the mini-games or going on missions that would simulate working as a cybersecurity engineer. There were six contests that were given to students who had the overall highest score in the Project Mars, the highest score in the mini-games, and the highest score for different missions. Though I wasn't excited that the competition was a ranking competition based on technical merit alone, I wasn't familiar with Project Mars and didn't know what other kinds of contests we could hold in this track. This Cybersecurity Track was also special because it was designed to be a women and non-binary-only

track. The cybersecurity sponsor and I discussed making this change and they said that a goal of their organization was to increase the number of women in the cybersecurity field, so a track that gave women and non-binary students the physical and mental space to explore this field seemed appropriate and fitting to both the sponsor's and T9Hacks' mission.

During the hackathon, the Cybersecurity Track was one of the most well-attended tracks. We had about 135 participants that year and a little more than 50 students participated in the Cybersecurity Track. The track was held in a large classroom that would double as a learning space, as there were demonstrations about how to use Project Mars as well. However, this track had critical issues with its management and design that made it unsuccessful for a number of its participants.

During opening ceremonies, the cybersecurity sponsor decided to change the gender policy on the track and invited men to attend the track. This did not go unnoticed by the participants of the track. One non-binary participant at the beginning of the event said they were always interested in cybersecurity and felt excited that they could learn about it at it in a women and non-binary-only space, but they were disappointed to learn that the space was changed to be all-gender. Later in the event, I was approached by two women of color from the Cybersecurity Track who came to report a situation with two men in the track being disruptive and making inappropriate comments to the female participants. These women were students from out-of-town who drove to CU just to participate in T9Hacks. They said they were looking forward to participating in the track specifically because it was women and non-binary only. They were excited to be in a female-dominated space at a hackathon, but were disappointed that the cybersecurity sponsor decided to make the track all-gender last minute. I apologized to them for the incident and told them I would handle the situation. I talked with the two men in question and asked them about their behavior. After explaining their comments were making other participants uncomfortable, they could continue working in the track, but they would have to move to another room. Both men seemed understanding in the conversation, but ended up leaving the hackathon soon afterward. When the feedback forms for the hackathon were sent out, I received a response from an unhappy

male participant that said, “Change the organizing leader. Extremely rude and judgmental. Almost seemed she was sexist and I felt uncomfortable continuing at Hackathon so left in the middle of it.” The cybersecurity sponsor’s decision to include men in the track changed the environment, which lead to non-binary students, women, and men having a negative experience in the track.

Though I only spoke with the two disruptive men for a brief amount of time during the hackathon and do not have a good gauge of how they were feeling at the event, it is possible that their behavior was a response to their threatened identities. The Cybersecurity Track was female-majority, making them a non-dominant group. Computer science and cybersecurity are domains that are seen as traditionally masculine and are dominated by men. This could have been a change from the type of computing environments that the men were used to, especially if they were not used to being in and interacting with a non-dominant group. Male competitors may have also faced increased identity threat when they saw their female competitors, who usually are less visible and are not “typical” cybersecurity engineers, doing extremely well and leading the competition. Research has shown that men in these types of situations may react by increasing aggressive behavior or trying to sexualize or discredit their female competitors. The two men could have been, even subconsciously, reacting because they felt identity threat in the track.

The female and non-binary students could have also faced identity threat when cybersecurity sponsor changed the track to allow men. Though competition was not based on gender, the presence and behavior of the male students in the room influenced female and non-binary students, upsetting the social setting from the expected all-female and non-binary track. This affects how students interact in that environment, since they may be more defensive or less likely to take risks, producing identity threat in students who are not part of the dominant group. In a competitive environment, this may cause students to leave the competition and not risk competing in an unbalanced environment [101] or change how they compete to avoid aggression or retaliation from the dominant group [42]. Throughout the event, we saw about 75% of the students from the Cybersecurity Track leave to join another track at the hackathon or leave the hackathon altogether and it is possible that some of these students may have left to avoid an identity threatening environment.

The placement contests also caused problems for the Cybersecurity Track. All the contests were based on the students' scores, so the students with the highest score in the various contests would win. There was a public leaderboard that displayed real-time rankings of every participant throughout the event. Figure 4.6 shows the public leaderboard for Project Mars, where students could see where they ranked compared to the other participants. I spoke with one participant of this track who said that when she looked at the leaderboard and saw how far behind she was from the other participants, she realized there was no way she was going to win anything, and was already struggling to play in Project Mars so she decided to switch to the Creative Technology Track. She said that there was a small number of students who had significantly higher scores than everyone else and it felt like the contests were just between that small group. The public leaderboard could have served to discourage and intimidate students into leaving the event, or could have produced additional identity threat because the students were aware of who was doing exceptionally well in the track and who was doing poorly.



Figure 4.6: Example image of Project Mars' Leaderboard. Students could see their score compared to the other players.

A majority of the mini-games and missions students played in Project Mars were individual. There was only one mission that was team-based and only one of placement contests (out of six) were based on this activity. This was positive for some participants. I met a woman who attended hackathons as a hobby and was excited to see a track for individual participants, since she wanted a change of pace from the traditional hackathon's team structure. For her, the Cybersecurity Track was able to meet her needs and goals for the event. However, this was not the case for other participants. One participant, who had attended T9Hacks since its first year was excited to learn about cybersecurity and invited her friends to the hackathon. But she was disappointed she couldn't work on a team with her friends and that she would actually be competing against them in the track. This led the competition to produce a more severe interpersonal competition than the inter-group competitions in the other tracks. Though the other tracks still had students competing against each other, it was in a team-based group, where students were still working and collaborating with other students. Project Mars offered no way to collaborate with others, forcing everyone to compete alone. This isolating feeling could have also provoked identity threat because the competition was no longer judged on the efforts of a group where a student with weaker technical skills could still participate or enter into a competition with their teammates. When students were only competing alone, their success or failure was a result of the individual themselves, putting them in a more competitive, stressful, and conspicuous position.

Overall, I think the Cybersecurity Track was disappointing for multiple reasons, from how it forced students to work individually, to the nature of the placement contests, and the difficulty of Project Mars. We started out with over 50 students in the track and at the end of the hackathon there were only 10-15 left. All the other students left this track. The sponsor changed who was allowed to attend, used an advanced educational game, and awarded technical merit on an individual basis—all elements that added additional levels of complexity to the competition and created more instances for identity threat to flourish, which could also explain why so many students left the track and removed themselves from the identity threatening environment.

4.3.3.2 Humanitarian Technology

The other track we added to T9Hacks in the third year was the Humanitarian Technology Track. I felt this track was a good fit with the social justice and women’s empowerment projects students built in the past two years. In order for participants to develop these project ideas more fully, I felt that the track should include a workshop and have an explicit theme of helping people use technology. So I reached out to a colleague and graduate instructor in my department. The instructor did research in global development and was enthusiastic about teaching students about developing technology projects for social good. He suggested that we use the D-Prize (www.d-prize.org) challenges to structure the track. The D-Prize website is an external competition aimed at “funding entrepreneurs who increase access to proven poverty interventions” within six pre-selected areas: girls’ education, agriculture, energy, global health, education, and governance and infrastructure [41]. In addition to providing us with a focus for the track, using D-Prize gave students the opportunity to continue working on their projects after the hackathon. In order to support the students, the instructor and I designed an introductory workshop to would introduce topics like global development, the iterative design process, and basic user experience principles; topics that were intended to help the students learn about how to build projects on sensitive topics that were intended for underserved populations. The instructor also worked as a mentor for this track, helping and guiding students with their projects throughout the hackathon.

The instructor and I also discussed the type of competition we wanted to have for the Humanitarian Technology Track. I remember asking him directly what he wanted and he said we could just host the “normal ones, like 1st, 2nd, 3rd place.” I was a little hesitant about having another track with a placement contest, especially since this was a type of competition I thought would create a negative environment for the participants, but ended up agreeing to host a placement contest for this track, because, similar to the Cybersecurity Track, I couldn’t think of other types of contests to suggest. I absolutely trusted that the instructor would uphold our mission when running the track by sparking curiosity in students and pushing them to build creative and

meaningful projects. He worked to create a fun, supportive, and collaborative environment for students so the placement contest would not be the focus for the participants.

At the event, the Humanitarian Technology Track had the smallest attendance but the highest retention rate. At the beginning of the event, there were six or seven teams and, at the end of the event, five teams had stayed. I think that a large portion of why people stayed in this track was because of the way it was designed. The instructor cultivated intrinsic motivation in the students. Whenever I talked with them, they all seemed excited and motivated to build their projects, and it seemed the extrinsic reward of competition was less important. All the participants in this track were in a large classroom, so they all got to know the other groups and attended the workshops with the instructor together, building a community within the hackathon. I saw some of the students sharing supplies with each other and helping each other with simple problems. At some point in the hackathon, someone had written a list of git commands on the whiteboard, providing a shared resource for everyone in that track.⁹ The participants also seemed to build a casual sense of camaraderie and were supportive of each others' projects. When I visited the Humanitarian Track room, the students were excited to show off their projects, but would also talk about how cool the other teams' projects were as well. In the post-event feedback survey one student wrote, "this type of atmosphere felt more comfortable than a traditional hackathon, as it was less competitive and allowed people to collaborate and ask each other for help more." The students may have not thought of the other teams as competitors, but as other community members who were participating in an event together, creating a less threatening environment for the participants.

The projects that the students created in the Humanitarian Technology Track were also phenomenal. For example, the winner of the placement contest, the Autonoponics team, created a prototype of an automated aquaponics water filtration system. This system had a "fish tank" where the fish waste was filtered through the rock and gravel at the bottom of the tank, then the water was pumped into a "growth tank" where it was used to water plants or grow food; the left picture

⁹ Git is a common software used to share code between collaborators, users often have to use coding commands to upload, share, and download code. Git can be challenging for beginners to use with ease, so a list of step-by-step commands is an incredibly helpful resource.

in Figure 4.7 [10] shows what this completed project looks like. The team resourced used materials from the event—such as old soda cans, the insulated coffee cups, and the old catering boxes, items that can be seen in the left picture of Figure 4.7—to create their project. Other teams created projects that helped track women’s menstruation cycles to help predict ovulation and a communication system that was intended to be used in emergencies when cellular communication wasn’t an option. These projects were creative and worked on difficult topics. The projects produced by this track, as well as the nature of the track, are similar to the Empowering Women contest from the second year. The design of the Empowering Women contest and the Humanitarian Technology Track gave students a starting point and broad themes they could build projects from, but still allowed for project freedom.

Photos of the "Autonoponics" Project

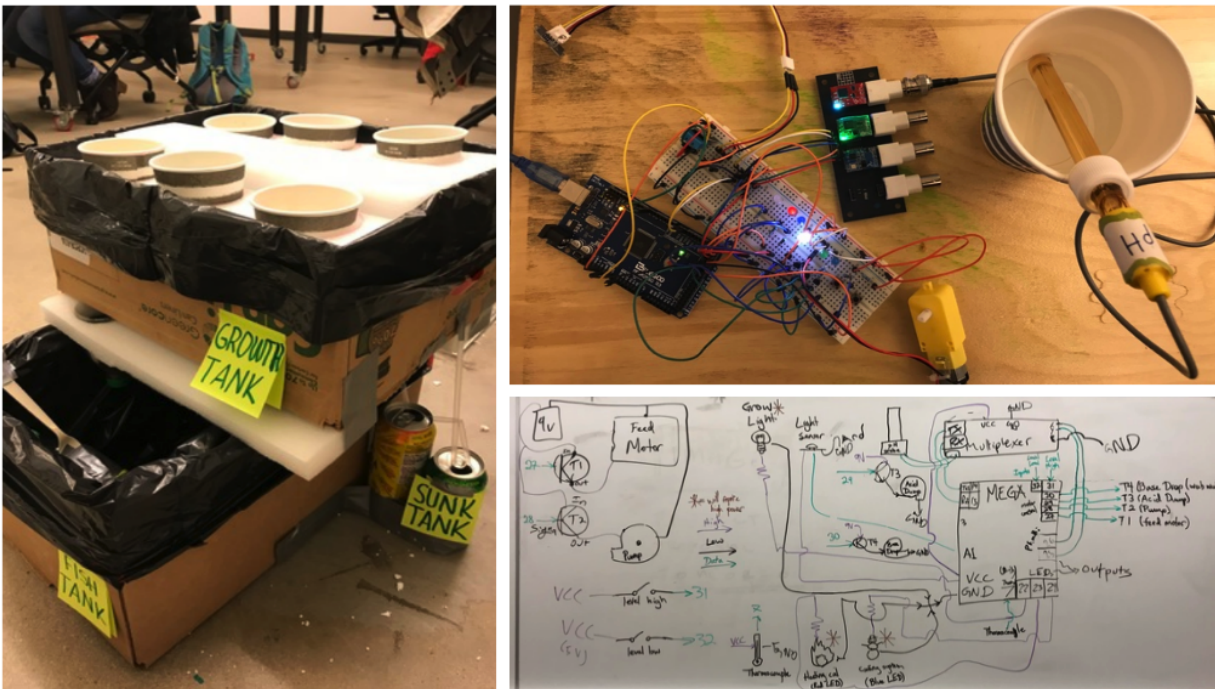


Figure 4.7: The Autonoponics project submitted to the Humanitarian Technology Track. (www.devpost.com/software/autonoponics)

At the end of the event, during demos, I spoke with the five teams who were presenting their

projects. One team I spoke with were all beginner students, they told me that the website they built for their project was the first one any of them had ever created. One student seemed a little disappointed that they were not able to build an advanced project like the Autonoponics team did, but another team member spoke up and said that they were still proud of the project they built, especially because they were just beginners. Another team member also said that the Autonoponics project turned out so well was because the team put a lot of hard work into building the project, staying up all night working on it and going through multiple prototypes before they settling on their final design. This team was talking about their competitors with respect and admiration. This was interesting to see because the placement contest they were in was, essentially, an unfair competition since the competitors were on such different skill levels. This imbalance between groups could have the potential to produce identity threat in the participants. The reaction from the disappointed student might indicate identity threat, but the other two students may not have felt as threatened. They acknowledged the effort of the other competitors and were still proud of the project they created. Overall, I would say the Humanitarian Technology Track was an astounding success in terms of quality of projects created, retention in the track, and positive communal environment created

4.4 Conclusion

The different types of contests we held at T9Hacks throughout the first three years were diverse in the themes, prerequisite technical knowledge, and expectations from the students, and they each produced different amounts of identity threat among the participants. I've broadly categorized the elements of these contests that contributed to producing identity threat. They are: a serious, narrow, or advanced technical nature of the contests, the valuable feel of the prizes, the competitive environment, and the extreme focus of competition at the event.

In our first year, though we intended to eliminate competition from T9Hacks, we had inadvertently allowed three sponsor contests to be held at the event. We created the Purple Prize contest, which the team forgot we were hosting, and we partnered with MLH. Though we were aware that

MLH provided different contests at their member-events, we never considered how our partnership with this sponsor conflicted with our goal of eliminating competition from the event. However, I think the sponsor contests turned out as well as they could have. The contests were fun and quirky, required minimal technical skill, did not restrict the students' projects, and gave away low-value prizes. Because the team was not aware we were hosting the contests until a few days before the event, there was also minimal marketing of the contests before and during the hackathon. These are all things that lowered the intimidation of the competition and could have lead to decreased identity threat.

In our second year, as the lead organizer, I re-evaluated the decision to eliminate competition from the event. The contests worked out well the previous year, and it was obvious that eliminating competition from a mainstream hackathon was more difficult than we anticipated. I was also growing concerned with how T9Hacks, as a women's hackathon, might be considered a weaker event because of our lack of competition; so I made an executive decision to add competition to T9Hacks. We had a series of fun, challenging, and serious contests this year. We employed strategies to lessen the competitive feel of the hackathon, such as not advertising the competitions on our website and marketing materials, and advertising the event as a learning and exploration opportunity. This was the first year we had contests that had more serious themes and were more potential to restrict to the projects that students could create. Still, the Empowering Women contest was widely more popular than the #HackHarassment Prize contest. The Empowering Women contest had a broad theme, focused on a positive issue, and allowed for project freedom, while the theme of the #HackHarassment Prize contest was narrow and difficult to work with and covered a theme that some students might find unpleasant or demoralizing. The issue-specific and negative focus of the #HackHarassment Prize could have been intimidating to students, which could have been more threatening than the uplifting and open Empowering Women contest.

In the third year, we added two placement contests that were hosted in two new tracks, the Cybersecurity Track and the Humanitarian Technology Track. The Cybersecurity Track was intended to be women and non-binary only, but a last minute change from the track's sponsor

to include men in the track could have created a more unpleasant environment for some of the women and non-binary students who were not expecting men to attend, and could have lead the men to face increased identity threat when they were losing to the female competitors. This could have contributed to the inappropriate behavior some of the men displayed towards the women in the track. The Cybersecurity Track's only focus was about winning the different contests that were held, contests were based on points the students accumulated in Project Mars which required a strong technical background to earn. Project Mars also included a leaderboard that allowed students to see where they ranked within the competition, which could have been demoralizing and could have intensified the contests. The track also was designed for the students to work alone and only allowed one opportunity to work on a team, which could have created an isolating feeling to the participants. All the design elements of this track could have created a more intensive competitive environment, which could have lead to increased identity threat.

On the other hand, the Humanitarian Technology Track provided students with possible project themes they could work on, many of which were personally impactful for the participants themselves. The track was lead by an instructor who worked to create a collaborative and communal feel, which in turn created positive experiences for the students. The instructor also worked as a mentor for the track and helped the teams create projects that were interesting and tailored to their skill levels, while simultaneously working to shift the focus of the track away from the end-of-event competition. All these elements of this track helped decrease the intensity of the competition in the track and could have lead to decreasing the identity threat to the students.

There were a lot of lessons learned while hosting the different types of contests through the three years, but I think this work can provide two salient and valuable contributions: First, it helps to broaden the hackathon literature's understanding of hackathon competition and, second, it can help inform inclusive practices at other student hackathons. The current hackathon literature discusses competition at the events as a rather monolithic entity. Research has discussed why students might be motivated to attend hackathons [64, 202, 251], how the presence of contests can produce competitive environments [69, 202], and the perceptions of a hackathon atmosphere with

the presence of prizes [251]. However, there is a gap in the hackathon literature that discusses the different types of contests that can be held at a hackathon, the design of the contests, and how they can impact the students. This dissertation provides one insight into competition at a women's hackathon. I found that the contest's impact can vary based on things like the seriousness of the themes, required programming knowledge, project freedom, valuation of the prizes, and how focused the event was on the competition. The severity of these contests elements has the potential to produce identity threat (or lack thereof) in students, which may influence their attendance at the event or their behavior towards other participants. I've focused on analyzing competition from an identity threat theoretical lens, but I encourage other hackathon researchers to use other means and methods to discover how competition can affect students at hackathons.

Finally, the analysis of all the contests T9Hacks held in the first three years can provide valuable insight to other hackathon organizers who wish to create hackathons that are inclusive and welcoming to a variety of students. I found that "fun" contests that did not require much technical skill and allowed for complete project freedom were the most popular and can feel less intimidating for students. Contests that provided the students with a theme or focused on a topical issue were more successful than if the topic was broad or uplifting and allowed for project freedom. We also tried to lessen the intimidation factor of the competition by advertising the hackathon as a learning and project exploration opportunity for the participants, shifting the focus away from the competition. Creating collaborative environments where students could share materials and work on similar projects together could also lessen the feel of the competitive environment. These are elements that can be adopted at other women's hackathons and mainstream hackathon events. Competition, especially in co-ed environments, can produce a threatening environment for some participants, which may cause them to avoid attending (or attend and then leave) a hackathon, or act out against other participants. By lessening the severity of the competitive environment, students who otherwise might not have attended the event may choose to attend. I also do not want to promote the idea that all hackathons must adopt these suggestions; some events may want to create a competitive environment for their participants, and that is a choice the organizers need

to make for themselves.

“As a hackathon organizer, it is your job to design for the right kind of behavior”
– Jon Gottfried, co-founder of MLH [68]

Chapter 5

Structure

5.1 Introduction

The structure of an event is an important element of hackathon design. The structure of a mainstream hackathon usually follows the same format: registration and check-in, opening ceremonies, team formation, hacking time, demos and judging, then closing ceremonies [171]. The hacking time usually lasts 24 to 36 hours, but some events can last up to 48 hours [173]. During this time students are expected to brainstorm projects, divide up tasks and responsibilities among team members, and build their project until it is complete or time runs out. This open structure gives the participants the freedom to create project ideas and explore how they are going to build their projects; there is time for students to begin a project, realize their original idea was too complex or run into critical obstacles, start a new project, learn new software, and still finish a project in time for demos (if desired). This open structure is great for experienced hackers who know how to manage their time and guide themselves throughout the event, and experienced programmers, who can learn and immediately begin to use new software quickly. But for the first-time hackers and beginner programmers in attendance, the open-ended structure does not provide a clear roadmap or scaffolding to help them choose a project idea, plan the project, and learn the necessary skills to stay on track.

During the first year of T9Hacks, we advertised the hackathon to beginner programmers, visiting introductory computer science classes and computing classes for non-CS majors to recruit women for the event. However, at the hackathon we left the hacking time open and didn't provide

many resources for the students to learn new computing software, and we didn't provide many ways for the students to receive guidance on their projects. This led the team to change the way we structured the hacking time in our second year; with additional introductory workshops to help beginner students learn about different computing fields like web development and app development. But students criticized the self-paced style of these workshops as being less helpful. We also received feedback from the advanced students that they would have liked advanced workshops that catered to students at their skill level. In our third year, we hosted beginner and advanced workshops, as well as providing students specialized tracks that focused on building technology for social good and taught cybersecurity which were intended to give students more scaffolding and support for working in these areas.

This chapter describes the structural changes we made to the hacking time at T9Hacks throughout the first three years. I'll use the theoretical lens of the "visitor journey" [67] to help frame my discussion of the participants' expectations and the elements the T9Hacks team added to the event to appeal and support the participants at the event. I'll analyze the various "touch-points" [67]—the tangible elements of an event that the participants experience, such as mentors, workshops, and resources—that the T9Hacks team designed by discussing how accessible, relevant, and supportive they were for the participants.

5.2 Year One: Build Cool Shit

In year one, when we were advertising the hackathon, one of the most common questions we were asked by students was, "What kinds of projects do we create?" This was a difficult question because we hadn't held a hackathon before and we didn't know what kinds of projects students at T9Hacks would create. Only three of the seven organizers on our team had attended a hackathon before, one that appealed to more advanced students. We had seen really complex and interesting hacking projects, but we were also trying to build T9Hacks to be inclusive of beginners. We didn't want to tell our potential participants about these advanced projects in case they would feel intimidated by the projects or feel like the event was only for technically-skilled students. So, the

team kept telling the potential participants that they could build “anything they wanted” or build an idea they had for a while but never had the time to develop before. We were trying to avoid presenting any projects ideas to the students and potentially risk creating an image of the event that we didn’t want to promote. However, I’m not sure if this approach was the best; I talked to one student who said she was interested in attending the event, but when she learned that it was an open event without any focus, she became disinterested, telling me she thought “T9Hacks just wasn’t for her” as she wanted to attend a more domain-specific event. I brought this student’s feedback to the team and we began discussing adding a theme to the event.

We discussed at length whether a theme for the event would give students more direction for what to build at the hackathon. I’m using the term “theme” broadly here, as we did during our first year at T9Hacks; themes at hackathons can be domain-specific [23]—for example there are hackathons that focus on data science [2, 4, 5, 29, 117, 215], healthcare or biology [49, 121, 179, 185], or video games [64, 69]—or themes can be goal-oriented [23]—for example, there are hackathons that ask participants to create projects for social good [61, 139, 151, 197], expanding current scientific software [132, 243], or to create projects that are useless or “shit no one needs” [219, 79]. However, the prospect of adding a theme created a tension on our team between the organizers who wanted to keep the event open-ended and did not want to restrict the students and the organizers who thought this might help the students who were asking questions about what to create at the event. We compromised and created an optional theme for the event: “Helping the Community.” However, to appease the organizers who didn’t want a theme, we also didn’t advertise this theme on our website, social media, or marketing materials; we only mentioned this theme once, in our Resource Guide.

The Resource Guide was created to give some guidance to the participants who came to the event and didn’t know what to create. It was a document that listed resources, websites, and datasets that the participants could use to help them decide on a project. We also included external computing competitions that were happening—such as Go Code Colorado [37], Code for America [36], and OpenIDEO [188]—that were related to our theme and could give students project ideas

that they could develop during the hackathon and continue working on after the event. We printed the Resource Guide and set them out on the participant hacking tables. Unfortunately, I forgot to mention the Resource Guides in the opening ceremonies, so a lot of the students didn't know what the packet was. I talked with multiple teams and individuals during the event who wished that they had access to free datasets or knew about other competitive coding events that they could attend. When I asked them if they looked at the Resource Guide, I heard responses like "I didn't know what that was so I ignored it" or "we thought it was trash left by another team, so we threw it away" or "I only looked at the first page and didn't think it was relevant, I didn't realize there was more information on the back." So our goal of providing our participants with resources and a theme wasn't as successful as we intended.

We also realized that our intentions to provide our participants with project ideas and data did not help the students actually *build* their projects. The only type of support we provided them in their projects was providing mentors. A majority of the mentors were employees of the companies that sponsored us, plus a few mentors from non-sponsored companies, most of whom were Aileen's, T9Hacks' faculty advisor, former students interested in supporting the event. Mentors are extremely common at student hackathons and provide guidance to students and help answer technical questions they have [6, 171, 183]. Although we had around 15-20 mentors attending the event, they were not well utilized.

We ran into a number of issues with the way we introduced mentors. Teams would spend a few hours creating a project idea, so many of the mentors, who came before the start of opening ceremonies, were waiting around for a few hours before most participants had questions. Also, many of the mentors went home after dinner, which was when a lot of the students finally got deep into their projects, encountered problems and needed help. We also kept running into a problem with one particular mentor, who was a senior developer and was upset that a lot of the students were not building "efficient" projects. He was frustrated with the plans students came up with and the software they choose to work with, claiming that students were over-complicating their projects and were not selecting the best software. We also ran into difficulty in the ways we tried to match

mentors to students. The T9Hacks team was using Slack to communicate with the participants, so we set up a “Mentor Help” channel where we asked students to post about their problem so a mentor could see their question and come help them.¹ This method was not as effective as we hoped, very few students were posting their questions in the public channel and instead would try to seek out the mentors in-person to help. Many of the mentors were hanging out near the sponsor tables, which were placed in the hall outside of the hacking space. On three separate occasions, teams of students came to me and asked if there was anyone I knew who could help with a problem they were having on their project. I would ask if they posted their question on Slack and the answer was always no. One team told me they didn’t want to post on Slack, they would just figure out their problem themselves. Posting a question on a public forum, where everyone at the hackathon could see that a team was struggling could have been an intimidating prospect; they were publicly admitting that they didn’t know something and needed help. In our post-event feedback survey we had one student write, “we didn’t feel confident asking for help from the mentors or on the Slack channel, since everyone else seemed to have much, much more experience coding.” As discussed in Chapter 4, in a competitive environment, admitting a lack of technical knowledge is something that could have caused identity threat [101, 142] for the students, which may explain why so few students posted in the Mentor Help channel. This also meant that many of the mentors didn’t know which teams needed help and were at a loss of how to help them.

The most successful mentor relationships we saw were from the mentors who walked around the hacking space, talking to the students about what they were building and asking them if they needed help. We heard about 4 or 5 mentors who would sit and work with a team for a few hours, helping them refine their project idea, giving advice on what software to use, teaching them how to use the software, and coaching them through building the project. The teams who were able to work with a mentor for a few hours usually had well-scoped project ideas, with project goals that were attainable during the hackathon time period and were technically impressive. Unfortunately,

¹ Slack is an online messaging system that organizations can use for internal collaboration, communication, and sharing of documents. There are different “channels” or groups that can be created in an organization’s Slack that pertain to specific topics.

only a few mentors were able to collaborate with students in this way because students may have been building projects in a domain or with software that the mentors were unfamiliar with. This type of collaboration requires that mentors be patient and accepting of the team's project choices be effective teachers who are good at explaining new concepts and adapting to the students' needs. This in-depth and collaborative type of mentorship was a result of the amazing mentors we had at the hackathon who were eager and excited to help the students.

Still, not every student took advantage of the mentors (possibly because of the way we required them to reach out to the mentors in Slack). Several of the students I spoke with at the event had only taken one or two programming classes and were excited to attend the event to learn about a different field of computing, but without more support from mentors, these students were left without guidance to help them select and learn new software or scope their project ideas. I spoke with one team who was interested in learning about web development, but the four members of their team had only taken one programming class before, in a language that isn't often used to build websites. They had developed a program in that language and asked me how they could turn their code into a website, without realizing that web development required other languages. In our post-event feedback survey we had one person write, *"the marketing of the event as supportive for people with no experience hacking or coding, but then there was no organized support to tell people how the hackathon process works, or to help you brainstorm a feasible project, etc. My group ended up leaving because we were floundering...I just sort of felt like the event started and my teammates and I still had no idea what we were doing or how to use the resources available."* It was saddening to hear that this team of students had to leave the event because we didn't provide enough support for them to build projects.

Looking back, our strategy to provide a general theme and mentors for the event didn't help many of our participants develop project ideas or program their projects. Our general strategy was to create an event with 24 hours of hacking time, put all the students in one hacking room, and hope they figured it out themselves. Even the design the of the hacking space reflects the general "put everyone together and hope for the best" attitude we had that year; Figure 5.1 shows that the

hacking space looked like; a large room that only provided tables to work at and extension cords to power their laptops. We assumed that once the participants had a project idea, they would figure out a way to build it. We also assumed that the process was easy for the participants and they could accomplish a project within the time constraints of the hackathon. I began to realize this might be a problem roughly a week before the hackathon when Aileen told the team about a conversation she'd had. Someone asked her what a student would do at the hackathon if they don't know how to code. She responded that the student would just have to learn how to code then. In our last planning meeting, the team discussed that we probably should have had workshops or something to help the students who were complete beginner programmers, but at that point didn't have time to create one. In retrospect, it's embarrassing to look at the decisions we made that first year. We advertised the event as a place where beginner programmers could attend and learn how to code and our mission was to provide a space for students to explore computing, but we had no plan on how to make that happen. We could have added online tutorials to the Resource Guide. We could have hosted workshops. We could have facilitated matching mentors with students more. But we didn't do any of that, we didn't really have anything to support beginner students learn about computing.

Our focus on helping students create project ideas also implied that the project idea itself was most important. Looking back, I believe the team fell into a common hackathon mindset I like to call the "Build Cool Shit" mentality. When a team believes their hackathon participants should be there to Build Cool Shit, then producing projects becomes the focus of the event. The Build Cool Shit mentality also places a value on the types of projects that students create, where projects considered "cool" are successful (e.g. they use interesting or new software, they have unique solutions to problems, they are technologically impressive, etc.) and projects that are simpler or pragmatic can be considered mediocre (e.g. they use common or popular software, they create projects that are similar to other apps or programs, the projects are personally relevant, like a personal website, etc). The focus of the Build Cool Shit mentality is also on the product and not the process. This mentality only rewards interesting, and most importantly, completed projects.



Figure 5.1: This is a photo of the hacking space from the first year. Everyone was in a large basement room, building projects in the same space. Photo courtesy of MLH.

Completing a project at a hackathon is very difficult to do, given the time constraints of the event and the problems that might arise during development. At a project-focused hackathon, there is no reward for learning or for trying and failing. At a competitive event, where the teams and projects are supposed to be completed and technologically impressive, or at a problem-focused event, where the projects are intended to solve a problem and be used outside of the event, the Build Cool Shit mentality can be a useful way to motivate participants. However, the mission of T9Hacks was to create an environment where students could explore computing, something that was at odds with this mentality.

In year one, we encountered issues we never considered. In my opinion, the largest improvement that could have been made to the event was adding support for the participants to learn

and build projects. One participant wrote in a comment in the post-event feedback survey that summarizes this feeling well:

While the advertising said that you really didn't need any experience to participate, the reality was that there was very little onboarding for people who had never attended a hackathon before and/or hadn't coded much before. Maybe having some sort of pre-hackathon session for people with no experience would have been helpful to help frame expectations and provide more guidance.

Some of the most meaningful interactions we saw at the event were times when students learned and explored computing with the help of a mentor. Some of the experienced students were able to provide that support for themselves. They knew where to look online for resources or tutorials and knew how to manage a software project. For them, the open structure of the event fit their needs and wants. They were able to freely explore without constraint or having to adhere to a theme or guidelines for the event. However, over 60% of the participants were first-time hackathon participants and over 50% were freshmen or sophomores. The T9Hacks team needed a way to improve the event design to support our beginner participants. We tried thinking of the different types of participants that came to our event, specifically beginners who had no programming experience and beginners who might have taken one programming class before but wanted to learn other languages or software. We wanted to design additional opportunities for them to learn computing and help building their projects. This strategy we employed, thinking about the experiences of our different attendees, is also a strategy that scholars who study events use when designing their events.

5.3 Visitor Journeys

There were a number of ways we could have improved the structure of the event, particularly in how we supported beginner students. However, when analyzing the structure of the hackathon, I needed a framework that helped me understand how the different elements of an event might be impactful to the participants. I looked at the visitor journey framework [67] because it is centered in the experiences of the participants and creates a framework to understand the experiences of

the participants before, during, and after an event. The visitor journey framework also positions sponsors and stakeholders as resources that can be leveraged for participant experience creation [189]; which aligns with how mainstream hackathons and T9Hacks view sponsors: they are there to support and create a positive experience for the participants [68, 145, 143].

When someone visits an event, like a hackathon, they are embarking on a journey. This journey begins when the participant first hears about the event, continues throughout the event, and can continue after the event concludes. Scholars of event design refer to this as the “visitor journey.” For a hackathon participant, their visitor journey may begin when they first hear about the hackathon from an email list they are on or if they see a poster for the hackathon on a school bulletin board. Their visitor journey continues in the weeks leading up the event where they may receive emails from the hackathon organizers giving them more information about the hackathon, sending updates to the event schedule, asking to engage with their social media, or sending reminders for the event. At the event their visitor journey continues and is shaped by the event design. Things like registration and check-in, opening ceremonies, team formation, hacking time, demos and judging, and closing ceremonies are all points of contact that the event has with the participants that help form their overall experience of the event. The visitor journey then continues after the event where the hackathon organizers may send a post-event feedback survey or information about other upcoming hackathons. A participant then may choose to continue their journey by attending the next year’s hackathon or they may end their journey by ignoring the emails they receive from the event organizers and not attending the next hackathon.

The visitor journey also helps us understand the participants’ experiences with an event by breaking down their experience into “touchpoints,” which are the tangible elements or services that a participant encounters at an event [67, 189]. At a hackathon, these may be things like directions and signage to the event, check-in process, team formation, workshops, available hardware, networking opportunities, mentors, judges, catering, facilities, or hacking space. Figure 5.2 shows an adapted version of Gerritsen and van Olderen’s [67] conceptualization of the visitor journey from the visitor’s perspective; in the figure, the visitor journey moves through five phases starting

with the individual visitor and ending at the various event touchpoints. The visitor journey begins with the visitor and their “values and motives” (phase 1 and 2), which Gerritsen and van Olderen describe as a participant’s needs and desires, and motivations they have for attending an event. A participant may be motivated to attend an event because it can provide them with socialization, excitement, escapism, novelty, a learning opportunity, or a significant experience [67, 201, 246]. Participants also enter an event with certain expectations about how the event can benefit them, which can affect their behavior at or engagement with the event [201]. In the third phase, participants are exposed to the event design, which shapes the participant’s total experience. In the fourth phase, the visitor (hopefully) experiences multiple “meaningful moments.” Gerritsen and van Olderen describe meaningful moments as the positive, emotional, or intense experiences a participant has at an event; however, other event studies scholars argue that a moment does not need to be emotionally intense to be meaningful; any moment can become meaningful if the participants are given the materials and resources to create their own experiences [190, 203]. The fifth phase describes the various touchpoints, or participant-event encounters [189], that are involved with creating meaningful moments for a visitor. The touchpoints a visitor finds important depends on their individual visitor journey.

Designing an event that creates meaningful moments, or positive experiences, for the participants requires a two-pronged approach: The event organizers must understand their participants’ needs, motivations, and expectations for the event, as well as understanding what touchpoints are the most impactful and important to the participants. The visitor journey framework can provide a tool to analyze the experiences of the T9Hacks participants and understanding which touchpoints were the most effective at providing support to the participants, particularly as they relate to the participant’s project development and their goals of learning and exploring computing at the hackathon.

In the beginning of this chapter, I described the structure (or lack thereof) of the hacking time at T9Hacks in our first year. Using the visitor journey framework, I would claim that this year had very few touchpoints for the participants to engage with. We provided the students with

Visitor Journey, From the Visitor to the Touchpoints

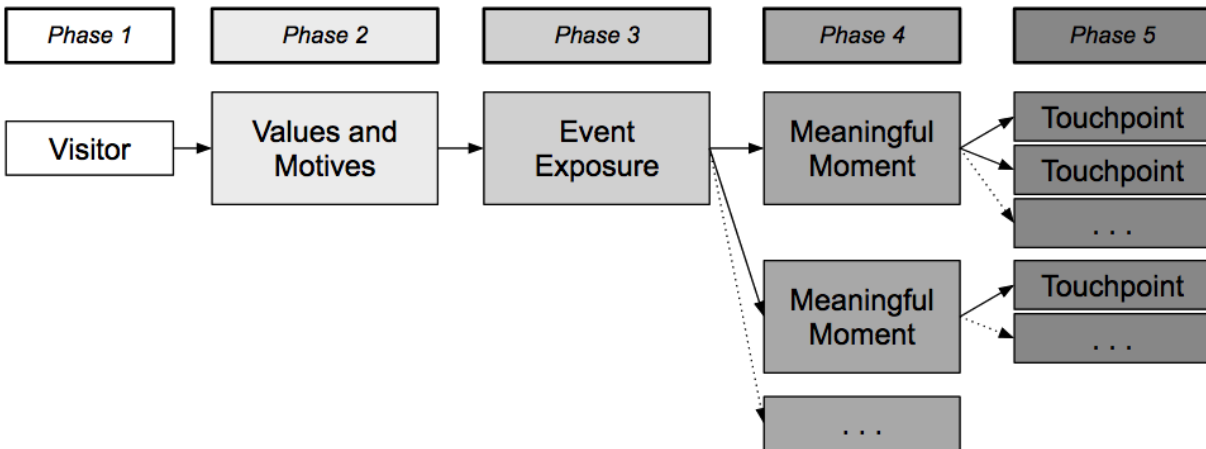


Figure 5.2: Visitor Journey, From the Visitor to the Touchpoints

a Resource Guide to help with project idea generation, which largely appeared to be underused, and mentors to help the students with their projects, which we had mixed success with. These two touchpoints were not enough to adequately create a hacking experience that assisted the students in building their projects or provided learning opportunities for beginner students. In the second year, we took these lessons learned from the first year and created new touchpoints for the students.

5.4 Year Two: Finally, Some Workshops

When we began planning the second year, building in workshops and other types of support for beginner programmers was an important touchpoint we wanted to add. Unfortunately, for a majority of the planning period this year, we only had three people on our organizing team: Aileen, another grad student who was graduating that semester and busy with his thesis project, and me, who was also busy preparing to take my Preliminary Exam. The team was spread thin, and everybody on the team had a lot of responsibilities with limited availability. We spent a majority of our planning time on the logistical tasks of finding sponsors and advertising the event to students, two things that were critical to the event's operation and success. By the time the team was able

to dedicate to planning workshops and other event experiences for the participants, we were only a week or two away from the event. This left us very little time to plan, causing coordination problems with with instructors. We asked professors, graduate students, and other colleagues we knew if they could help host workshops, but due to our last-minute organizing, a lot of people had other plans or couldn't make it to the event. We spent one planning meeting brainstorming ideas for the types of workshops we wanted to host, but our choices were largely limited by instructor availability.

We created three workshops this second year: Intro to Web Development, Intro to App Development, and Intro to GitHub. We selected the topics for these workshops based on the feedback we received and our observations of the participants in the first year. Web development projects are extremely popular events at hackathons because they only require a laptop, have minimal software installation, and students can quickly begin developing. A majority of the projects created in the first year were web-based and I talked with a number of beginner students who were interested in learning web development, so this workshop seemed like an obvious choice for us. The app development workshop was selected because Aileen saw a number of teams in the first year who we wanted to build their first phone app, but were unsure how to begin. App development has a steep learning curve and it can be difficult to create a project from scratch without any guidance. It can also be restrictive, since all iOS apps must be created on a Mac computer, whereas Android apps can be developed on Mac and Windows. From the previous year, we knew that students were interested in building both iOS and Android apps, so we created a workshop that taught both. Finally, we wanted to host a GitHub workshop because of how difficult it was in the first year for students to share code between their team.² When I was cleaning up the Slack messages from the first year, I saw teams sharing code by copying and pasting hundreds of lines of code and messaging their teammates. Git is also incredibly popular in the tech industry and a useful skill to further develop after the hackathon. The workshops we created were intended to address some of

² Git is a common software used to share code between collaborators, users often have to use coding commands to upload, share, and download code. GitHub is a cloud-based system that programmers can use to publically store code.

the difficulties we saw students having in the first year. These struggles were points in their visitor journey where the event design was not meeting their needs and the three introductory workshops were intended to provide additional touchpoints to help students learn technical skills.

In our second year, we also did not effectively utilize our sponsors to help us host workshops. In the visitor journey framework, sponsors can be leveraged to create experiences for the participants, but this was something that the T9Hacks team didn't consider, we never thought to ask the sponsors if they wanted to host the beginner workshops. We did have one platinum (our highest sponsor tier) sponsor who hosted a "Resume Review" workshop, where students could bring their resumes to be critiqued by tech industry recruiters. This workshop was extremely popular, and when the track started there were around 20-30 students waiting to get their resumes reviewed. The Resume Review was also a professional development workshop, which was different from the technical, introductory workshops, something I think worked in our favor. Professional development workshops are common at student hackathons. Students tend to attend hackathons for the networking and connections it gives them with industry sponsors and the local tech community [5, 64, 171] and it isn't uncommon for students to attend hackathons and create projects that can be used to expand their resumes or project portfolios [5, 251]. So offering professional development workshops can be an impactful touchpoint for students who are looking for these types of opportunities.

In the two weeks before the event, we managed to add four additional touchpoints to T9Hacks; however, since we had created the workshops so late, we were unable to use them in our advertising or promote them before the hackathon. We began advertising the hackathon six weeks before the event, and at that time we were advertising ourselves as a beginner's hackathon, but were not able to give potential participants any information about how we were supporting beginners. One time, when I was advertising the hackathon in an introductory computing class, students asked me questions about how the hackathon was open to beginners. I said that we were hosting workshops and when the students asked what kind of workshops we would have, I couldn't answer them. I tried to play it cool and said that "we were still in the process of organizing the workshops, but

they were going to be awesome!” In reality, it was frustrating that I wasn’t able to provide more information to the students about the workshops. I do not remember what the student who asked me that question looked like, so I do not know if they ever attended T9Hacks or not. However, my non-committal response could have created an ambiguous image of the hackathon in their mind, which could have lead them to chose not to attend.

The late planning of the workshops also caused logistical problems for the app development workshop. App development requires special software to be installed on the participants’ laptops, which can take upwards of 2 or 3 hours to install. Since the workshops were not finalized until a few days before the event, there wasn’t much time to inform the students of the software requirements for this workshop and about half of the students in the App Development workshop came without the required software installed on their computers. This meant that several students were trying to download and install the software at the workshops, overloading the wifi network with large files and further stalling this process. Aileen was the instructor for this workshop and she noticed that quite a few students spent their entire time in the workshop just trying to install the software.

Though the workshops could have created informative touchpoints for the beginner students, we did not provide any additional touchpoints for the advanced students. I remember before the start of the Web Development Workshop, I spoke with a team who were interested in attending the workshop because their planned on building a website and they wanted to learn more web programming. I watched them leave their hacking table, along with about 10-15 other students in the hacking space, to go to the workshops. Ten minutes later, I saw the team return. Curious as to why they returned so early, I asked them about it. They said they all already knew basic web development and thought the workshop was a little more advanced. They said that they still wanted to learn more about web programming, but they didn’t want to spend two hours re-learning the basics again. They lamented that all of the workshops were for beginners and said they wanted to see more advanced workshops that covered more advanced topics. This feedback was a little surprising for me to hear, though in hindsight it was an obvious gap in the hackathon design. The mission of T9Hacks was to provide space for students to learn and explore computing, but in

this second year, we had only provided support for the beginner students to learn new software, we didn't provide any touchpoints that were learning opportunities for the experienced students. I had assumed, that since the experienced students fared better than the beginner students in the first year, that they didn't need any support, but really, the event should provide learning opportunities for all the students.

When we were planning the web and app development workshops, we were also concerned with catering to students of different skill levels. At the time, Aileen and I were teaching programming classes at our university and this was a topic we were continually discussing. How did we meet the needs of students who self-proclaimed to be “not computer people” and had never written a line of code at the same time as students whose major was computing related, like computer science? Our solution was to format the workshops as a self-guided activity, with instructors and mentors available to answer questions. We found online tutorials that students could follow at their own pace and learn the basics. In the workshops, the students sat and worked alone, occasionally asking questions (see Figure 5.3 [230] for a picture of a workshop). Evaluations showed that students did not like this format.

Evaluation comments about the workshops fell into four areas: (1) over half the students who responded said they did not like the self-paced structure and would have preferred a lecture-style or follow-me style workshop; (2) students asked us to stagger the workshops rather than running them concurrently, so they attend all of them; (3) students complained about the slow wifi and how long it took to download and install the software; and (4) one person said “It was fun!” (So, shoutout to that one person who had a good time! I don't know why they had a fun time, but it was nice to hear that at least one person enjoyed themselves when it was clear that the rest of the survey respondents had a difficult time in the workshops.) The main takeaway from this feedback survey was that students were interested in the workshops, but we needed to do a better job preparing and planning for them. The next year we could stagger the workshops, a concern that I didn't realize was a problem for the participants and was happy to learn about. We could easily change the format of the workshops to have more structure (i.e. lecture-style). We could also



Figure 5.3: Web development workshop. Students were focused and following online tutorials. (www.t9hacks.org/spring2018)

better inform and prepare the students for the software requirements of app development. Though it was frustrating to learn that the workshops were not as successful for some participants as we wanted, it was helpful to learn about the specific point where we could improve and create a better experience for participants. We incorporated this feedback into the next year’s workshops.

5.5 Year Three: Adding Thematic Tracks

In our third year, we separated the hacking into three tracks: Creative Technology, Cybersecurity, and Humanitarian Technology. The first track, Creative Technology, was open-ended and allowed for any and all types of projects. This track had two professional development workshops—“Resume Review” and “Scholarships, Community, and Networking, Oh My!”—and five technical

workshops “Intro to Front-End Web Development,” “Intro to iOS Development,” “Intro to Git and GitHub,” “Advanced Web Development: ReactJS and Firebase,” and “Advanced Web Development: VueJS and Firebase.” Though the workshops were a part of this track, any student from any track was allowed to attend the workshops. The second track we hosted was the Cybersecurity Track; in Chapter 4, the chapter about competition, I discussed how T9Hacks formed a partnership with a cybersecurity sponsor that led us to create a specific track for them. In this track students played an online educational game, Project Mars, that was intended to teach them about cybersecurity. The final track was the Humanitarian Technology Track. I reached out to a colleague and graduate instructor in my department to help host this track. The instructor and I designed the track to appeal to students who were interested in building social good projects, something the team had observed that our participants liked doing in the first and second year.

This year we were able to leverage our sponsors and mentors to help us host two of the tracks and all of our workshops. Leveraging sponsors as a resource is something that scholars of event studies advocate for in the visitor journey [67, 189]. Using sponsors to engage with the participants of a hackathon is also something that MLH tries to push their hackathon organizers to do, because it builds sponsor relationships and gives the participants the opportunity to network and learn from industry professionals [5, 64, 171]. In the second year, I spoke with two mentors who had attended the event two years in a row and were interested in helping host workshops for the students. They said that instead of them helping teams individually, where they would often explain similar concepts or teach the same software to teams multiple times, they were open to hosting workshops the next year and teach students all at once. So, in the third year, we reached out to four mentors and asked them to host four of our workshops: Intro to Front-End Web Development, Intro to Git and GitHub, Intro to iOS Development, and Advanced Web Development: VueJS and Firebase. Two of the four mentors were also participants at T9Hacks in our first year, which was beneficial for the participants because they told me they were able to help the students scope and develop their project ideas to be something they could build in the timeframe of the hackathon. This provided a more supportive touchpoint for the participants.

In the third year, we wanted to build the professional development opportunities that we offered to students, because we saw the positive feedback about the one workshop we offered in the second year and students often attend hackathons to build their professional network [64, 5, 171]. All students, regardless of skill level or major, could attend and get use out of professional development. The workshops also give the students a break from the constant technical focus of building projects. The platinum sponsor who hosted the Resume Review workshop in the second year returned as a sponsor in the third year and was excited to host the workshop again. One of our organizers also reached out to a colleague who worked at the National Center for Women in IT (NCWIT) and seemed interested in connecting with T9Hacks. The colleague hosted an informational session about the work NCWIT does and what NCWIT has to offer collegiate women in computing through its Aspirations in Computing initiative [184], which offers access to scholarships, internships, and professional work, as well as other opportunities. These well-attended workshops generated positive comments from the students. In the post-event feedback forms, two students mentioned that the Resume Review workshop was their favorite workshop. We asked the students to score their overall satisfaction with the workshops and all the students who responded gave the two workshops the highest score possible.

In this third year, we also overhauled the style of the technical workshops. The self-paced style of the previous year's workshops was heavily critiqued, so we decided to change the format to be mini-project building workshops instead. We made the workshops 2 hours long, which we thought was enough time to cover a few topics and get into some detail, but not take up too much time from the event. Our goal was for students to walk away with a complete and functional mini-project that they could use to build a project off of, if they wanted. We wanted the workshops to be helpful for students and a tangible takeaway project was one of the ways we were trying to make that happen. That way, it could help them in the hackathon or give them a project they could return to after the event. All of the instructors liked this format and I think it made it easier for them to structure a workshop, since they had to walk students through building a small project and didn't have to worry about covering a comprehensive introduction to a topic.

Three of the workshops were similar to those held in the previous year. We wanted to keep these topics as workshops in year three because they were well attended and students expressed interest in them. The “Intro to Web Development” workshop’s name was changed to “Intro to Front-End Web Development” to be more descriptive of what the workshop was about. Since the workshops were going to be mini-project building, we had to break apart the Android and iOS app development, since they were using completely different development environments. We were only able to get one instructor to teach iOS app development and couldn’t get an instructor for Android development, so we ultimately only had a workshop for one development environment. Remembering problems with installing the software last year, we also made sure to clearly describe the software requirements for the workshop on the website before the event. This led to fewer students having problems with software at the beginning of the workshop. Finally, we also hosted another introduction to git and GitHub. This workshop was the only track that did not have a mini-project built in, because it was about learning how to use a piece of software, and this workshop went well—for Mac users. The instructor, who was a Mac user, didn’t know that Windows computers don’t have the same software automatically installed on them to use git. So during the workshop, I became an impromptu instructor for the Windows students and helped them install the correct software so they could get started. Despite some of the hiccups that these tracks had, I would say they were very successful. I saw students throughout the hackathon using the projects or software they learned in these workshops in their hackathon projects. I think they cover great topics that students are interested in learning about and can provide a great way for students to learn about these topics they may not have otherwise.

This second year we also added two advanced workshops, Advanced Web Development: ReactJS and Firebase and Advanced Web Development: VueJS and Firebase, to cater to the more experienced students. We were able to utilize our mentors and sponsors this year to host the two advanced workshops. This was a great way to help build connections between the students and the mentors and sponsors that attended the event, because they got to work closely with each other in these workshops. I also spoke with a number of students who said they were happy that we taught

these languages because they don't have the opportunity to learn this software in a classroom, so it was useful getting a quick introduction to new software and learn the basics, so that they can continue using it in the future. Similar to the introductory workshops, we also saw students building projects scaffolded from the mini-projects they built in these workshops. The workshops were also held one after another, so students could attend both if they wanted. Both workshops used taught one software framework that was used to build the website and a database API that was used to store data. The workshops, though unintentional, supported each other because they used the same database API, so students who attended both workshops were able to apply what they learned in the second workshop. I spoke with one participant who said she was excited to learn the two software frameworks because she was graduating in a year and wanted to start a career in web development and wanted to add additional frameworks and software skills to her resume. She told me that she was thinking about teaching herself one of these frameworks, but attending the workshops made it easier and quicker for her to understand and complexities and nuances of the frameworks which would have been difficult to teach herself.

Overall, the five technical and two professional development workshops provided the students with valuable touchpoints that addressed their goals of networking, building their resumes, learning new software, and supporting them develop their hackathon projects. On the feedback form, we asked students to rate their satisfaction with the workshops and only one student gave the workshops a negative rating. The other students had positive ratings for the workshops. The Cybersecurity and Humanitarian Technology Tracks had a very different structures, however, and their workshops and educational experiences they provided to the students were more integrated within the design of the track.

As described in Chapter 4, we ran into a number of problems with the Cybersecurity Track, including the sponsor changing the track last minute to allow men when the track was supposed to be women and non-binary only, there were few team-based activities, and there was a strong focus on competition. This track had one informational session workshop at the beginning of the track. This workshop was held at the beginning of the hackathon, concurrently with the Humanitarian

Technology introductory workshop, and a Creative Technology introductory workshop. During the hackathon, I spoke with three separate participants who were all frustrated that the introductory workshops for the Cybersecurity Humanitarian Technology Track were held simultaneously. One participant had entered the Humanitarian Technology Track, gone to that workshop, but was soon interested in learning about cybersecurity, but was disappointed to learn that she missed the introductory workshop and had a difficult time learning how to use Project Mars. This was similar to the feedback we received in the second year, because this meant that the participants had to choose which workshop they wanted to see more and miss a workshop they were also interested in, all at the beginning of the event when they might not know what projects they wanted to create yet. However, these were not the only problems we encountered with the Cybersecurity Track. As we learned throughout the event, the design of this track was not conducive to the type of hackathon environment we were trying to create and did not provide touchpoints for beginner students, especially, to have positive visitor journeys.

The biggest problem we ran into with the Cybersecurity Track was with Project Mars. The design of the game itself had a number of problems: it frequently disconnected from the game server, it often froze and lost a student's progress, it only allowed two options for gender, and its help guides were filled with typos and mistakes. However, by far the biggest challenge with Project Mars was that it was really built for *cybersecurity* beginners who were knowledgeable of computing, not beginner *programmers*. Project Mars was described to me as an online educational game where someone who knew nothing about cybersecurity could learn, but, as I would learn from the participants in this track, Project Mars was built with the underlying assumption that a student had a strong computer science background. For example, a "number conversion" mini-game asked students to convert numbers from decimal numbers to hexadecimal or binary, Figure 5.4 [230] shows an image of this mini-game.³ This is a challenging task for experienced programmers and

³ In computer science there are multiple ways to store data in "numerical" form. Decimal is the base-10 numbering we use in everyday life; numbers go from 0 to 9 and to represent larger numbers we use 0-9 in the tens and hundreds (etc.) places. The number "123" is written as a combination of the numbers "1", "2", and "3" that are written in a specific order, the "3" is in the first column that means "3" ones, "2" is in the second column that means tens of ones, or 20, and in the third column "1" means 1 hundreds ones, or 100. Hexadecimal is a base-16 numbering system

is not something that most people can do in their heads, but is even more difficult for students who don't even know what these terms mean. Making matters worse, when students looked up the information in the help guide, they were given incorrect information.

Unfortunately, a majority of the T9Hacks participants and a large number of students in that track were beginner programmers and had a lot of difficulty with the advanced system. I remember talking with one student, a woman who had attended T9Hacks all three years, who demonstrated to me how difficult one of the mini-games was. It was a Jeopardy-style quiz game, where students had a limited amount of time to select an answer to a technical question. But the questions were so advanced, neither of us could answer them correctly. After one round, we only got three out of 20 questions right. We were shown which questions we got right and wrong, but after such a devastating round, it was difficult to review so many answers instead, the student and I tried to memorize the answers, just so we could earn her some points in the Project Mars. However, the mini-game randomized the 20 questions in the next round, so memorizing the answers wasn't as successful as we initially thought. We got eight out of 20 correct in the next round. The student told me that she had felt more confident attending the Cybersecurity Track because she had taken some advanced programming classes about networking and security and was excited to learn more, but felt that Project Mars didn't provide enough explanation about new concepts and it made her feel that she may not have learned enough in her classes to compete in the track. The mini-games that were designed to be teachable for beginners were nearly impossible to play. The T9Hacks team had explicitly advertised this track to beginners, but the software used in the track was essentially inaccessible and unusable for them.

Still, not every student had a negative experience in the Cybersecurity Track. There was a number of experienced students who enjoyed themselves playing Project Mars and stayed until the end of the hackathon. In the post-event feedback survey we received comments from some

that uses the numbers 0-9 then letters A-F to represent numbers, so the system has 16 symbols that can be used in the first column. The number "10" is written as "A" because it is one more than 9. In hexadecimal, number "123" is written as "7B" because there are "B" (11) ones and "7" sixteens of ones. Binary is a base-2 numbering system that only uses the digits 0 and 1 to represent numbers, so "3" is written as "10". In binary the number "123" is written as "1111011".



(a) A student playing the number conversion mini-game. (www.t9hacks.org/spring2018)



(b) Screenshot of the number conversion mini-game

Figure 5.4: Project Mars number conversion mini-game. This was all the students saw when they clicked to play the mini-game, there were no instructions or descriptions of the differences between decimal to binary or hexadecimal numbers.

participants that said things like, “the cyber security track was pretty fun” or “I’m happy I was introduced to cyber security and what it entails.” During the event, once I learned that Project Mars was meant for students with experience, I started asking the students who were remaining in the track how they felt about Project Mars. I spoke with one woman who had recently graduated from college and was interested in getting into the cybersecurity industry, but didn’t have the opportunity to take very many cybersecurity classes at her university. She said that Project Mars was challenging to play, but she was learning a lot and it gave her the confidence to continue pursuing a career in the field. I also spoke with another two students who were working together at the same table. The students were seniors in CS and were friends who attended the hackathon because they were interested in the Cybersecurity Track we were hosting this year. They were a little disappointed to learn that they couldn’t work together as a team for a majority of the hackathon since Project Mars was primarily an individual-based game; however, there was one team-based mission in the game where they were able to partner with each other. These two students would often attempt the same mini-games or missions at the same time, forming a friendly competition between the two of them to see how fast or how many points they could accumulate together. Project Mars was built for students like the ones in these examples, they were knowledgeable about computing and had some knowledge in cybersecurity. For them, Project Mars created educational and engaging touchpoint.

Though Project Mars itself had a number of mini-games or missions in it, the students in the Cybersecurity Track only had one option: to play Project Mars. This did not give them the same freedom or creativity that the other two tracks had. If a student couldn’t play the online game, they had no other options for working in this track. This inherent conflicts with the mission of T9Hacks and the type of hackathon we wanted to provide for our participants. The draw of a hackathon is the open nature of it and the ability for students to explore. A track that only gave them one option (and that was only accessible to a subset of participants) did not provide a valuable touchpoint for the students to connect with. It is common for students to attend hackathons to create projects that can be used to expand their resumes or project portfolios [5, 169, 175, 251]. Though this track

was informative for some students, it did not provide them with anything tangible to leave the event with. They did not have a project to take away, receive materials they could use after the event, or evidence of their time at the hackathon. Project Mars is a pay-to-play online game so any student interested in continuing to learn cybersecurity in the game would have to pay a monthly subscription. There was no record of what the students had accomplished after the event ended, something T9Hacks had tried to make sure students had from the other tracks.

The design of Project Mars also became a point of frustration for many students because it was primarily an individual game with only one team-based mission. This was reminiscent of the Web Development and App Development workshops from the second year, where students were sitting in a room, working alone at a self-paced event for 24 hours. This structure (with the exception of one activity) was designed for working in isolation, not collaboration. A hackathon is meant to be a collaborative and social activity. Every year in our post-event surveys students have commented about how they are glad they attended the hackathon with their friends, hackathon research has also shown that friendship, teamwork, and collaboration are some of the top motivations for attending a hackathon [5, 183, 251]. Above, I discussed two separate instances where I talked with participants who had attended the hackathon with their friends and were disappointed that they could not work in a group together in this track. The structure of this track did not provide an effective touchpoint to address these participants needs or desires for attending the event.

Though the T9Hacks team was unaware of the visitor journey framework at the time, we were essentially trying to create a visitor journey for the participants of the Cybersecurity Track by creating a structured and all-inclusive experience for the students. This track was meant to provide an easy path for beginner students to learn about cybersecurity in a fun way and creating a community of other beginner students who were all playing Project Mars together. However, Project Mars was only accessible to advanced students, and even then, had very few opportunities for teamwork and did not give students tangible projects to leave the hackathon with. In the end, about 75% of the students left the track (or the hackathon). The track started with about 50 students and only 10-15 were left at the end of the event. After discussing this track in a

series of post-event debrief meetings, we recognized that this track failed to meet our participants' expectations and provided negative experiences for a lot of them. So, the team decided to send an email to the participants of the track, apologizing for the design of the track and use of Project Mars. Both in form and structure, the Cybersecurity Track was different from the other two tracks, which, in itself, wasn't a bad idea. However, the changes this track made to the hackathon structure did not provide the correct type of touchpoints to meet the participants' needs, the Humanitarian Technology Track; however, was much more successful at doing this.

The Humanitarian Technology Track was created because I had seen a number of students in the past two years who seemed interested in creating social good type projects, so a dedicated track that was focused on creating these types of projects and teaching them how to design a project for impact seemed like it was a good fit. I reached out to a colleague and graduate instructor in my department who helped me organize and host this track. The instructor did research in global development and was enthusiastic about teaching students about developing technology projects for social good. This track was discussed in Chapter 4, where it was discussed that the design of the track lead to a supportive community of participants, and though there was a placement competition, the track was not overly competitive and many students were intrinsically motivated to build their projects to solve a problem that was relevant or appealing to them.

This track provided students a theme to work with. The instructor also encouraged students to pick project ideas from the D-Prize (www.d-prize.org) website. The D-Prize is a global competition that is intended to get developers and entrepreneurs to build projects that increase access to technology-based solutions to social problems. The D-Prize website has six areas of focus: girl's education, agriculture, energy, global health, education, and governance and infrastructure. Each area has multiple problem briefs within in it that describe a specific social problem and the challenges with making a solution accessible or distributable to those who need it. The students in the Humanitarian Technology Track were using these problem briefs as a starting point where they could continue to develop their projects. About half of the teams created projects that addressed the D-Prize problem briefs and the other half of the teams took inspiration from the D-Prize briefs,

but created unique project ideas. Formatting the track in this was very successful in giving the students some guidance, but allowed for project freedom at the same time. The format of this track is reminiscent of the attempts the team made in the first year to provide project ideas to the participants, as well as the #HackHarrasement Prize from the second year. In the first year, our problem was that we were not able to follow-through with any of the project ideas and did not provide structure to help the students *build* these projects, something the Humanitarian Technology Track fixed. The second year, the #HackHarrasement Prize was too specific and judged students on their solution to a very large social problem. The D-Prize competition was about the *distribution* of solutions, not creating a solution. Many of the teams in this track were creating projects about problems that already had solutions and were working to improve the efficiency, effectiveness, or accessibility of the solution. With this track format, the students still had the freedom to create the projects they wanted with room to be creative.

There was one introductory workshop for the Humanitarian Technology Track, which was hosted by the instructor. The Humanitarian Technology workshop was adapted from another workshop he had hosted at a global development conference, a workshop that had positive reviews from its attendees and covered a lot of the same topics that were relevant to the students building their hackathon projects. The workshop was two hours long and covered topics like the design cycle, project management, different user-centered design methods, and how to prototype. In the workshop, the instructor worked with the students prototyping an example project, so they could get hands-on experience using these methods before they worked on developing their projects. This workshop did have one drawback, though, and it was the same drawback mentioned in the Cybersecurity introductory workshop, which was that it was held concurrently as other workshops. This made it difficult for students who started the hackathon in another track but wished to switch into this one. The Humanitarian Technology workshop was hosted at the same time as the Intro to Front End Web Development workshop, something that a lot of the students in this track wanted to attend. This was unfortunate because a number of students who were in this track were also beginner programmers and wanted to build websites for their projects and were unable to attend

both workshops.

After the workshop, the instructor let the students in the track form teams based on their interests and skills levels. Some students attended the track with pre-formed teams that they stayed in, but it is common to find students who want to join a team or groups who are looking for additional team members at a hackathon. By giving the students in the track some time to get to know each other during the workshop phase, they were able to get a better idea about who they wanted to work with and what kind of project they wanted to create. This also led to the students in the track learning more about each other's projects and building a community within the track. Students in the Humanitarian Technology Track were sharing resources and helping each other with their projects. I spoke with one team who was learning web development for the first time. When I asked them how their project was doing, they told me of a time when they had run into a problem and didn't know how to fix it, but asked a student from another team for help. The other student was able to quickly fix the team's problem and get them back on track. The community this track created facilitated positive and supportive interactions between the students and created a valuable touchpoint for the students.

The instructor continued to work closely with the teams, helping them develop their project ideas and scope the project development into something that the team was able to complete within the span of the hackathon. The instructor then stayed on as a mentor, helping and guiding the teams with their projects throughout the event. The instructor was a big part of why the Humanitarian Technology Track was successful, not only because he was incredibly supportive and helpful to the participants, but he was the lead host for this track and a constant presence in the track room. This track was the smallest of the three tracks and all of the students were working in the same classroom together throughout the event. Having one person be available for a majority of the hackathon, constantly available to the participants, created a consistent and reassuring environment. The instructor was familiar with every team's project in that track, which was only beneficial to the participants. In the first year, we learned the benefits of having one mentor work with a team and which was how the instructor was working with the students in the Humanitarian Technology

Track. Having one dedicated mentor per team allows them to know the project more intimately and give students help and advice that a mentor who only knows the project casually wouldn't. With a dedicated mentor, students do not have to re-explain their project every time someone comes to help them; they know what ideas the students have tried in the past, they know the trajectory of the project, and know what skill level the students are at, all things that provide a better mentoring experience and touchpoint for the students.

5.6 Conclusion

Throughout the first three years of T9Hacks, we worked to improve the design of the hackathon so that it was fit our participant's needs and goals for attending the event. In the first year, we didn't provide many touchpoints for the participants to connect with to help them build projects. The beginner students were especially lost, since they had trouble teaching themselves the necessary software to build their projects and scoping a project that was capable of being created within the time frame of a hackathon. In the second year, we added workshops to the event, one professional development and three technical workshops. The professional development workshop was a success, but the other three workshops had issues informing the students of the software requirements which lead to students not being able to work in the workshop. These workshops were also structured to be self-paced and concurrent with each other, which was criticized by the participants. Though we provided additional touchpoints for the beginner students to learn about computing, there were no touchpoints for the advanced students. In the third year, we improved the workshops by staggering them out, structuring them to be mini-project building workshops, and adding advanced workshops for the experienced students. These workshops created valuable touchpoints that addressed the students' goals of networking, building their resumes, learning new software, and supporting them develop their hackathon projects. In the third year, we also added tracks, to varying success. The Cybersecurity Track provided the advanced students with a fun learning experience, but was inaccessible for the beginner students. This track also didn't provide an opportunity for the students to collaborate or have a tangible project. On the other hand, the

Humanitarian Technology Track created a collaborative community for the participants and offered them open themes to develop project ideas. The instructor who hosted this track also helped students fostered project ideas that were accessible for their skill level and achievable within the time frame of the hackathon.

Though this chapter discussed the various changes the T9Hacks made to our hackathon, the process we went through is one that can be mimicked by other student hackathon organizers. In the first year of the hackathon, the T9Hacks team was not focused on providing tangible services to the participants that could help them with project development, create community, or build their professional development. In the second year we added touchpoints that helped support these goals, but in the third year, we iterated on the designs and created a more structured event that was able to provide services that created a more positive visitor journey for our participants. Our focus was on creating impactful and educational services for our participants that matched with their motivations for attending the event. A lot of the structural changes we made to the hackathon was trying to provide more support for beginner students. If other hackathons want to build a broader participant audience, they need to be aware of how their participants may perceive the environment and provide touchpoints to their events that fulfill their participants' needs.

Chapter 6

Conclusion

Hackathons seem the antithesis of what we want to promote about computer science. On the one hand, they emphasize the Geek stereotype (it’s all about caffeine and who needs showers?), so they don’t help to attract the students who aren’t interested in being labeled “geeky.” On the other hand, it’s completely against the idea of designing and engineering software. “Sure, you can do something important by working for 36 hours straight with no sleep or design! That’s how good software ought to be written!” It’s not good when facing the public (thinking about the Geek image) or when facing industry and academia.

So why try to make them “female-friendly”?

– Mark Guzdial [74]

Hackathons are strange events; they take hundreds of students who are interested in computer science, put them into a room for 24 hours, and tell them to build something. Hackathons embody many unwelcoming stereotypes of computer science and perpetuate perceptions of CS which the field is trying to move away from. They personify the very reasons women, non-binary students, and students of color have shown tendencies to leave the CS field. The quote from Guzdial at the beginning of this chapter poses an interesting question: why try to change these events? I agree with his position; hackathons can promote a geeky image of CS [204, 250], which is often associated with white and male programmers [45, 71]; hackathons are competitive environments [69], which can create a hostile, discouraging, and intimidating environment for their participants [68, 251] and create an competitive image of CS [202]; hackathons do not promote healthy work habits and ask their participants to build software in uncomfortable conditions [12, 251]; hackathons are only accessible to students who can afford to spend their entire weekend coding and are unwelcoming

to students with jobs, personal obligations, health concerns, or a wealth of other situations that may not allow them to attend [251]. So why try to change hackathons when the very structure of hackathons create unwelcoming and exclusive environments for students?

The answer, I think, is that student hackathons are only growing in number and becoming increasingly popular in the computing field [235]. According to MLH, in the 2015-2016 school year, 65,000 students attended over 200 member-event hackathons[168] and two years later, in the 2017-2018 school year, that number grew to 71,000 students attending over 500+ MLH hackathons and hacker meetups [177]. As an advocate for women and non-binary representation in computing, I cannot change this trend; instead, I have tried to work within the constraints of the mainstream hackathon model to change the elements of a hackathon that can be changed. This autoethnography discusses the design of T9Hacks, a women and non-binary hackathon, in regards to its branding, design of competition, and structures that supported our participants. This conclusion begins with a brief summary of the three analysis chapters: Chapter 3 discusses the name of the event, the graphic design, and the labels and the ideologies and values associated with those choices; Chapter 4 discusses how the nature, value of prizes, and framing of the contests were impactful to students; Chapter 5 discusses how the professional development and technical resources we provided to the students satisfied their personal goals for attending the event. I then discuss how the design of T9Hacks can be used to inform hackathon scholarship and the design of student hackathons, before moving on to discussing the limitations and future of this work.

6.1 Summary of Work

Chapter 3 discussed the design choices the T9Hacks team made for three branding elements: the name of the event, the graphic design, and the labels for the event. We discovered that each branding decision had a series of ideologies and values associated with it. These ideologies had implications in the way our participants perceived the event and who chose to attend the event. The name “T9” in T9Hacks stands for “Title IX,” which represents our mission to increase the representation of women and non-binary people in computing, and the alpha-numeric shortened

name alludes to the technological focus of the event. We initially wanted to avoid the stereotypical color of pink for our graphic design, and chose purple instead, but we eventually began using pink in the graphic design as a way to reclaim the color from its negative stereotypes. The label for the event went through multiple changes, but eventually we settled on “women and non-binary hackathon” because it had the greatest impact on our participants and was the most effective way to recruit our target participants.

Chapter 4 discussed the design of the competitive elements of T9Hacks. In our first year, though we were adamant about eliminating competition from T9Hacks, we had inadvertently allowed three sponsor contests to be held at the event. We created the Purple Prize contest, which the team forgot we were hosting, and we partnered with MLH who provided a league contest and three sponsor contests. The contests were fun and quirky, required minimal technical skill, did not restrict the students’ projects, and gave away low-value prizes, all things that may have lowered the competitive feel of the event and decreased intimidation. In our second year, we hosted a series of fun, challenging, and serious contests and employed marketing strategies to lessen the competitive feel of the hackathon. This was the first year we had contests with serious themes and project restrictions. The contest that had a broad theme, focused on a positive issue, and allowed for project freedom was more successful than the contest with a narrow, difficult, and unpleasant theme. In the third year, we added two placement contests for the new Cybersecurity and Humanitarian Technology Tracks. In the Cybersecurity Track, we ran into a number of issues, including the sponsor allowing men into the women and non-binary track last-minute, creating an overly competitive environment by focusing on winning the contests and displaying a public leaderboard, requiring a strong technical background, and creating an isolating work environment. All of the design elements of this track could have created a more intense and unpleasant competitive environment for the participants. On the other hand, the Humanitarian Technology Track created a collaborative and communal feel in the hacking space, helped students develop and create projects that were impactful for them and appropriate for their skill level, and shifted the focus of the event away from the competition. These elements helped decrease the intensity of the competition in the

track and created positive experiences for the students. The contests that did not require technical skill and allowed for complete project freedom were the most popular and could have been less intimidating for the students; while issue-based contests were the most successful when the issue was broad or uplifting and allowed for project freedom.

Chapter 5 discussed the structural elements of T9Hacks that provided tangible support for the participants' needs and goals for attending the hackathon. In the first year, we designed very few resources to help the students learn computing or develop project ideas; beginner students were particularly impacted because they had trouble teaching themselves the necessary software to build their projects and scope their projects. In the second year, we added workshops: one resume review workshop—which was successful in meeting some of the participants' professional development goals—and three technical workshops—which were criticized because they were self-paced, concurrent and had technical issues. These technical workshops were also introductory, and not technical workshops for the advanced students. In the third year, we improved the workshops by staggering them out, structuring them to be mini-project building workshops, and adding advanced workshops for the experienced students. In the third year, we also added two new tracks: the Cybersecurity Track and the Humanitarian Technology Track. The Cybersecurity Track provided the advanced students with a fun learning experience, but was inaccessible for the beginner students. This track also didn't provide an opportunity for the students to collaborate or have a tangible project. The Humanitarian Technology Track created a collaborative community for the participants and offered them open themes to develop project ideas. The instructor who hosted this track also helped students foster project ideas that were accessible for their skill level and achievable within the time frame of the hackathon. Throughout the three years, we learned that the hackathon was the most successful when there were structural elements to the event that satisfied our participants' goals of networking, creating projects for their resumes, learning new software in an environment that fits with their varying skill levels, and supporting them create and develop their hackathon projects.

6.2 Contributions, Recommendations, and Future Work

Though the bulk of this dissertation has been an autoethnography about the design decisions the T9Hacks team made for our event, this work can also be used to inform student hackathon scholarship and inclusive practice practices at student hackathons, as well as informing some of MLH's recommendations for hackathon organizers. T9Hacks was intended to be a reprieve space, a place that was different from traditional and normative computer science culture. However, the practices that were implemented at T9hacks were unique to our hackathon, they can be implemented at other student hackathons, but what I want to stress the textitprocess that the T9hacks went through in creating these choices. Designing our hackathon was an iterative process, we created T9Hacks by trial and error, finding the things that worked for our participants. My intent is not to give a list of design recommendations for other hackathons to follow, but to give a detailed view into the planning of one student hackathon and present findings from my autoethnographic analysis that can be used to inform a broader audience.

6.2.1 Student Hackathon Scholarship

This research makes several contributions to the scholarship on student hackathons. The hackathon literature primarily discusses the design of mainstream hackathons, whereas this work presents a detailed look at the design of a women and non-binary hackathon, a type of hackathon that is under-researched in the literature [129]. This work also provides discussions about three elements of the hack design that can be impactful for the participants. First, the branding discussion provides insight into how the name, color scheme, and labels of an event can create an image of the event, which may affect student participation. This work builds on work that prompts hackathon organizers to be cognizant of how the nature of the event name [60, 70] and the branding choices, like color scheme, [210] can create an image of the event in a participant's mind and influence their attendance. The branding choices of hackathons is not something that is often discussed in hackathon literature, but can be something that can have a large impact on the perceptions and

attitudes of the participants. I encourage hackathon researchers to study how these choices can affect participants, even before they attend an event. It is possible that women, women of color, non-binary students, students of color, and other underrepresented students are not attending hackathons because of the impressions these events have on them.

Next, this work expands the work on competition at student hackathons. The current hackathon literature discusses competition at the events as a rather monolithic entity. It asks why students might be motivated to attend hackathons [64, 202, 251], how the presence of contests can produce competitive environments [69, 202], and the perceptions of a hackathon atmosphere with the presence of prizes [251]. However, there is a gap in the hackathon literature that discusses the different types of contests that can be held at a hackathon, the design of the contests, and how they can impact the students. This dissertation provides one insight into the competition of a women's hackathon. I found that the contests can vary in things like the nature of the themes (e.g. fun or social good themes), necessary programming knowledge, project freedom, prize value, focus on winning the competition, and feel of the competitive environment. Contests that cover serious themes, require programming knowledge, and restrict projects may be threatening to some students, which may influence their choice to attend (or stay in) the event and/or their behavior towards other participants. I encourage other hackathon researchers to consider the different types of contests that are held at hackathons to continue this preliminary work in categorizing and defining the possible elements of competition. I also encourage researchers to consider how the different types of competition may affect marginalized or underrepresented students in computing.

Finally, this work adds to the literature about student motivation in attending hackathons. There has been work done researching the motivations for attending hackathons, which include things like teamwork, professional development and networking, building projects to put on resumes, and learning [23, 64, 183, 251]. This work uses these motivations and provides a discussion around the tangible services—such as mentors, workshops, or tracks—that can provide students with engaging and interactive ways to meet these goals. This work can be used to inform research about the activities that a hackathon can provide students to support the mission of the event and

to create the type of experiences the organizers want their participants to have [60, 62].

6.2.2 Inclusive Practices at Student Hackathons

This work can also serve to inform practices at students hackathons. As the lead organizer of T9Hacks for its first three years, I can vouch for the fact that a lot of our organizing was done spur of the moment and by trial-and-error. I was able to work closely with my team to improve the design of the event for three years, so time played an important element in allowing me room to continue to work to improve T9Hacks' design; however, there were a number of lessons learned that can be useful for organizers of not only women's hackathons, but mainstream hackathons as well. First, as discussed above, the branding of an event is very important and can influence potential participants' perceptions and expectations of the event, possibly leading them to avoid the event if they feel like they won't fit into the hackathon environment. At T9Hacks, since we were a women and non-binary hackathon, we chose to use feminine imagery to represent the event, and though mainstream hackathons may not want to adopt a completely feminine image, using demasculinized branding may create a more welcoming environment to a variety of participants. These can be things like removing the term "hackathon" from the name and labels, using "girly" or softer colors in the design, or promoting a non-computing obsessive image. In my experience, I've seen a lot of student hackathons that are organized by male computer science majors and though I do not know if this is representative of a majority of student hackathons, research had shown that events and spaces created by people in a dominant group tend to create environments that reflect their experiences with computing and may continue to ostracize marginalized non-dominant groups [65]. If hackathon organizers wish to diversify their participants, they should be aware of how other participants may interpret their event and how they can brand to be more inclusive.

Next, this work can be used to help inform how competition can impact participants, specifically how women and non-binary students may feel threatened by traditional means of competition. I found that fun contests that did not require technical skill and allowed for complete project freedom were the most popular and could have been less intimidating for the students. Contests that

provided the students with a theme or focused on a topical issue were the most successful than if the topic was broad or uplifting and allowed for project freedom. We also tried to lessen the intimidation factor of the competition by advertising the hackathon as a learning and project exploration opportunity for the participants, shifting the focus away from the competition. Creating collaborative environments where students could share materials and work on similar projects together could also lessen the feel of the competitive environment. These are elements to our hackathon that can be adopted at other women's hackathons and mainstream hackathon events. Competition, especially in co-ed environments, can produce a threatening environment for some participants, which may cause them to avoid attending (or attend and then leave) a hackathon or act out against other participants. By lessening the severity of the competitive environment, students who otherwise might not have attended the event may choose to attend. I also do not want to promote the idea that all hackathons must create less severe competitive events; organizers should be free to create the type of event they want, even if that is an intensely competitive event. However, they should also be aware of how an overly competitive event may create an unwelcoming or uncomfortable environment for some participants, precluding them from attending.

Finally, this work can inform the design of hackathons to be accessible for beginner students. At T9Hacks we found that beginner programmers and students with no programming experience had a difficult time learning programming on their own, creating project ideas, and building hackathon projects. Creating workshops, contests, tracks, or hacking spaces that cater specifically to beginners can provide the support and structure that these students need to be successful at a hackathon. After reviewing the design of T9Hacks and the feedback from our participants, I would advocate for creating an all-inclusive beginner track for inexperienced programmers. This track could have workshops covering different topics of computing (e.g. web development, game development, data science, etc.) that can provide a broad introduction to computing. The beginner track could have dedicated mentors that can work with a team to develop and scope a project idea and help them set up their development environments (e.g. install software, code editors, etc.) and help them create a skeleton structure of a project they can work use to continue building their

projects. Host this track in a dedicated room or space so that the beginner students can build community with other students who are at their same skill level. Finally, the beginner track could host multiple beginner contests that award effort and knowledge gained. Though, during my time as lead organizer, I did not get the opportunity to implement a beginner track like this at T9Hacks, the success of our other dedicated tracks in our third year present a strong case that a with a dedicated scaffolded structure can create a supportive and educational experience for the beginner students.

6.2.3 Major League Hacking

In T9Hacks' fourth year, we lost MLH as a partner. Beginning in the fall of 2018, MLH increased their minimum event size requirements, so events must have at least 200 participants to be considered for membership. This was disappointing for the new lead organizer of T9Hacks because MLH was such a huge supporter of the hackathon in our first three years and losing their partnership meant there were fewer resources for the participants. I was frustrated because I think a strength of T9Hacks has been the small and close-knit community it created. The mission of T9Hacks was, and continues to be, to create a welcoming and non-intimidating environment for women and non-binary students. I think the small hackathon environment is one of the elements of T9Hacks that helped us achieve this goal. This new participant requirement seems representative of a larger tension between the missions of MLH and T9Hacks. MLH is a public company and has shareholders to answer to. The organization cares about maximizing the number of students they reach. Partnering with a hackathon is a large cost to them (e.g. they fly a team member out to the event to help with its organizing, they provide hardware students can use during the event, they provide expensive prizes for the winners of the placement contests, etc.). I understand that they want to maximize the number of participants they can reach in one event. However, creating a large hackathon had never been a goal of T9Hacks. When the team first learned about this new policy, I wrote a response to the team that summarizes my thoughts about this new policy well:

That isn't what I expected either. I think this shows how the values of MLH and T9Hacks may be different.

In the past, we haven't planned on being the largest hackathon with the largest number of people. I thought that the hackathon last year was great! Especially since we saw so many great projects by so many first-time hackers and beginner programmers. Increasing the size of a hackathon makes a more intensive environment. Beginners might think a larger hackathon is more intimidating or less welcoming. A larger hackathon also introduces more people and variables we have to control for, which could turn-off women and non-binary hackers. T9Hacks is a beginner, women and non-binary hackathon, so I thought a smaller environment might be more inclusive and less stressful. We also hosted a lot of workshops that were informative and fun for many people. We did have some people who left after the workshops (and dinner) ended on the first night. That was still a great service we provided people. People have to work, they have exams, homework, other responsibilities, or they just wanted to go to the workshops. That was still one more person who was able to learn and explore with computing, who wasn't before. Reaching one person is still good, even if they leave early. We held T9Hacks so that people could learn about programming and build fun projects. And I think a lot of the participants last year had a great time and enjoyed themselves. Last year we only planned for 100 to attend and only expected 80 to show up based on our registration numbers. 136 people came. That was a great turnout and we should be proud of those numbers. It means we built a good event that people wanted to attend. We also got those numbers ourselves, with our own planning. And, of course, we can keep improving the event and even growing to be a larger event. We could have a goal of 150 participants this year. But we should make that choice because it is the right decision for T9Hacks and not to fill a quota for

MLH.

MLH has given us some suggestions in the past for increasing registration numbers, but I think those suggestions wouldn't work at CU or for T9Hacks. MLH thinks that other hackathons happening that same weekend might impact our participants and can make it difficult for us get a large number of participants at our hackathon. But in the past, 95% of our participants come from CU and 60-70% are first-time hackers, so our participants aren't affected by other hackathons happening out-of-state like hackers on the East Coast might be.

In the end, MLH really cares about reaching the most number of hackers. They want to partner with large events, maximizing their efforts. They are also invested in making sure hackers stay to the end because it maximizes hacker and sponsor contact and encourages hackers to compete for the sponsor prizes. It costs them a lot of money to send hardware and a Coach to a hackathon, especially with the large number of hackathons that are being hosted. However, I can empathize with MLH's position. They want to reach the largest number of hackers, but have limited resources, so they need to make some restrictions. They've always had member-requirements, which was why in the first year we changed T9Hacks to be a 24-hour hackathon with 100 people (our initial plan was 12-hours with 50 people). I wish MLH had membership tiers so that smaller hackathons could still be associated with them, even if we do not get the same amount of resources as full members. However, right now it looks like MLH has just grown too large for us.

Though I did not talk about the size of T9Hacks much in this dissertation, we had 90 participants in the first year, 110 in the second, and 135 in the third year. As discussed in Chapter 4, students may feel threatened face identity threat in competitive environments and in large group settings [20, 101, 142]. T9Hacks works as a small event, where it is possible to create collaborative

and community-based environments for the students. By requiring that hackathons have hundreds of participants, MLH is making it harder for like T9Hacks to be visible and active members of the larger hackathon community. I would reiterate the suggestions I made in the message to the T9Hacks team; MLH should think of additional ways that smaller events like T9Hacks can be community members at a lower cost to them as an organization.

6.3 Limitations

Autoethnography is a departure from traditional academic forms of research, writing, and presentation, and the validity, credibility, and rigor and are evaluated of an autoethnographic study are accessed through different methods than traditional research [43]. Autoethnography has been critiqued for being “lazy research” [46], narcissist and self-indulgent [158], and unsuitable for general audiences [43, 66]. Dashper [43], a critical event studies scholar who advocates for the use of autoethnography in event studies, provides five criteria to evaluate autoethnographic work that are more appropriate for its narrative form:

- (1) Evocation: the researcher must create a personal narrative that creates a sense of the personal and emotional meanings to the events, the narrative must also resonate with the reader to provoke an intellectual, empathetic, or personal response
- (2) Narrative flow and structure: the researcher must create an effective narrative that helps analyze the events in the autoethnography
- (3) Believability: the narrative needs to be credible and ring true and gives the impression of a lived experience
- (4) Ethical narratives: the researchers must demonstrate that they have been critical about their place and how they portray other persons and organizations in the narrative
- (5) Contribution: researchers must make sure their narratives contribute to wider social and cultural issues and create a richer understanding of event experiences and social life.

I chose autoethnography as my primary methodology for presenting my analysis of the design choices made at T9Hacks for our first three years because as the lead organizer of the hackathon, I had the deepest understanding of these design choices and how they could have impacted our participants. However, this study is limited by the one thing that also gives the study its strength, it

is a personal narrative of my observations and analysis of the three T9Hacks hackathons. Regarding the first three evaluative criteria that Dashper provides, I cannot predict if readers find my work evocative, structured, or believable. Ultimately, my dissertation committee provides this final judgement if my work fulfills these criteria. As for the fourth criteria, the ethical nature of the work, I have tried to obscure and anonymize the interactions I had with the participants, mentors, sponsors, and organizations; however, this work does suffer because I did not seek permission from the anonymous persons or organizations I discuss. This is because many of the participants I spoke with are unknown to me. I did not learn the names many of the participants at T9Hacks, (or if they did introduce themselves to me, I have forgotten their names), and I can only remember a few of their faces, so I would not be able to contact them to ask for their permission to include their stories in this autoethnography. Finally, the contributions this dissertation makes to student hackathon scholarship and the implications inclusive practices at student hackathons are limited by a number of items:

- *Personal recall*: As an autoethnography, this work is limited by my memory of the last three years. Though I have tried to mitigate this possibility by collecting artifacts and historical documents from the organizing process, I know that there was a lot that, as a team, we didn't record and I may have forgotten about. My memory of the hackathon participants is also limited because there is little documentation of their projects and experiences beyond post-event surveys, project submissions on the website, and pictures of the event.
- *Interactions with the participants*: My interactions with and observations of the participants were limited by time. During T9Hacks I was acting as the lead organizer and was running the event, which left little time for me to speak with all of the participants. Every year I made it a goal to speak with as many of the participants of the events as possible, but this still only represented, by my estimation, 20-30% of the participants of the events. I do not know if the participants I spoke with are representative of the larger population of T9Hacks.
- *Post-event feedback surveys*: There were few responses to the post-event surveys, averaging between a 15-25% response rate for each of the three years. Similar to the participant interaction point above, I do not know if the survey responses are representative of the larger population of T9Hacks.
- *University of Colorado Boulder (CU)*: T9Hacks was conducted at CU, a primarily white, wealthy, large research institution. The population of CU is not demographically representative of the US population, nor of other universities. It is possible that the demographics of CU and T9Hacks could have an impact on the participants and their reactions at the hackathon.

- *Tangible design decisions*: Though I cover the design decisions of T9Hacks in detail, I do not claim that other student hackathons, women-focused or mainstream, take these as suggestions to implement at their events. Instead, this study advocates that other hackathons go through the in-depth analysis of their choices to make sure that they evoke the correct kind of response, do not create a threatening competitive environment, and support the needs of their participants. Unfortunately, I do not suggest easy to implement design changes that hackathon organizers can make to their events to be more inclusive to a wider audience of participants. Hackathon organizers must decide for themselves what design elements appeal and support their hackers.
- *Positionality*: As mentioned in Chapter 2, my position as a lead organizer, my personal politics, and my background and demographics can and have influenced my perspective as a researcher. In Chapter 2 I discussed in more detail how my positionality affected my work.

6.4 Future of T9Hacks

In concluding this dissertation, I'm also examining the last four years of my life, from attending my first hackathon, to creating T9Hacks with Aileen, acting as the lead organizer for its first three years, and finally, stepping down as lead organizer in its fourth year and watching T9Hacks grow and flourish under amazing new leadership and an enthusiastic team of who are taking the event into exciting new directions. The fourth T9Hacks event was hosted just a few weeks before my dissertation defense and I needed to take time to write this document, so I chose not to take an active part in organizing the fourth event. This time, I attended T9Hacks as a volunteer and observer. I joked to the team that I was actually a participant at the hackathon and my project was writing my dissertation. The fourth year of T9Hacks was amazing. The new lead organizer designed a cool graphic that incorporated the "T9" logo in a tech-y way (shown in Figure 6.1). There were new contests being held, removing the unsuccessful ones from previous years and replacing the track-based placement contests with three "Best of" contests instead. There were new tracks, more professional development workshops, more technical workshops, and so many more things for the participants to connect with. I attended demos and spoke with a lot teams who said they had a positive and educational experience at the event. I was so proud to see the success of T9Hacks and I'm excited to see how it will continue to grow and change. Though I'm sad that my time with the team is coming to a close and I'm leaving the event that I've spent the last four years of my life

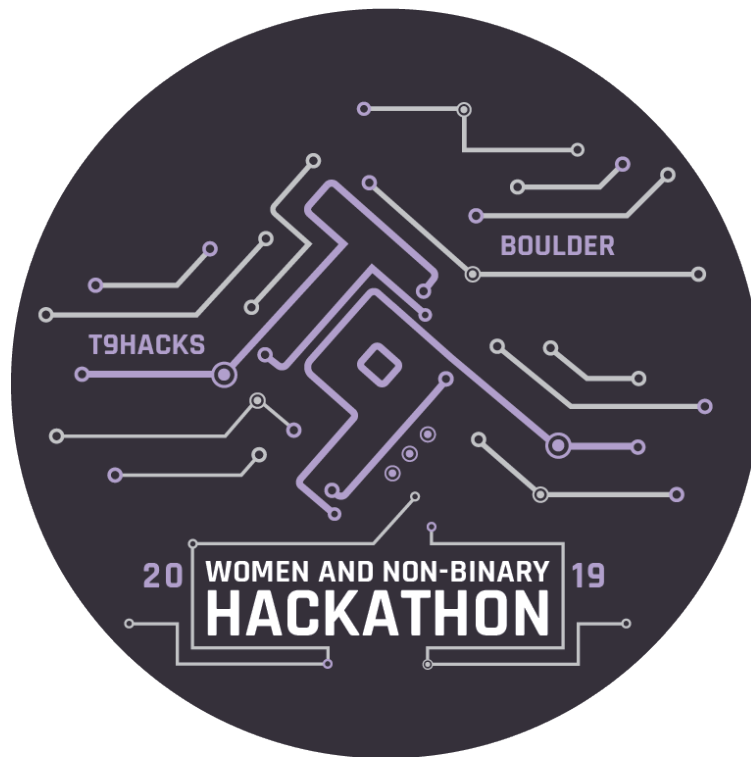


Figure 6.1: T9Hacks' logo in year four.

devoted to, I have absolutely no doubt that T9Hacks will continue to be a supportive and positive event for women and non-binary students in the years to come.

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Appendix A

Artifacts Collected

T9Hacks - Public Archives

- Website: 121 git commits [226, 228, 230]
- Social media: 196 posts [225, 231, 232, 234]
- Project submission website: 54 projects [224, 227, 229]
- News [19, 28, 108, 109, 110, 113, 118, 127, 128, 170, 242, 248]

T9Hacks - Private Archives

- Communications with the team: 2,102 emails, 763 private messages
- Post-event feedback surveys
- Google Drive: 119 documents, 789 photos
- Meeting Notes: 65 summaries

Major League Hacking (MLH) Documentation

- Hackathon Organizer Guide [171]
- Become a MLH Member Event [176]
- Member Event Guidelines [173]
- Community Values [165]
- The MLH Policies [174]
- A College Administrator's Guide to Hackathons [169]
- A Parent's Guide to Hackathons [175]
- About MLH [168]

- Frequently Asked Questions [159]
- Hackcon (Hackathon Organizer Conference) Presentations [161, 162, 164, 166, 172]

Student Hackathons

- AthenaHacks (www.athenahacks.com) [7, 8, 9]
- BitCamp (www.bit.camp) [15, 16]
- BrickHack (www.brickhack.io) [21]
- Diamond Hacks (www.ncsudiamondhacks.com) [51, 52]
- ElleHacks (www.ellehacks.com) [56, 57]
- Hack the Gap (www.hackthegap.com) [75, 76, 77]
- HackCU (www.hackcu.org) [80, 81, 82, 83]
- HackNYU (www.hacknyu.org) [93]
- HackHers (www.ruhackhers.org) [84, 85, 86, 87]
- HackHolyoke (www.hackholyoke.com) [88, 89, 90]
- HackMIT (www.hackmit.org) [91]
- HackNC (www.hacknc.com) [92]
- HackRU (www.hackru.org) [94]
- HackSC (www.hacksc.com) [98]
- MangoHacks (www.mangohacks.com) [146]
- McWiCS Hackathon (www.mewics.com) [152]
- MedHacks (www.medhacks.io) [154]
- MHacks [156]
- Pearl Hacks (www.pearlhacks.com) [95, 96, 97, 193]
- PennApps (www.pennapps.com) [115, 194]
- She Innovates (www.sheinnovates.us) [105, 106, 107]
- SuperPosition (www.superposition.tech) [220, 221]
- Fashion/Tech Hackathon (www.fashiontechhackathon.com) [78]
- Technica (www.gotechnica.org) [236, 237, 238, 239]
- TechTogether (formerly SheHacks) (www.boston.techtogether.io) [211, 212, 240]
- WHACK (www.wellesleyhacks.org) [253, 254, 255]

- WiCHacks (www.wichacks.io) [256, 257, 258, 259]
- WomxnHacks (www.womxnhacks.com) [263]