ACTIVIST TECHNICAL COMMUNICATION AT GIRLS' TECHNOLOGY CAMPS: BUILDING GIRLS' CONFIDENCE IN DIGITAL LITERACIES

by

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In honor of Dr. Sirkka Vuornos, my Grandma Grant, a STEM girl of the 1920s.

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ABSTRACT

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Title: Activist Technical Communication at Girls' Technology Camps: Building Girls' Confidence in Digital Literacies
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Activist Technical Communication at Girls' Technology Camps: Building Girls' Confidence in Digital Literacies presents a mixed-method empirical study investigating the capacity of a girls' summer technology camp, Girls Go Digital, to foster girls' confidence and interest in STEM subjects. I build on the work of a growing number of university technical communication and composition programs hosting local digital camps for middle school-aged girls, responding to the gap in STEM confidence that grows between boys and girls after middle school. My dissertation works in partnership with a large, national, for-profit version of these camps, and I utilize a community engagement approach. Though some may see the aims of a for-profit tech camp as incompatible with engagement ethics, I argue that we ought not to ignore the potential for community impact offered by their resources and reach. With a camp design targeted to reach girls who may feel discouraged by a mixed gender setting, a week of camp at Girls Go Digital leads to statistically significant positive impacts on girls' confidence in their technology skills, as well as attitudes relating to technology. These findings contribute not only to strategies for technofeminist interventions, but also to the growing body of technical communication scholarship with social justice aims. In order to build girls' confidence at camp, technical instruction is intertwined with instructors' roles as

emotionally supportive mentors for their campers. Complicating technical communication's prioritization of clarity and efficiency, my study suggests that for girls learning STEM subjects, and for many other disenfranchised audiences, truly effective technical communication must also be trust-building advocacy work.

CHAPTER 1. WHY GIRLS' TECH CAMPS?: FOUNDATIONS IN DIGITAL LITERACIES AND TECHNICAL COMMUNICATION

At the beginning of the week, Gabriela wanted to be the next Ariana Grande. We played into this aspiration during activities, creating a lip sync battle for Gabriela to give her best pop star performance. But during the week she also used pre-coding skills to create a computer game about frogs, helped by a 21-year-old computer science major nicknamed Hopper (for Grace Hopper, the computer science pioneer). At the end of the week, showing off her project to her parents, Gabriela said maybe she could see herself as a computer scientist if the Ariana Grande thing didn't work out.

This is Girls Go Digital, an all-girls technology summer camp created by a longstanding tech camp company, Kids Go Digital, that has struggled for years to increase its rate of attendance by girls. With encouragement from some prominent women in tech[1], the company began this line of girl-specific camps to help fight the still-dismal gender distribution in STEM fields. Only 28% of STEM jobs in the US are held by women, and only 18% of undergraduate computer science bachelors' degrees go to women (National Science Board, 2018). I had been working for Kids Go Digital as a summer gig throughout grad school, and when Girls Go Digital was announced, I jumped at the opportunity to run one of their first locations, and later, to partner with the company to study their impact on girls.

Girls Go Digital and other summer camps like it are responding to studies showing that girls start losing confidence in their STEM abilities around middle school,

[1] Advisors kept anonymous here to preserve the anonymity of the camp company.

and the gap between boys and girls widens through high school and college (Pajares, 2005). Discouragingly, girls' confidence in their technology abilities better predict their likelihood to pursue STEM interests than any objective measure of their skills (AAUW, 2010). As a result, building girls' confidence, more than their practical skills, becomes a critical target for growing the number of girls in STEM, as I'll demonstrate in detail in Chapter 2. This is what my study in partnership with Girls Go Digital focuses on--understanding the impact that camp has on building girls' confidence in their technology skills, and the factors that go into creating this impact. Though Girls Go Digital is part of a large, national, for-profit camp company, my partnership with them draws on community engagement principles as we collaborate with a shared drive for encouraging girls in STEM. Though some may see working with a for-profit company as antithetical to engagement ethics, I'll elaborate in Chapter 2 on why I see this work as a necessary tactic for sustaining the humanities within higher education, as well as an opportunity to make broad impacts using for-profits' resources.

When introducing my project, I often reflexively ask and answer the question, "So what does this have to do with research in English?" It's a fair question, as Girls Go Digital strives to send more girls and women into STEM fields, not the humanities. But rhetoric and composition has had a long history of examining the societal forces that influence our students' and all people's literate development, including technological/digital literacies. Since Brandt (1998) traced the ecologies that enable the sponsorship of differing literacies, and since Selfe (1999) warned of the hazards of ignoring differential technological access in our classrooms, rhetoric and composition has invested in promoting digital literacies, particularly for those who otherwise might not

access them. Technical communication, too, has long been interested in understanding the human factors that influence complex communication tasks, and recently the field has called for greater focus on the role that positionality, privilege, and power play in technical communication (Jones, Moore, & Walton, 2016). Such calls support projects like this one that examines the rhetorical strategies camp instructors use to fight the socialization of girls away from STEM interests by building their confidence at the same time as providing technical instruction.

I don't claim to be the first in rhetoric and composition or technical communication to work with girls' technology camps. In the last ten years, a number of university programs have begun creating their own local camps fostering girls' digital literacies, like the Digital Mirror Camp at Bowling Green State University and Louisville's Digital Media Academy. Almjeld and England have advocated for rhetoricians taking part in such projects as a form of praxis with technofeminist research and community outreach, driven by a "focus on mentorship, a commitment to interrogating gender via the lens of technology, and a belief that working in and with the community is the best way to take on that interrogation" (2015, "Our Story"). From their experience running the Digital Mirror Camp, Blair, Fredlund, Hauman, Hurford, Kastner, and Witte (2011) further offer principles grounded in technofeminism and composition for other girls' camps and similar outreach efforts to follow. Their principles provide a valuable basis for comparison against Girls Go Digital's methods in Chapter 3.

Before I begin building on others' tech camp work, in the remainder of this chapter I'll trace the foundations for working with girls technology camps through the literature on digital literacies and technical communication, in an effort to further bolster

its relevance to these fields, as even established scholars working with girls' technology camps still face sidelining as peripherally relevant. Next, in Chapter 2 I'll explore the courses of action available for intervening in girls' digital literacies before explaining my methods for the present study. I draw on technofeminist and community engagement methodologies, and have designed my study to investigate how effectively Girls Go Digital's camp design and practices are addressing factors that research shows to best predict girls' persistence in STEM fields. In Chapter 3, I'll unpack how Girls Go Digital is targeting girls' confidence and report the results of student and parent surveys that demonstrate what impacts camp is actually having. Chapter 4 aims to enrich understanding of student outcomes at camp by exploring instructors' perspectives on what is producing Girls Go Digital's results. I'll articulate instructors' tactics as a form of activist technical communication and argue for their relevance across the field as examples of trust-building tactics needed for technical communication with skeptical and disenfranchised audiences. Finally, following community engagement principles, I'll connect my findings back to revisions to be made at camp, future research efforts, and takeaways for other digital literacy interventions.

1.1 Foundations in Digital Literacies

A clear basis in rhetoric and composition's history for examining girls' literate development at these technology camps comes from Brandt's work tracking literacy sponsorship and case studies of how particular literacies develop. Beginning in the late 1990s, Brandt used individual literacy narratives to expose larger influencing economic and social forces that blocked or sponsored literacies. Her approach of identifying and interrogating literacy sponsorship is especially useful for making differences in

technological access more visible. For instance, in an early article on sponsorship, Brandt presents the cases of Raymond Branch and Dora Lopez, who were the same age growing up in the same town in the 80s but experienced dramatically different literacy and technology experiences (1998, p. 337). The son of a science professor, Branch learned about programming in his dad's lab, received his first computer from his parents at the age of 12, hung out in computer stores with rising tech founders, and ultimately earned a degree and career in software development. In contrast, Lopez's Mexican American parents worked in shipping at the university and at the local bookstore. Lopez taught herself to read and write in Spanish, found reading material at the bookstore, and eventually worked for a cleaning company, where she translated her English-speaking boss's directions to the Spanish-speaking staff. She began her college education at the same school as Branch, at which point she was gifted her first computer by her father, but she soon transferred to the nearby technical school. As Brandt demonstrates, "For Raymond Branch, a university town in the 1970s and 1980s provided an information-rich, resource-rich learning environment in which to pursue his literacy development, but for Dora Lopez, a female member of a culturally unsubsidized ethnic minority, the same town at the same time was information- and resource-poor" (p. 338). These narratives show that children's literacies may be influenced by their parents, but even more strongly they illustrate the large-scale economic forces driving literacy development, like the boom of new communication technologies in the 80s and 90s and the distribution of low-wage migrant workers into the service industry in the 90s. Differential access to high-value literacy sponsorships is afforded based on socioeconomic status and cultural capital.

Brandt's case study format could easily be duplicated to examine the forces behind and beneficiaries of Girls Go Digital. Technology summer camps have existed for 20+ years now, responding to that same technology boom that shaped Raymond Branch's development. The development of a girls' camp takes part in the popularization of feminist initiatives in the corporate world and especially in progressive tech startup circles, aiming to shift resources and cultural norms against gender disparities in STEM. But it isn't the Dora Lopezes that these camps most often serve. A week at Girls Go Digital costs in the range of $1000, which likely would have been out of the Lopezes' reach. We can learn from examining how literacy economies like technology camps are working today in order to identify who's being left out and how we might reach them.

Selfe and Hawisher extended Brandt's work with *Literate Lives in the Information Age,* with case studies delving deeper into the contexts of digital literacy development termed "cultural ecologies of literacy" (2004, p. 644). Selfe and Hawisher identify five key themes that emerge from their case studies. The first theme is that "Literacies have lifespans" (p. 644), by which they mean that particular literacies rise and fall in alignment with societal shifts, and multiple literacies can exist simultaneously, competing for dominance. There is some debate at the moment whether the dominance of computer science literacies, for example, have passed their peak. Silicon Valley employers lament that there is a growing talent shortage for highly skilled tech positions (Harvey Nash, 2019), which has sparked new initiatives to make programming a standard part of the curricula as early as elementary school (Department of Education, 2015). Technology camps capitalize on that projection. But others push back against claims of programming's continued growth, saying we're bound for oversaturation, automation,

and another tech bubble burst (Rushkoff, 2016; Young, 2017; Wang & Wittenstein, 2019).

Selfe and Hawisher's second theme of cultural ecologies is that "People can exert their own powerful agency in, around, and through digital literacies" (p. 644). In other words, they argue that though our contexts constrain our literate development, we may still have the ability to "push back" to a certain extent in order to carve our own literacy paths. This theme too connects to camps like Girls Go Digital, where students (or their parents) are taking active steps to rebel against the cultural forces discouraging girls from pursuing those interests. Third, Selfe and Hawisher find that "Schools are not the sole—and, often, not even the primary—gateways through which people gain access to and practice digital literacies" (p. 644). Brandt's case studies illustrated this extracurricular literacy development, as Branch and Lopez's contexts outside of school shaped their literacy pursuits much more clearly than anything done at school. Technology camps seem to exist in a space between school and independent development. Selfe and Hawisher's fourth theme finds, "The specific conditions of access have a substantial effect on people's acquisition and development of digital literacy" (p. 644). They point to three levels of forces that can shape literacy access: macrolevel societal shifts, medial level institutions to which you're connected, and microlevel individual contexts, which together create a full picture of influences that may shape a person's literacies. For Girls Go Digital campers, they're participating in the macrolevel rise of tech careers and the recent push for diversity in STEM. Girls Go Digital is itself a medial level institution providing STEM access for those who can afford it, but it's still microlevel individual circumstances—parent support, exposure to and interest in tech, location--that shape who

winds up at camp. Finally, Selfe and Hawisher find that "Families transmit literacy values and practices in multiple directions" (p. 644), so that while parents pass literacy values on to their children, children also influence each other's literacies and sponsor literacies, especially technological, back up to their parents. The relationship between child and parent literacies will show up in the Girls Go Digital study in the likelihood for campers to have parents in STEM fields.

Ultimately, literacy studies provide important context for rhetoric and composition's work. Case studies like Raymond Branch and Dora Lopez's help us discern patterns at the macro-, medial-, and micro-levels, which allow us to better understand and address students' literate needs and accessibility barriers. And though literacy ecologies do relate to our classrooms, I don't believe all literacy research must, as there is value, too, in seeking to better understand and advocate for literacies of all kinds.

Literacy case studies can also help remind us of the permeability of the boundaries we tend to draw between alphabetic and technological literacies; yet the development of both is shaped by the same types of forces and follows along similar processes. These similarities occur because as Ong (1986) tells us, fundamentally, writing itself is a technology. As Baron (1999) elaborates, computers (and mobile devices) are just the latest in a long line of communication technologies, each of which comes with new features and functions that can impact the nature of communication. So when speaking of digital literacies, which literacies are included, and what skills or knowledge does literacy entail? Following Ong and Baron, I take the view that technological literacies should not be separated in our studies from the alphabetic, as they exist along the same spectrum of development of new communication technologies. Therefore, I

view “digital literacy” as encompassing skills with any range of new communication technologies. However, as technologies become more complex, so does defining what being “literate” entails. As Selber (2004) classifies, holistic “digital literacy” must really entail multiple forms of literacy: functional literacy as a user of technology, critical literacy as a questioner of technology, and rhetorical literacy as a producer of technology (p. 25). Girls Go Digital certainly emphasizes functional literacies, as they help girls develop new skills in a variety of programs, with hopes that they will eventually become producers of technology, previewing rhetorical literacies with the small technology products girls create with their final projects. We could say that critical literacies are part of camp in the social discussions girls participate in about the nature of STEM fields, but it’s true that this is not a priority in quite the way it is for rhetoric and composition scholars.

As we interrogate boundaries for literacy studies in rhetoric and composition, we must also consider the responsibility for investigating the technologies themselves that are used for literacy. Because technologies shape the communication that takes place through them, as compositionists, we must consider the processes and implications of how technologies are developed. For instance, in “Politics of the Interface,” Selfe and Selfe (1994) identify how computer interfaces are implicated in perpetuating our cultural values and legacies of oppression: “Within the virtual space represented by these interfaces, and elsewhere within computer systems, the values of our culture—ideological, political, economic, educational—are mapped both implicitly and explicitly, constituting a complex set of material relations among culture, technology, and technology users” (p. 485). Selfe and Selfe illustrate this mapping of cultural values with

the metaphor of a "desktop" that we use to organize our digital world, a metaphor that encourages reinscribing capitalism and corporate culture with its folders, files, and documents. The "desktop" says, "this is a technology for work," and not the work of a woman in the home or a factory worker at a plant, but instead is work that takes place in a post-industrial office. Such cultural inscriptions shape cultural norms, and interrogating their production can open up possibilities for refuting their dominance.

Work with girls' technology camps can also contribute to the pursuit to understand forces shaping our socialized uses of and access to technologies. This work connects with rhetoric and composition's history of fostering digital literacies in our classrooms, momentum for which gained traction in the 90s as well. In her Chair's Address to the Conference on College Composition and Communication (1999), Selfe warned against the dangers of haphazard integration of technology in the classroom: "Computer-using teachers instruct students in how to use technology--but all too often, they neglect to teach students how to pay critical attention to the issues generated by technology use" (p. 1178). She identifies how technology can easily become incidental to teaching composition--instructors either use it or don't, but in either case it's not given adequate attention to appropriately align it with our interests in literacy. Selfe particularly emphasizes issues of access in serious need of attention, as "computers continue to be distributed differentially along the related axes of race and socioeconomic status" (p. 1171). Understanding different populations' relationships to technology can help us be more mindful in our incorporation in the classroom, as my study aims to contribute.

In 2004, Yancey proposed in her Conference on College Composition and Communication Chair's Address positioning the digital through a frame of public

rhetorics, arguing, “Our model of teaching composing, as generous, varied, and flexible as it is in terms of aims and as innovative as it is in terms of pedagogy--and it is all of these--(still) embodies the narrow and the singular in its emphasis on a primary and single human relationship: the writer in relation to the teacher” (p. 309). To break out of this limited arrangement of students writing only to teachers, Yancey identifies a variety of new concerns to pose to students about negotiating audience and medium choices rhetorically, expanding the realm of composition instruction to include diverse publics and technologies. Technology camps engage this public orientation toward technology literacies, and perhaps offer new teaching methods to consider. The digital divide has also evolved since the field’s initial attention to it, as Vie addressed in 2008, calling attention to the new reality that many students are now more technologically adept than their instructors, but they “lack critical technological literacy skills” (p. 10). Much like Selfe’s original warning to instructors about teaching technology, Vie points out that even though many students are now using technology, they aren’t very conscientious about how they’re doing so. Vie advocates bringing students’ favored technologies into the classroom to foster critical discussions about such issues as authorship and intellectual property, marketing and networked media. Critical discussions of gendered technology issues at Girls Go Digital offer another shade on this approach.

Selfe, Yancey, and Vie each advocate for the field to avoid becoming “anachronistic” (Yancey, p. 302) and irrelevant. Digital literacies, they argue, are increasingly learned and utilized exclusively outside classrooms, and writing teachers need to take part in the digitization of writing, developing our own methods of fostering critical digital literacies. Examining methods of technology instruction that occur outside

of composition classrooms can contribute to this effort, as can understanding the factors that influence these literacies like gendered socialization.

1.2 Social Justice in Technical Communication

Beyond the basic "how is this English?," I am also frequently asked what makes this research relevant to technical communication. It may be reasonable to trace rhetoric and composition's interest in digital literacies to promoting them at girls' camps, but promoting digital literacies is not inherently technical communication. Yet, Girls Go Digital's instructors *are* technical communicators, and their work in the camp environment requires specialized, even activist, methods in order to attend to girls' confidence in addition to building their technical skills. These methods are worthy of study for the field of technical communication, as I'll argue in time that they also hold relevant implications beyond their specific contexts.

Technical communication is a field with a complicated history of inclusion for projects with social justice aims. Jones, Moore, and Walton (2016) identify that in fact the field has always included work that investigates the human impact of technical communication practices, even emphasizing such focus in foundational movements like humanism and social construction. Yet, they observe that projects spotlighting the role that factors like race, class, and gender play in communication often remain at the margins of the field, never centrally integrated to the narrative of technical communication, their legitimacy and significance often questioned against the "purer" technical communication projects focusing on apolitical, universal problem-solving strategies. In the case of gender, White, Rumsey, and Amidon (2015) find that the number of articles addressing gender in business and technical communication journals

has actually decreased since 1989, and when it is addressed, it remains limited to the themes identified by previous meta-analyses (Thompson, 1999; Thompson & Smith, 2006), evolving very little in the past decade. Jones, Moore, and Walton call for technical communication "to unabashedly embrace social justice and inclusivity as part of its core (rather than marginal or optional) narrative" (2016, p. 212), which means welcoming projects that explicitly address how positionality, privilege, and power shape technical communication efforts. My study participates in this new effort by examining how gender shapes STEM education communication strategies.

Though they may not all be remembered as central to the field, other earlier feminist technical communication projects do provide grounding for my work. Miller's (1979) seminal critique of the positivist Western principles driving technical communication opened space for more humanist inquiries, as she cautioned against blind advocacy of apolitical clarity and objectivity. My partnership with Girls Go Digital certainly follows this rejection of apoliticism, as I take an openly supportive position towards the camp's activist aims (which I'll discuss further in Chapter 2). Gender studies was first named as a relevant lens for technical communication by Lay (1989, 1991, 1994) who proposed its use for critiquing objectivity, conducting workplace ethnographies, and promoting collaboration. In one of the first (and few) special issues on gender in technical communication journals, LaDuc and Goldrick-Jones (1994) emphasized the value of recognizing the positionality of speakers and audiences, as "looking through the lens of gender allows the writer-scholar-teacher to see how a number of communication practices can be oppressive" (p. 247). More recently Frost (2015) has advocated for "apparent feminism" as a methodology for responding to the

often hidden misogyny in professional spheres, exacerbated by today's political climate and necessitating ongoing work to make problematic assumptions visible and build coalitions to fight them. Following these methods, studies of particular gender issues in technical communication have highlighted the importance of social justice orientations toward technical communication, like Koerber's (2013) analysis of the gendered rhetorical lineage of the breastfeeding debate, Ingram and Parker's (2002) case studies of gendered collaboration in engineering, and Petit's (2001) examination of the rhetorical affordances and limitations of feminine identities in a public environmental debate. Projects like these expand the scope of our consideration of what "counts" as technical communication and the range of tools we have to work with when approaching a technical communication need. Though it has done so in fits and starts, feminist work in technical communication has highlighted important considerations for interrogating and upholding the ethics of the field.

As Jones, Moore, and Walton (2016) comment in the antenarrative they fashion about social justice themes in technical communication, gender "seems to repeatedly emerge only to be covered over again without having its due impact on the overall pattern of the tapestry" (p. 214). Addressing this obfuscation, Durack (1997) points to the "peculiar set of cultural blinders" (p. 250, referencing Cowan, 1983) that obscure the ways women have contributed to technical communication, based on how we have limited the field to dealing with technology, work, and workplaces. We assume these to be gender-neutral arenas, rather than contested territories which have excluded women from public participation and recognition throughout history. Including women's technical communication as relevant to the field requires questioning two assumptions:

> First, (the assumption of agency) that women are not significant originators of technical, scientific, or medical achievement; and second, (the assumption of technological significance) that women's tools are not sufficiently technical, nor their work sufficiently important, to warrant study of their supporting texts. (Durack, 1997, p. 251)

To be frank, I see questions about the relevance to the field of my research on the feminist technical communicators at STEM camps as trapped within this second assumption--that the specificity of women's technical communication methods are not worthy of study, because they departs from the "universal" methods of technical communication, which are by default male (and white).

An example of technical communication scholarship that hones in uniquely on women's strategies is Moore's (2017) article on black women technical communicators' public engagement methods. Their approach to dialogic communication with the public contrasts typical models of public engagement work as one-way processes of speaking *to* the public. Exemplifying black feminist theories of activism by which progress is made through small conversations and actions day-to-day, these women approached their public engagement plan for a transportation environmental impact study with an iterative dialogic approach committed to both speaking and listening, involving as many stakeholders as possible in the decision-making process. Based on this case, Moore offers strategies for all technical communicators to serve as participants, facilitators, or designers for public engagement projects. Anticipating her audience's skepticism of adopting black feminist methods, Moore includes an explicit disclaimer about her work's transferability:

> I want to be clear that anyone invested in positive change—not just Black women or Black feminists—can adopt the strategies enacted by the consultants in my study. But adopting a dialogic approach to public engagement requires a particular set of skills that technical communicators can nurture, invest in, and adopt. (p. 248)

This again highlights the struggle for inclusivity in the mainstream technical communication catalog--not only to value alternative methods, but to do the work necessary to actually adopt them, which in the case of Moore's study may require some reckoning by many technical communicators to newly build the skills long practiced by black feminist activists. I hope that my account of the instruction at girls' technology camps will add to the feminist and activist approaches to technical communication that can and should be incorporated into the regularly-practiced methods of the field.

I understand why my dissertation on girls' technology camps receives confusion for its inclusion as an English project. But despite being about promoting girls' interests in STEM, my study takes part in a rich history of literacy studies work to understand how certain literacies are promoted over others and for some groups over others. My study also responds to calls for technical communication projects that consider the role of race, class, and gender in how messages are conveyed, as Girls Go Digital instructors enact activist trust-building tactics in order to reach girls interested in STEM. Complicating traditional notions of effective technical communication as prioritizing clarity and efficiency, Girls Go Digital instructors demonstrate that for some audiences, building trust is equally important and intertwined with conveying technical information clearly. By investigating girls' confidence at camp, I hope to contribute new strategies for others

doing technofeminist digital literacy work, as well as offer a case study of one situation that demands creative techniques for technical communication. In the next chapter, I'll explain my methodological influences, review the literature on what's shown to influence girls in STEM, and elaborate on my methods for the design of the study.

CHAPTER 2: METHODS FOR TARGETING GIRLS' STEM CONFIDENCE

Despite increased attention and efforts toward growing the number of women and girls pursuing STEM careers, gender disparities persist. However, as with all buzzy topics these days, the "facts" about the situation depend on who's reporting them and how. For instance, the 2018 National Science Board report on science and engineering indicators holds that women have made up about half of college graduates in science and engineering since the 1990s. Upon closer inspection, this apparent victory is revealed to depend on longstanding high rates of women in psychology (77% women in 2015) and social sciences (54% women in 2015). Women graduated with just 20% of engineering degrees and 18% of computer science degrees in 2015, with computer science rates actually dropping from 28% in 2000. Researchers have used the metaphor of a "leaky pipeline" to describe the ways in which women interested in STEM drop out during the course of their degree or get hired at lower rates once they do graduate, despite even metrics on performance between men and women (Xie & Shauman 2003; Cech, Rubineau, Silbey, & Seron, 2011; Shauman, 2017; Hyde & Linn, 2006). Once in their careers, a recent study finds that 43% of women leave STEM after having their first child, compared to 23% of men (Cech & Blair-Loi, 2019). These findings suggest that social and cultural factors are at work contributing to inhospitable conditions in STEM fields for women, as well as for that 23% of men who find their workplace unaccommodating once their lives shift to build a family.

The policies, practices, and culture in STEM spaces are going to require a deep reckoning before gender parity can ever be achieved, and many researchers and activists

working on the infrastructural factors that need to change. My project draws on their lessons about what enables women who do persist in STEM to be able to do so, targeting interventions that can be made with girls before they reach the college and career squeeze. I want to be clear here that I am not dismissive of the barriers that absolutely must be addressed within STEM fields to stop pushing women out. Encouraging more girls to pursue STEM interests without also addressing misogynistic practices within colleges, workplaces, and even primary education can only continue the disparities and set girls up for future struggle. My study on building girls up at summer camps is only a small piece of the puzzle.

In the rest of this chapter, I introduce the technofeminist grounding for intervening in girls' STEM development, and for embracing an activist approach toward researching technofeminist interventions. As STEM diversity campaigns like Girls Go Digital are on the rise, I'll argue that humanities researchers have a role to play as collaborators on such efforts, as we have seen the dire consequences when technological development neglects the human. One approach for connecting with STEM projects is by expanding our consideration of community engagement projects to include opportunities for working with for-profit entities, like Girls Go Digital, while maintaining the ethical orientation of community engagement. Finally, I'll review the research on factors influencing girls' pursuit of STEM interests and the most promising approaches for intervention, before explaining my mixed methods for this study, designed to speak to both STEM and humanities audiences.

2.1 Technofeminist Grounding

To understand the stakes of the STEM gender gap, it's valuable to look to the history of gender and technology and its inscribed cultural values and biases. This legacy can help to point toward critical junctures for intervention toward more ethical technological development and use. Technofeminists offer analyses of how technology has historically been inscribed with masculinity to significant consequence. Longino (1992) theorizes that women have long been "the objects the technology, designed primarily by men, acts upon" (p. 203), pointing to the history of reproductive technologies that have subjected women to heteronormative cultural constructions of fertility, while also being prohibitively expensive for all but the most privileged women. In the 1990s, Haraway extensively examined how sociobiological theories have naturalized sexist models of interaction under the guise of "objectivity," as demonstrated by seminal studies of the animal body politic that supposedly confirm such findings as: "intragroup dominance by males was strongly correlated with sexual activity, and so presumably with evolutionary advantage" (p. 16). Haraway deconstructs how these "findings" truly only confirm the researchers' own assumptions about hierarchies of dominance, which they failed to test experimentally.

As Wajcman (2009) traces it, the development of feminist approaches to technology shifted over time from questions of the treatment of women by science to "examining the very processes by which technology is developed and used" (p. 4). She proposes the contemporary approach of technofeminism, highlighting the impact of women's exclusion from the development of technology, which mutually constructs and is constructed by cultural values of gender. Wajcman argues, "[G]ender power relations

will influence the process of technological change, which in turn configures gender relations. Women's systematic absence from the sites of observable conflict over the direction of technological developments is therefore as indicative of the mobilisation of gender interests as is the presence of other actors" (p. 7). Echoing back to Selfe and Selfe's analysis of the interface, Wajcman suggests that if technologies are inscribed with cultural values, in this case about gender, those values are also reproduced by the performance of the technology's gendered use. She thus concludes that women have been treated so poorly as objects of science and technology because they have largely been marginalized in their efforts to determine its development and use. In other words--"unless women are in the engine-rooms of technological production, we cannot get our hands on the levers of power" (2004, p. 111). Considering the abysmal rates at which women continue to hold STEM jobs, there is still need for greater balance in technological development.

In response to the problematic gendered history of technology, technofeminists propose intervention. Challenges to the masculinist dominance of technology have actually been developing alongside the history of the gendering of the digital technologies and literacies from the beginning. As we now know, women actually have been involved in technological developments in ways rarely highlighted by masculinist history, tracking back to Ada Lovelace's writing on early imaginations of a computer in the 19th century; to the team of women who worked on programming the ENIAC, one of the world's first electronic computers; to Grace Hopper, who invented the first programming language using words (Sydell). Certainly these contributions challenged male exclusivity in developing technologies during their times (and these are only the

most famous and remembered examples), and technofeminists continue to challenge the male dominance of historical tech narratives today. One example of technofeminist intervention during the early days of the internet took the form of a mailing list for women in computer science called Systers. Camp describes it in *Wired Women* in 1996: "Systers has given me comfort when I needed it, reminding me every day that I am not alone. The feeling is small but constant. As Systers has filtered into my being over time, it has become a tremendous positive force in my life....The very strength that Systers offers can make it a sanctuary on a hostile net" (p. 121). Though its visibility in changing the masculinist script of technological development may be small, this support network likely had a major technofeminist impact in following Wajcman's call to get more women involved in actually developing technology. The value of support networks in helping women persevere in hostile environments cannot be overstated. Similarly, Takayoshi, Huot, and Huot wrote about the rise of websites authored specifically by and for girls' at the end of the 1990s. Highlighting the two adolescent authors' experiences navigating gender issues, they articulate how girls' websites are claiming girls' presence online, challenging the narrative of male dominance. Takayoshi et al. also highlight the collaborative technofeminist methods behind writing the article, which "[underscore] the importance of listening to girls' voices as they articulate their experiences negotiating these technological spaces" (p. 91).

Recently, technofeminist interventions have more clearly begun revising the inscription of gender in digital platforms. One example I studied with my master's thesis is a network of intersectional feminist bloggers who are challenging the social media infrastructures that enable racism and sexism. For instance, it's common practice these

days--particularly among companies but socially as well--to delete social media posts that cause public offense. In response to too often finding themselves trying to engage in dialogue about offensive comments that had disappeared, intersectional feminist bloggers built new infrastructural processes and systems for saving anything at risk of disappearing. In a more popular vein, the social media site Pinterest has been characterized as prescribing a feminine gender script. Friz and Gehl (2016) examine how feminine roles are enacted particularly through the design of the site's sign-up interface, which "encourag[es] users to cooperate rather than to compete with each other, to curate content rather than to create it, and to interact affectively with images rather than with text" (p. 1). Friz and Gehl take issue with Pinterest's sign-up interface as deterministically disciplining users into a traditionally feminine gender script, but given the masculine gender scripts perpetuated by so many other technologies, the platform's inherent promotion of cooperation and validation of affect can still be considered a significant technofeminist success. It remains troubling that Pinterest's more feminine structure is used predominantly by women, but this again points toward the need for broader and deeper involvement of women in developing technologies beyond those specifically for female users.

2.2 Methodological Alignments: Applying Technofeminism, Speaking to STEM, and Engaging For-Profits

As a research methodology, technofeminism makes a valuable companion to rhetoric and composition's interests in just distribution of digital literacies and technical communication's interests in ethical user advocacy. Edwards and Gelms (2019) have recently formalized a technofeminist methodology to interrogate the rhetorics of

platforms following the tradition of Selfe and Selfe's work. Edwards and Gelms highlight the value of an intersectional technofeminist lens for investigating five factors produced by digital platforms: "social inequalities, labor, material infrastructures, networks of support and activism, and lived experiences" ("Tenets"). This approach holds potential not only for critiquing oppressive technologies, but also for advocating for technofeminist change. With digital literacies research, Blair has taken up technofeminist methods in ways that are sensitive to situating the macro, medial, and micro contexts that have impacted, and often marginalized, women's access to technology. She highlights technofeminism's emphasis on diverse voices and narratives, which aligns with feminist methodologies long valued by rhetoric and composition. Blair identifies goals for researchers adopting technofeminist methods:

> The questions ... technofeminist researchers, including those working in rhetoric and composition, must address are: (1) how and why women access technology in their daily lives, (2) what larger material constraints impact that access, and (3) what methods best enable opportunities for women to make their lived experiences with technology more visible. (2012, p. 65).

These questions take up the methods of investigating digital literacies utilized by Brandt, Hawisher, and Selfe, as well as aligning with efforts in technical communication to recover and advocate for feminist technical communication practices.

Blair's third question about opportunities for women also points toward her activist interests--she identifies technofeminism as suited to feminist methodological rejection of the presumption of neutrality in research. Instead, technofeminist methodologies recognize that researchers are often politically and personally invested in

the research, and rather than feigning a lack of bias, researchers must vigorously disclose their perspectives (Lather, 2001; Sullivan & Porter, 1997). While some may critique the possibility of sound research findings from such a position, I align with Haraway's (1992) holding that all research comes with the biased perspective of a researcher, which shapes how findings are portrayed. The difference is that feminist methods acknowledge this bias, constantly seeking to identify and disclose and counterbalance it, rather than try to ignore or cover it up. Further, technofeminism is ultimately interested in changing the status quo of the relationship between gender and technology, and technofeminist research embraces that end, seeking to improve the conditions of research participants and future technology users.

For my own study, I am an open advocate of Girls Go Digital's aim to intervene in the male dominance of STEM fields by encouraging young women to pursue their STEM interests. I am also personally involved--I directed one of the first Girls Go Digital camp locations, hosted over 700 campers as a manager for mixed gender Kids Go Digital camps, and worked part-time on Kids Go Digital's corporate team as a hiring manager. Rather than discard (or try to conceal) my expertise in how camp operates, I embrace the ways in which my situated position within Kids Go Digital has shaped my research, allowing me access to operational procedures, corporate debates, and firsthand experiences of camp, and I have intentionally deepened my relationship with the company toward becoming a collaborator for this study. My own experience with Kids Go Digital and Girls Go Digital is infused throughout the dissertation, for which I do not apologize or aim to hide. At the same time, I have tried to ensure that my empirical methods are rigorous so that my results can be trusted, and I have been conscientious

about reporting results both positive and disappointing, and particularly striving to identify areas where the results suggest room for Girls Go Digital's improvement.

In addition to adopting technofeminist research principles, I am directly picking up the lineage of Blair's work with girls' camps. As mentioned in Chapter 1, Blair has been an advocate of technofeminist intervention in middle school girls' technological literacy development through summer camps, and her questions for technofeminist research align with her camp work. From her experience bringing her activist orientation to action at the Digital Mirror Camp, Blair (2012) advises that technofeminist educational interventions need to go beyond simple skills development to "help participants develop a shared understanding of the role of technology in their own lives and articulate those experiences through digital composing processes" (p. 67). What Blair proposes here is a technofeminist rhetorical pedagogy and mentoring model that exemplifies the alignment of digital literacies research and technofeminist action to promote girls' pursuit of STEM interests. However, there is need for research to assess the impact of such interventions into girls' digital literacies. Are camps like Digital Mirror making a difference?

In designing a study to examine the impact of girls' technology camps, qualitative measures are important to capture the nuanced dynamics of feminist teaching and mentoring. But qualitative research alone will not speak strongly to STEM audiences. Incorporating quantitative methods can help validate technofeminist humanities work to STEM educators, while mixed methods can also introduce STEM readers to the richness of qualitative findings. Such research can also serve to begin forging alliances between STEM and technofeminist humanities researchers, which can bring not only scholarly value to enrich both fields, but also political benefits within the university. By working

with girls technology camps and joining in other STEM interventions with humanities motives, rhet/comp and tech comm scholars have an opportunity to position themselves as go-betweens for STEM and humanities interests, able to attend to the role of gender and other identity issues in technological development, as well as implementing rhetorical, ethical strategies for effecting change within STEM. Given English's tenuous position in the growing corporatism of higher education, alliances with STEM could be critical to our future. Some may see this as a pessimistic instrumentalization of our programs, but I believe that this kind of strategic adaptability is necessary for the sustainability of our programs. These tactics align with Johnson, Simmons, and Sullivan's (2018) model for lean technical communication programs, which advocates attunement to institutional priorities and creative rhetorical moves to tell a program's story publicly and secure funding for to preserve departmental autonomy.

Of course, collaborating with STEM may be easier said than done. In my own work, I have at times sought research partners in technical fields only to be ignored or disqualified as a non-STEM collaborator on a STEM-only grant. I still believe there are inroads to be made with intra-institutional STEM collaborations. but what I can model more readily myself as a route for STEM connections is working with an industry partner utilizing a community engagement approach. As I've mentioned, my dissertation is based on a partnership of convenience. As a summer employee for Kids Go Digital when Girls Go Digital was announced, I saw an opportunity to apply my technofeminist research interests with the potential for significant impact on both the camp itself and our knowledge base in technical communication and digital literacy development. Though I began my relationship with Girls Go Digital without research motives, once I saw the

opportunity for research, I worked to strengthen my relationship with the company and build trust in order to become a research collaborator. This relationship-building has followed a similar trajectory as much of my work in community engagement. Often I have begun a partnership with a community organization on a limited scale, with a particular project goal for a single service-learning class. But that first project can turn into new projects, deeper relationships and mutual understanding, and eventually collaborative research. Community engagement best practices (Jacoby, 2003, 2015) emphasize reciprocity in building relationships that will mutually benefit all parties. Attention to balance in these relationships is particularly important for community engagement work because of higher education's history of taking advantage of their surrounding communities (Cushman, 1996), and unfortunately exploitative relationships with community partners under the guise of engagement persist all too frequently today (Stoeker & Tryon, 2009). I have found bringing my community engagement background to my work with Girls Go Digital to be a valuable lens for ensuring that we are on the same page as collaborators, as well as always keeping broader community impacts in sight. I know that Girls Go Digital is interested in my research for its public relations benefits demonstrating their positive impact on clients, and my partners know that I am benefitting from utilizing their camps at a research site for my dissertation. But beyond our self-interested goals, we share an investment in having a positive impact on girls interested in STEM. As with community partnerships in which an academic partners with a non-profit organization but focuses on outcomes for their clients and the community more broadly, reciprocity means not just a 1:1 exchange between academic and

corporate/community entities, but consideration of all stakeholders, particularly those in the positions of least power.

I find that my approach to working with a for-profit company sits at a crossroads between rhetoric and composition and technical communication methods. In rhet/comp community engagement circles (and other community engagement circles across fields), I am at times met with skepticism about the ethics of my work--am I really benefiting those most in need by working with a company concerned about profits? Wouldn't I be better off starting by collaborating with local nonprofits or even founding my own girls' camp? Here's how I see it: Girls Go Digital is happening anyway, and if I have an opportunity to learn more about reaching girls and maybe help make the camp more ethical along the way, isn't that a valuable opportunity? For-profits with social missions often have the resources to make an impact on a broad scale. However, for-profits can also make damaging missteps when bringing corporate logics and lack of understanding to deep societal problems, like the well-documented struggles of Toms Shoes (Bansal, 2012; Wydick, 2015). As with tackling STEM diversity issues, humanists can play a role in mediating under-considered negative consequences of for-profit efforts, especially when those for-profits do have social change missions that align with our own. For my own collaboration, Girls Go Digital has demonstrated its genuine commitment to promoting girls in STEM sufficiently for my comfort. A few years ago, they admitted that Girls Go Digital was not becoming profitable as quickly as they'd hoped. Rather than abandoning it, as they did with another poorly-performing line of camps that same year, Kids Go Digital doubled down on the importance of figuring out how to grow the program, adapting some logistics and numbers for the camp to keep it afloat until they

cracked the code to help it catch on. Ultimately, I just can't swallow the argument that the best solution is not to engage when a potential partner doesn't meet ideals that are easy to critique from the academy. But then, I have always been someone who's drawn to working to change systems from the inside.

In technical communication circles, collaborations with companies are built into the field, though scholars have varying comfort levels and orientations toward these relationships. On the more accepted end of the spectrum are research partnerships investigating industry trends that will enable technical communication programs to better prepare students to enter their careers, as well as opportunities for students to directly develop these skills through partnerships like internship programs. However, as Rude (2015) observes, technical communication still struggles to embrace and widely practice industry partnerships due to "a habit of thinking of binaries and differences, individually-driven research projects, and lack of shared forums" (p. vii). She points to a need to find common ground not only to inform what instructors teach technical communication students, but to build shared knowledge as fields like medicine do: "Perhaps, for example, we need to stop letting binaries frame our conversations and to foreground shared interests in such issues as intercultural communication, new media, and ethics, all of which have theory and practice components" (p. vii). I see my collaboration more along these lines of building shared knowledge about technical communication strategies that can benefit students and practitioners alike. Even with this framing, however, I still value utilizing community engagement for its orientation toward social change, which as I discussed in Chapter 1, technical communication struggles to prioritize. It's my community engagement framing more than my for-profit partnering that tech comm

circles seem to question. Community engagement is no foreign concept for technical communication, of course, but as Simmons recently commented at a technical communication conference, “service-learning” is often looked down upon as not “true” technical communication. The distinction of service-learning from community engagement is traditionally used to separate teaching projects from deeper research partnerships, but in practice it’s often used to denigrate the notion of service as merely volunteerism and not rigorous academic work. I do not see a line of separation between the two, and prefer to use the term community engagement even when describing teaching-related projects to emphasize the meaningful relational work that can occur in both teaching and research arrangements.

Ultimately, I see my positioning of community engagement as a framework for approaching partnerships with for-profit companies as parallel to Edwards and Gelms’ argument for technofeminism as a lens for investigating digital platforms. Both models emphasize ethics, power dynamics, and individual experiences, as well as provide pathways for research to go beyond critique toward enactment of social change. And while I align with both technofeminism and community engagement, community engagement is valuable separately from technofeminism for its roadmap to collaborating with research partners. In sum, methodologically this project draws on technofeminist methodologies to investigate the technofeminist intervention of a girls STEM camp, utilizing mixed methods to speak to STEM audiences and community engagement principles to partner with a for-profit company toward social impact. Next, before describing the specific instruments of my study, it’s necessary to examine how girls are

currently engaging with STEM subjects, which will become a basis for assessing the outcomes of Girls Go Digital's intervention.

2.3 Girls in STEM

A persistent argument rationalizing the lower rates of women in STEM fields is natural gender difference. The evidence remains inconclusive; a 2009 meta-analysis of 400 studies of gender in STEM finds that although there are physical brain and hormonal differences between men and women, whether or how these contribute to differences in STEM skills isn't proven (Ceci, Williams, & Barnett). Even if natural aptitudes are at play, the rate of improvement in STEM performance for girls over the last few decades shows that educational interventions can make a difference. Girls now earn high school math credits at the same rate as boys and earn slightly higher grades (US Department of Education, 2007). On the National Assessment of Educational Progress, girls still perform slightly below boys in math on average, but only slightly--a difference of 4 points out of 300 (US Department of Education, 2015). At the highest ends of youth math performance, girls have shifted from performing in the top .01% of middle school SAT math test takers at rates of 1:13 in the 1980s (Benbow & Stanley, 1983), to rates of about 1:3 in 2007 (Halpern et al., 2007). These changes have occurred far too fast to be explained by any natural gendered evolution. In areas where gendered aptitudes persist, like spatial reasoning, studies have shown that simple training can make an impact (Baenninger & Newcombe, 1989; Vasta et al., 1996). A 2000 study implemented a first-year engineering course to improve spatial-visualization skills, and rates of persistence from the first to second year for female students in engineering grew from one half to three quarters (Sorby & Baartmans, 2000).

Still, gains in STEM performance do not inherently lead to more women in STEM, as rates of women in STEM careers have not grown nearly as fast as girls' improvement in skills. A 2005 study also demonstrates that it's not even necessarily the top math and science performers for either gender who pursue STEM careers (Weinberger). Factors other than aptitude and skill alone shape people's career choices, and perhaps the biggest, most complex factor is a person's interest in a field. Girls don't express interest in STEM fields nearly as often as boys. One 2009 survey of 8-17 year-olds found only 5% of girls to be interested in a STEM career, compared to 24% of boys (American Society for Quality). In another survey, 74% of college-bound boys ages 13-17 said computer science would be a good major for them, compared to 32% of girls (WGBH Education Foundation & Association for Computing Machinery, 2009). A study conducted by the Girl Scouts Research Group (2010) adds complexity to the picture. They report that the problem isn't really girls' lack of interest in STEM--they found 74% of teen girls in a national mixed method study to be "somewhat" or "very" interested in STEM subjects (p. 8). But they also found STEM to be just one of girls' many interests. Though 81% of girls interested in STEM also expressed interest in a STEM career, only 13% rated it as their top choice--medicine/healthcare, arts/design, social sciences, and entertainment all rated higher. The Girl Scouts study explains that in addition to STEM, and often more strongly than STEM, girls are interested in changing the world and helping people:

> Eighty-eight percent of all girls want to make a difference in the world, and 90% want to help people. Traditionally, they achieve this through careers working with people and are less likely to consider careers that use technology and scientific

> expertise to change the way things are done, to improve the environment, to make people healthier, or to make life more efficient. (p. 27)

This interest in serving a social purpose is consistent with Eccles' work on occupational choice, which finds that occupational choices are shaped by personal values and expectations for success (Eccles [Parsons] et al., 1983; Eccles, 1994, 2006). As the Girl Scouts study would suggest, women place greater value on and are more likely to pursue careers with a clear social purpose than men (Jozefowicz et al., 1993; Konrad et al., 2000; Margolis, Fisher, & Miller, 2002; Lubinski & Benbow, 2006; Eccles, 2006). These findings about girls interests and values lead to one possibility for intervention. Maybe if girls can see that STEM can work in conjunction with their more humanist interests, their interest in STEM careers may grow.

The Girls Scouts study also finds that girls are discouraged by perceived barriers to pursuing STEM interests both socially and intellectually, citing discomfort with being in a male-dominated setting and the belief that they'd have to work harder to prove themselves (p. 19). Other research supports the impact of social factors on girls' STEM pursuits. Girls are able to identify gendered stereotypes about STEM as early as elementary school (Farenga & Joyce, 1999; Ambady et al., 2001), and beliefs that characteristics of women do not align with characteristics of scientists persist with adults (Carli et al., 2016). Stereotype threat, first defined by Steele and Aronson in 1995, is the phenomenon of fearing being viewed negatively due to a stereotype, as well as fearing doing something to confirm a negative stereotype. Stereotype threat was first used to explain differences in academic performance between white and black college students not accounted for by other school- and family-related factors (Steele and Aronson, 1995;

Blascovich et al., 2001). With gender, stereotype threat has been demonstrated numerous times through experiments in which one group of test takers are told that males perform better on the test than females, and another group is told that both genders do equally well on the test (Spencer, Steele, & Quinn, 1999; Nguyen & Ryan, 2008). Any introduction of gendered expectations, even a demographic question at the beginning of a test (Inzlicht & Ben-Zeev, 2000), can cause the threatened group to perform below their ability when not under threat. Stereotype threat may be contributing to the continued gap in STEM performance between the genders, as well as having psychological effects that discourage girls from pursuing STEM interests. A consequence of long-term stereotype threat, ie. continued feelings of pressure to perform against stereotypes, can lead to what researchers call disidentification (Woodcock et al., 2012), in which a person deflects interest in a subject to avoid confirming a negative stereotype. For girls who fear confirming stereotypes that girls are not well-suited to STEM subjects, stereotype threat may lead girls to disidentify with STEM subjects altogether and avoid STEM careers. As for interventions, studies have shown promising results for reducing the impact of stereotype threat by talking explicitly about it (Johns, Schmader, & Martens, 2005) and by emphasizing the fairness of exams (Good, Aronson, & Inzlicht, 2003).

A key period for targeting interventions against the social effects of stereotypes for girls and STEM is middle school. A European study conducted by the London School of Economics in partnership with Microsoft found that many girls become interested in STEM subjects around age 11, but they lose interest in STEM by the age of 15 (2017). This age range is also important for girls' confidence. Studies have shown that girls start losing confidence in their math abilities around middle school, and the confidence gap

between girls and boys widens through high school and college (Pajares, 2005). Girls also report lower self-assessed skill with computers, which correlate to their ratings of comfort and competence (Schumaker & Morahan-Martin, 2001). These measures of self-efficacy, or the belief in one's abilities, become bigger predictors of pursuit of further skills in a given area than actual performance (Bandura, 1986, 1997). Correll (2001) found that boys were more likely to enroll in an advanced math class than their female peers not because they performed better in math, but because they believed they were better at math than the girls did. In other words, girls' lack of confidence in and comfort with their STEM skills do damage to their likelihood to pursue them.

As Pajares explains (2005), self-efficacy beliefs are complex and formed with a variety of influences, but the biggest is an individual's experience of their own performance: "Individuals engage in behaviors, interpret the outcomes of their actions, use the interpretations to develop beliefs about their capability to engage in subsequent behaviors in similar domains, and act in concert with the beliefs created" (p. 295). People with low self-belief are more inclined to discount their own successes instead of positively shifting their belief in themselves. Beyond personal mastery experiences, self-belief can be influenced by vicarious experiences, ie. watching someone with traits interpreted as similar to their own perform tasks. So for girls and STEM, seeing a woman successfully perform a programming task can build their own belief in their ability to do the same. On the flip side, seeing someone similar to themselves fail can hurt their own confidence, and their association with someone they see as unlike themselves, ie. male models, will inspire a weaker correlation to their own self-beliefs. Self-belief can also be influenced by social persuasion. Pajares warns that "social persuasions should not be

confused with knee-jerk praise or empty inspirational homilies. Effective persuaders must cultivate people's beliefs in their capabilities while at the same time ensuring that the envisioned success is attainable" (p. 296). Again, negative persuasion can harm a person's self-belief just as much as positive persuasion can build it, which relates to the effects of stereotyping. We'll look at Girls Go Digital instructors' effectiveness as social persuaders for campers' self-efficacy beliefs in Chapters 3 and 4.

Another factor related to self-efficacy beliefs is an individual's learning mindset. A "fixed mindset" is the belief that intelligence is fixed and biologically determined, ie. the idea that a person is either bad at math, or they're good at it. A "growth mindset" views intelligence as malleable and able to be changed with effort. Studies have shown that growth mindsets are correlated to greater persistence when faced with challenges, and ultimately a greater likelihood of success in any field (Dweck & Leggett, 1988; Blackwell, Trzesniewski, & Dweck, 2007; Dweck, 2006, 2008). Perhaps unsurprisingly, boys are more likely to have growth mindsets than girls, and bright girls are particularly susceptible to giving up in the face of confusion (Licht & Dweck, 1984). As far as where the difference in learning mindset originates, studies show that the feedback children receive has an impact. Praise about a child's intelligence leading to their success makes them less likely to persist when faced with difficulty versus children praised about their hard work leading to success (Mueller & Dweck, 1998). This makes sense when we think about the gendered socialization of "good girls" versus "boys will be boys." Girls, and particularly bright girls, tend to develop self-control earlier than boys and may receive praise that suggests their qualities are fixed, ie. "you're so smart." Boys, who mature later and often need more coaching to focus, may be encouraged more often by emphasizing

effort, ie. “if you try you can figure it out.” Learning mindset is a particularly promising area for intervention for girls and STEM. When learning mindset is controlled in studies of male/female math performance, the gender gap disappears (Grant & Dweck, 2003; Blackwell et al., 2007). Good et al. (2003, 2009) found that negative stereotypes have less impact on girls and women when they have a growth mindset; instead of seeing their struggles as confirming that girls are less capable, they’ll see themselves as capable of improving and want to rise to the challenge to disprove the stereotype. If girls can see their abilities in STEM as able to grow with experience and learning, rather than as innate “gifts,” their performance and persistence will increase.

Finally, relationships are worth discussing as their own factor. I’ve already mentioned the ways that role models can impact self-efficacy, forms of praise can shape different learning mindsets, and stereotypes can be instilled or refuted from many directions. Relationships affect girls’ potential for success in pursuing STEM. The Girl Scouts study (2010) finds that girls interested in STEM are more likely to know a woman (53%) or someone (66%) in a STEM field than girls who aren’t interested in STEM (36% know women, 47% know anyone). Studies have shown that role models can improve attitudes toward STEM subjects and careers (Evans et al., 1995; Smith & Erb, 1986), as well as help “inoculate” girls against negative stereotypes that deflate self-belief and discourage persistence (Dasgupta, 2011). While a role model can simply be someone that a girl relates to and looks up to, mentoring goes beyond role modeling with a two-way relationship. In addition to serving as role models, mentors also “help their mentees by counseling, advising, instructing, and sharing knowledge with them” (Stoeger et al. 2013). Mentoring has been shown to positively impact young women’s STEM activities,

self-efficacy, and awareness of STEM career possibilities (Stoeger et al., 2013). Mentors who are as similar to their mentees as possible, or near-peers, have been shown to be particularly effective (Bussey & Bandura, 1999). Of course, the specifics of each mentoring relationship shapes its outcomes; it's important for mentors to avoid pitfalls like infrequent contact (DuBois et al., 2002), insufficient reflection (Stowers & Barker, 2010), and lack of commitment to the relationship (McCall, 2017). The relationships between Girls Go Digital's instructors' mentoring tactics and the literature on mentoring will be explored further in Chapter 4.

The focus of this literature review has been on trying to unpack why fewer girls pursue STEM interests than boys, but it's also critical to acknowledge that gender is not the only gap that exists in STEM; race and class compound issues of access. Black women earned less than 1% of engineering bachelor's degrees in 2015, and Latina women earned 2% (NSF, 2018). African American and Hispanic homes are still less likely than Caucasian households to have internet access (U.S. Census Bureau, 2015), making self-development of digital literacies more challenging. Wang and Billington (2016) found a group of economically-disadvantaged minority girls in fifth grade to have few opportunities to learn about STEM outside of school, and they did not articulate their future career interests as related to STEM, even when they involved technical and scientific tasks. While white girls have stereotypes of gender and STEM skills to fight, girls of color have the additional weight of persisting through racial stereotypes as well. The Girl Scouts study summarizes:

> African American and Hispanic girls say they have just as much interest in STEM as Caucasian girls, but they have had less exposure to STEM, less adult support

> for pursuing STEM fields, lower academic achievement, and greater awareness of gender barriers in STEM professions. However, their confidence and ability to overcome obstacles are high, pointing to the strong role of individual characteristics in STEM interest and perceived ability in these subjects. (p. 20)

The need for technofeminist intervention to foster minority girls' STEM pursuits is even more dramatic than the already dire situation for white girls. Though my study is done in partnership with a camp that primarily serves middle class white students, I do have data addressing the comparative impact of camp for disadvantaged girls in Chapter 3, and I'll address future opportunities to grow this impact in Chapter 5.

Ultimately, the puzzle of what leads girls to pursue STEM careers seems to be a delicate assemblage of pieces, including girls' confidence in their abilities, mindset for learning, response to stereotypes, understanding of STEM's relevance to their goals, and social support, with barriers being even greater for girls of color and low-income backgrounds. These factors likely aren't surprising if you're a woman. Most women I know have their own stories of why they hated math or where along the line they lost a passion for science they once treasured. For myself, I enjoyed math and science in elementary school, and I believed in my abilities. In the transition to middle school, however, I was advised to play it safe by taking pre-algebra instead of algebra. The next year, I was under-challenged. I'll never forget when my pre-algebra teacher, a vibrant, fierce woman I loved to that point, said to me in front of the class after I raised my hand one too many times: "You know what your problem is? You always have to be right." After that, I stopped speaking up in math class. Girls Go Digital is striving to fight such discouragements for girls with STEM interests. In aiming to assess Girls Go Digital's

success as a technofeminist intervention, then, my study must investigate not only *what* the impact of camp is on girls, but also *how* they are achieving it. Comparing Girls Go Digital's methods to the existing literature on routes for intervention will open up both techniques from Girls Go Digital that may translate elsewhere and opportunities for improved methods at camp.

2.4 Research Questions and Methods

The driving questions of the study address three areas of focus:

1. Students: How and to what extent does Girls Go Digital build girls' confidence with and interest in technology?

   The largest set of participants in the study are female campers, ages 10-15, along with their parents when possible. Girls were given a survey at the beginning and end of the camp week at Girls Go Digital locations nationwide to measure their change in attitudes over the course of the camp week. Parents were sent an email survey at the end of their child's week at camp for their perspective on their child's STEM attitudes.

2. Instructors: How do instructors understand and enact their role at camp?

   The second group of participants is female Girls Go Digital instructors, who can range in age and background, but frequently are undergraduate students in majors relating to technology and engineering. Instructors play a huge role in providing the camp experience for students, so the study investigates how they approach their relationships with their students and through a survey with qualitative and quantitative questions.

3. Camp Setting: How do the curriculum, activities, and environment shape the camp experience?

    Girls Go Digital is part of a large, national, for-profit tech camp company, Kids Go Digital. They have a proven model for curriculum and instruction in the tech camp world, and they have carefully cultivated the Girls Go Digital camp experience to inspire girls to want to change the world through technology. The study incorporates document and autoethnographic analysis of how the design of the camp shapes girls' experiences and impacts their feelings about STEM.

In all, my study uses one primarily quantitative survey (students), two mixed surveys (parents and instructors), document analysis, and autoethnography. Utilizing Teddlie and Tashakkori's (2009) taxonomy of mixed method research designs, my study follows a multilevel mixed design, in which "QUAL data are collected at one level of analysis (e.g. child) and QUAN data are collected at another (e.g., family) in a parallel or sequential manner" (p. 156). Teddlie and Tashakkori formulated this structure particularly to accommodate the way mixed method designs frequently operate in educational research, where different strands naturally separate around different levels of analysis, like testing students quantitatively and instructors qualititatively, then "the QUAN and QUAL data from the different levels are used to answer related questions about a topic of interest," making "the resulting meta-inferences...necessarily mixed" (p. 156). For my design, though the student survey includes one qualitative open-ended question, students' self-efficacy and attitudes are primarily measured with the quantitative pre- and post-test. This aspect of the study design also follows a parallel

mixed design, in which the quantitative measures are confirmatory--identifying if students actually are improving their confidence at camp. My qualitative measures are then more exploratory, seeking to understand how these quantitative results are being achieved based on instructors' teaching methods, parents' observations, the design of the camp, and my own experiential reflections.

Student Survey: To measure Girls Go Digital's impact on girls, I created a pre- and post-test based on two established protocols used in computer science education. The first is the Computer Self-Efficacy Scale (CSE), which was created in 1989 (Murphy et al.) and has been used to link children's perceptions in their abilities to their future choices about learning (Bandura, 1997). The CSE contains 32 items using a 5-point likert scale that result in 3 factors: beginning, advanced, and mainframe computer skills (See Appendix A). This scale is widely used by technology researchers and its factors have been proven to have high reliability ratings with alphas from .83 to .97 (Davis & Davis, 1990; Durndell, Haag, & Laithwaite, 2000; Harrison & Rainer, 1992, 1997; Langford & Reeves, 1998). The second protocol I utilized is the Computer Attitudes Questionnaire (CAQ), a 67-item, 5-point likert scale self-report questionnaire designed to measure children's attitudes about computers on eight subscales: Computer Importance, Computer Enjoyment, Computer Anxiety, Computer Seclusion, Motivation/Persistence, Study Habits, Empathy, and Creative Tendencies (see Appendix B) (Knezek, Christensen, & Miyashita, 1998). This survey has also demonstrated high internal consistency when used by its designers and others, with alphas of .80-.87 (Schumacher & Morahan-Martin, 2001; Zhang & Espinoza, 1998). These two surveys were chosen for their reputability in

STEM education research and their ability to help examine factors shown to be important for girls in STEM, including self-efficacy/confidence, growth mindset, and interest.

Logistically, the two original surveys were too long for the Girls Go Digital camp setting, where camp staff at locations across the country needed to be able to integrate the survey into the first and last day of camp each week (Monday and Friday) without becoming too big a burden on the schedule. I wanted to include some measures from both surveys without adding the time to have campers complete two surveys. The CSE survey also needed updating to make it more relevant to today's common computer tasks. So I created a combined adapted survey (see Appendix C). In addition to abbreviating both original surveys, I also added some questions about demographics, stereotype beliefs, and interest in STEM careers. 203 girls completed both a pre- and post-test at camp.

Parent Survey: The parent survey (see Appendix D) was distributed by email on the last day of camp (Friday) to parents/guardians whose students participated in the student survey at camp, The parent survey was designed to both qualitatively and quantitatively capture parents' perspectives on their child's orientation to STEM and any impact of camp, so that parent perceptions could be linked to their children's own self-assessments, This survey needed to be short and sweet to encourage participation by email, since parents did not participate in the study as a captive audience at camp. The survey has 13 questions, and 80 participants completed it.

Instructor Survey: To understand participants' motivations and methods at camp, instructors were asked a series of categorical ranking questions, ie. "Which is most important to your role at camp?," as well as open-ended questions asking participants to explain their choices (see Appendix E). Survey answer choices were selected based on

my own experience of the range of Girls Go Digital instructors' interests, as well as to test the intervention methods found to be most promising in the literature for girls in STEM. The instructor survey was distributed by email to 120 Girls Go Digital staff and received 44 responses.

Rhetorical Analysis and Autoethnography: My analysis of the design of Girls Go Digital camps includes a rhetorical analysis of marketing materials and training protocol, which will be put in conversation with the design of the Digital Mirror Camp and the research on girls in STEM. In unpacking the design and effects of the camp, I also include autoethnographic analysis to fill in gaps in what the surveys can show, like exploring what may be happening at camp to produce girls' quantitative shift in confidence.

To again disclose my history with the company: I have worked with Kids Go Digital since the summer of 2013. In that time, I have served primarily as a camp director, managing operations on-site at a given camp location. I have directed at least 32 weeks of camp at 5 camp locations, one of which was a Girls Go Digital. I also served as a hiring manager part-time for Kids Go Digital for one camp season, during which time I was responsible for recruiting, interviewing, training, managing, and evaluating staff at multiple camp locations. As I discussed above, I not only recognize but embrace the fact that my integration within the company shapes my perspective for the study. I understand that this may lead to questions about my ability to report negative results or critique the camp, and so I have been conscientious about infusing methodological rigor to produce trustworthy results.

In this chapter, I have tried to lay out not only the design of my study, but also the factors that have shaped this design, including my alignment with technofeminist and community engagement methodologies and the literature on the variety of factors that can influence girls in STEM. To investigate how Girls Go Digital is affecting girls' confidence in their STEM abilities, the study uses mixed methods to measure changes in girls' attitudes over the course of camp, gather parents' observations about their daughters' experiences, explore instructors' insights on what works at camp, and fill in gaps with my own autoethnographic experiences. In the next chapter, I'll explain how Girls Go Digital is designed to reach girls and report results from the student and parent surveys.

CHAPTER 3: GIRLS GO DIGITAL AND CAMPER CONFIDENCE

The big question: is Girls Go Digital having an impact on students' STEM confidence? The short answer is yes. In this chapter, I'll dig into how the design of Girls Go Digital is tailored to reach girls who may feel excluded from Kids Go Digital's mixed gender camps, comparing the Girls Go Digital approach to the technofeminist intervention principles from the Digital Mirror Camp as well as the research on girls' STEM persistence. Then, I'll give the results from the student at-camp survey, supplemented with camp parents' perspectives on the impact of Girls Go Digital. Results confirm that camp is positively affecting girls, though in some realms more than others, and in ways that echo both the intentional design of the camp and the literature on girls' interests and barriers relating to STEM.

3.1 Girls Go Digital Camp Design[2]

As I've mentioned, Girls Go Digital came about at the encouragement of a prominent woman in technology. She spoke with Kids Go Digital's leadership about the need for an incubator specifically for girls to foster their interests in STEM, and she thought that Kids Go Digital would be an ideal choice to do it given the success of their other camps. Kids Go Digital had been toying with the idea on their own for some time, as the company has struggled since its beginning to enroll girls in camp. They've tried a number of unsuccessful interventions, including "girls' weeks" at Kids Go Digital camps just for

[2] As detailed in Chapter 2, I have been an employee for Girls Go Digital in the past, both as summer staff at camp and as a corporate operations manager. My description of the camp's design comes from their public materials, my personal experience with the company, and informal conversations with longstanding employees.

girls, recruiting clients at girls' activity groups, and changing marketing materials to make the camps seem more approachable for girls. The rate of girls at camp has grown over their 20+ years, though it varies significantly by location. Some camps still see only 0-5 girls per week, while the balance has hit around 60/40 at prominent locations in big cities. As with STEM more broadly, a gap persists. Some may say (and many have) that this means Kids Go Digital ought to work harder to make camp culture and branding more welcoming to girls. I don't disagree with this goal. But to more closely consider why Kids Go Digital decided to design a girl-specific camp, it may be helpful to look briefly first at the design of their mixed gender camps.

The main line of Kids Go Digital camps offers technology courses for ages 7-17 in coding, game development, design, and robotics. Courses are split by age, and each instructor works with no more than 10 students, each on a camp computer, in order to facilitate personalized instruction. Students start the week by learning basics of the program or subject area, then build their skills through the week to ultimately produce a single project or portfolio of work to take home at the end of the week. Camp culture varies a bit by location, but there are norms. The vibe of camp I would describe as nerdy fun. Instructors choose camp nicknames for themselves inspired by superheroes, cartoons, or even goofy foods. Camp branding is in a traditionally masculine color and uses lots of blocky fonts and design. As behavior incentives, camps use raffle tickets awarded for good deeds and class participation. At the end of the week, tickets are used for a raffle that includes the camp favorite of pieing an instructor of choice in the face. Throughout the camp week, activity breaks from coursework may include board games, sports, scavenger hunts, movies, and video games. Computer gaming tournaments are

popular, though corporate has worked to scale back the amount of gaming time allowed per day.

In sum, are the mixed gender Kids Go Digital camps, with their nerdy gaming culture, inaccessible to girls? I think the answer is a matter of taste depending on the girl. Game studies scholars and gaming activists have done extensive work to fight the stereotype that girls aren't into gaming. And in fact, a recent reporting of game play finds that the biggest demographic of gamers are women over the age of 18 thanks to mobile gaming (Entertainment Software Association, 2019). Certainly, we see girls who like gaming at Kids Go Digital camps. In terms of popularity for girls in specific classes, I don't have official numbers, but here's what I've seen in five years across dozens of locations: the most popular classes are in coding and game development, and those classes are offered at all locations. Design classes, which include photography and web development, tend to attract more girls, but smaller locations can't sustain them--when they're offered, they may not fill. For the courses for ages 12 and under, girls are about equally common in programming or gaming classes. Since the rise of Minecraft, I've seen more girls come into camp with existing Minecraft experience than I've seen for girls entering other gaming courses. For the teen courses, girls much more commonly take programming courses than gaming courses.

There is a particular case of a teen girl in a gaming class at one of my own Kids Go Digital camps that comes to mind as illustrating how the camp can become unwelcoming to girls. This student endured a horrific case of harassment that was absolutely an exception not the rule of girls' experiences at Kids Go Digital camps, but it did happen. As the female student was playing a gaming tournament with her classmates,

a male student came up and slammed her laptop closed. He persistently made racist, sexist comments at her behind the instructor's back. Once we caught it, he was promptly kicked out of camp, and my manager said it was one of the most awful cases she had ever seen in her 10+ years at the company. But this case does illustrate why Kids Go Digital might create an intimidating environment for some girls. As a camp director and manager, I heard many parents of girls express concern about their daughter being the only girl in their class, or express relief when they found that their daughter wasn't the only girl or had a female instructor. At camp, I've strategized with staff about how to bring girls into the fold or set up girls in different classes to eat lunch together. When I moved from a camp location with hardly any girls to one with a better gender distribution, I had to consciously shift my own patterns with camp culture to be more inclusive, changing a "favorite video game characters" dress-up day to a "favorite characters" dress-up day, featuring a number of young girls dressing as their favorite book heroines.

As the last chapter explores, there are so many ways by which girls can feel discouraged from pursuing their interests in STEM, and it makes sense that a technology camp dominated by boys might be one of them. Girls-only camps may prompt a political debate of "safe spaces," and whether they provide needed refuge to build girls up before they face the harsh realities of patriarchal society, or whether isolating girls away from boys at camp only contributes to the perception that boys and girls are different and that technology is a realm for boys. As I will discuss in Chapter 5, I believe there are further steps that Kids Go Digital can take to make their mixed gender camps not only more accessible to girls, but to help enculturate the boys at their camps to see that girls belong,

as well as foster traditionally “feminine” values that benefit everyone, like collaboration and helping people. But on the whole, I side with the argument for providing girls who seek one with a space of their own. As a Girls Go Digital camp director, I spoke with parents who said they were familiar with Kids Go Digital camps, but their daughters never expressed interest until Girls Go Digital came around. In an open response on the parent survey, 37.8% of parents explicitly referenced the girls-only environment as a reason they signed their daughter up for Girls Go Digital. There are also girls who attend and enjoy both camps.

So, how does Girls Go Digital reach girls differently than Kids Go Digital? Not through a different curricular structure. Like at the mixed gender camps, students choose a course topic, then work with an instructor in a class of no more than 10 students to produce a take-home project by the end of the week. However, the curriculum adds an additional focus on entrepreneurship and social consciousness, picking up on that key finding from the Girl Scouts study (2012) that girls value helping people just as much or more than they value their STEM interests. Staff leads discussions about using entrepreneurship to change the world, and girls are encouraged to connect their projects in the course to a social cause they care about. Course topics still feature programming and game design, but courses with additional equipment like robotics, photography, and film are offered more frequently than at mixed gender camps. One course, though no longer offered, combined engineering with sewing, where girls would create felt trinkets or accessories with programmed lights and music. I believe Girls Go Digital stopped offering it because of the challenge of simultaneously teaching fine motor skills with sewing and programming with circuit boards in one week, as well as the difficulty of

finding instructors confident in both. Still, this example gets at the way Girls Go Digital is designed to be more appealing to girls. Camp branding uses muted pastels and rounded fonts. Photos feature girls laughing together in bean bag chairs. While the mixed gender classes use computers locked to workstations for each student, Girls Go Digital students use mobile laptops and rotate around different stylish station setups for lectures, collaboration, and discussion. There's an autograph book signing at the end of the camp week instead of a raffle. Activities still include outdoor games like Kids Go Digital, but Girls Go Digital is much more likely to feature crafts and spa nights.

Similar to the debate about whether to separate girls, I also hear questions about whether Girls Go Digital is contributing to gendered stereotypes by making the camp stereotypically girly. I respond to this critique with a similar approach as I take to my community engagement work: if you want to reach people, you have to meet them where they're at. The reality is that girls weren't enrolling in high numbers at Kids Go Digital camps. There are likely a number of factors contributing to low enrollment besides the "girliness" of the camp, but since starting Girls Go Digital, Kids Go Digital as a whole has raised its percentage of girls at all camps from 12% to 25%. Numbers of girls are also up at Kids Go Digital mixed gender locations, so girls who aren't into the girly stuff are choosing Kids Go Digital, or even starting at one camp and moving to the other. I believe there's a delicate line to walk between promoting stereotypes about what girls should be into and criticizing girls for embracing girly interests. At camp, instructors lead explicit discussions about stereotypes, asking girls to reflect on their experiences with being labeled a certain way, then giving them a chance to choose their own adjectives to describe themselves. Yes, Girls Go Digital is girly. But, girly isn't inherently a bad thing.

To unpack the design of Girls Go Digital camps further, the Digital Mirror Camp at Bowling Green State University provides a useful basis for comparison. In "Cyberfeminists at Play," Blair et al offer takeaway lessons from their experience running camp based on their backgrounds in rhetoric and composition and utilizing technofeminist principles. Here's how their principles compare to Girls Go Digital's marketing materials and camp operations:

*"Seeing and being tech-savvy users and producers"***:** Blair et al. talk about one of the most important facets of Digital Mirror as having visible tech-savvy women, specifically tech savvy in the humanities who serve as role models to help girls envision themselves as tech-savvy adults. This approach echoes the research on the importance of role models to encourage girls in STEM, particularly role models who girls see as similar to themselves. For its part, Girls Go Digital's marketing emphasizes "leadership development" led by "inspirational mentors." Girls Go Digital doesn't explicitly emphasize mentors as women in the humanities, but humanities women are not uncommon as camp employees, especially in management positions. There is also a clear humanities bent on the design of the Girls Go Digital as a whole in comparison to the company's mixed gender camps. Girls do projects with social entrepreneurship themes, for example creating films about bullying, or programming games about recycling. Again, the camp is picking up on the research about girls wanting to help, but needing to see the connection between their humanist interests and the possibilities of technology.

"Empowering female technological agency through play": Blair et al. emphasize the goal of camp as creative exploration with technology, rather than being overly

product focused. Girls Go Digital's curriculum also offers opportunity for exploration with technology, but ultimately does have students focus on building their own creative portfolio to take home at the end of the week. Girls Go Digital strongly emphasizes its "[n]on-traditional teaching style and chic, collaborative environment [which] foster creativity and friendship." While Kids Go Digital mixed gender camps certainly target fun and making friends, they're less explicit about it. Collaboration may happen, but it's not a selling point or emphasis. I see Girls Go Digital's emphasis on collaboration as its own take on fostering girls' technological agency. While Digital Mirror channels this through low-pressure digital exploration, Girls Go Digital tries to emphasize that each girl is not alone, which may take the pressure of stereotype threat off of individual performance.

"Conceptualizing literacies beyond the classroom": For Digital Mirror, there's an emphasis on helping girls envision how their digital practices might carry beyond camp into their everyday lives, as well as "encouraging campers to see their literacies as not only classroom practices but also practices that can actively shape the world in which they live" (p. 52). This is another tactic for helping girls build confidence as independent agents, while again connecting the possibilities of technology to creating positive change. The way Girls Go Digital frames the promotion of connecting individual interests to technological skills is through "creativity" and "entrepreneurship." In a move that merges Digital Mirror's drive toward fostering individual interests and empowerment, the Girls website declares: "Voice your opinions. Take charge. Create change."

*"Connecting campus with community"***:** For Digital Mirror, this lesson is mostly about the opportunity to build relationships between the university and community, and

giving activist legs to academic research. While Girls Go Digital doesn't have these academic ties, it does promote community change as an interest for campers to explore, billed as "Philanthropy": "Make the world a better place with real-world projects. Success is so much sweeter when we help others in our local communities and beyond our borders."

In all, Girls Go Digital's design of their camps reflects many of the same technofeminist principles taken up by the Digital Mirror Camp. In areas where the camps differ, like Girls Go Digital's social entrepreneurship project theming, their approach still follows the research on interventions likely to help encourage girls to pursue STEM, just with different tactics than Digital Mirror. Coming back to the question of engaging with for-profits, though this is a for-profit company, they're being thoughtful about how they're trying to reach girls and are invested in making an impact. From here, I'll examine what impacts the camp is actually having on girls from a quantitative perspective, then dig further into staff's perspective about what is most important to creating this impact, in addition to identifying opportunities to make camp's impact even greater.

3.2 Camp's Impact on Students

Demographics: The student survey had 203 participants complete both the pre- and post-test at camp. Students were primarily between the ages of 10 and 14, as shown in Table 1. The racial/ethnic makeup of participants is shown in Table 2. Participants were able to select more than one identity category; more than half of participants identified as white or white and something else. The survey also asked if participants' parents had jobs using technology, and 68% of students said yes for one or both parents, as shown in Table 3.

Table 1: Age of Student Survey Participants

Age	**Count**	**%**
9	1	.5%
10	23	11.4%
11	49	24.4%
12	47	23.4%
13	46	22.9%
14	29	14.4%
15	4	2%
16	2	1%

Table 2: Race/Ethnicity of Student Survey Participants

Race/Ethnicity	**Count**	**%**
1 White/Caucasian	104	51.2%
2 Black/African American	16	7.9%
3 Asian	62	30.5%
4 Latino/Hispanic	18	8.9%
5 Native American	0	0%
6 Pacific Islander,	1	0.5%
7 Prefer Not to Answer	15	7.4%
8 Other	14	6.9%

Table 3: Parents in Technology

Does one of your parents have a job using technology?	**Count**	**%**
Yes, one parent	66	32.5%
Yes, both parents	72	35.5%
No	36	17.7%
I'm not sure	29	14.3%

Confidence/Self-Efficacy: The headline question of the study is whether girls' confidence in their technology skills increased over the course of the camp week. The survey given at the beginning and end of camp asked students to rate their agreement with the statement, "I feel confident working with technology" on a scale of 1 (strongly disagree) to 5 (strongly agree). At the beginning of the week, girls' mean confidence rating was already 4.13 (SD = .789), meaning many girls already came into the week with confidence in their technology skills. By the end of the week, the mean confidence rating increased to 4.38 (SD = .740). Though this increase may seem small, particularly since girls started the week already with high ratings, the change in girls' confidence ratings from the beginning to the end of the week is statistically significant, t (203) = 4.327, p = 0.000. Further, the effect size is strong for educational research, with a Cohen's d of 0.327, meaning students' confidence grew by about a third of a standard deviation. Figure 1 shows students' responses on this confidence question from the beginning to the end of the week, where you can see that many girls shifted to strongly agreeing with the statement, "I feel confident working with technology."

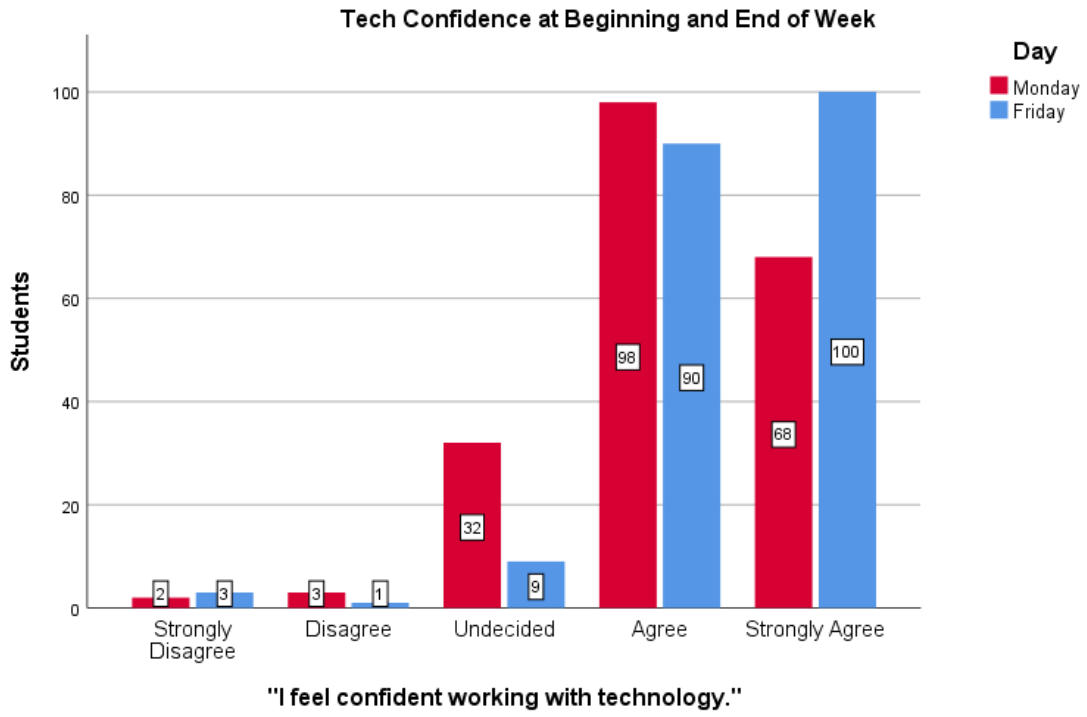

Figure 1: Tech Confidence at Beginning and End of Week

The survey went beyond this first measure of general confidence working with technology to ask a set of questions measuring girls' confidence with a variety of technological tasks, taken from the widely used Computer Self-Efficacy Scale (see Appendices A and C). The survey measured girls' confidence with beginning skills, like selecting from a menu and saving work, as well as advanced skills, like coding a program and troubleshooting problems. As discussed in Chapter 2, self-efficacy is an important predictor of girls' pursuit of STEM interests (Pajares, 2005; Schumaker & Morahan-Martin, 2001; Bandura, 1986, 1997; Correll, 2001). Table 4 shows the results for each self-efficacy subscore from the beginning to the end of the camp week.

Table 4: Self-Efficacy Scores

	Monday Mean	**Friday Mean**	**Mean Difference**	**T-Test**	**Effect Size**
Beginning Level Skills	4.2044 SD= .58086	4.4926 SD= .54407	.2882	t(202)= 6.773 *p*= .000	*d* = .512114
Advanced Level Skills	3.8580 SD= .66642	4.2225 SD= .65640	.3645	t(202)=8.249 *p*= .000	*d* = .55108
Overall Self-Efficacy	4.0312 SD= .57099	4.3576 SD= .56665	.3264	t(202)= 8.324 *p*= .000	*d* = .573815

Self-efficacy scores showed a statistically significant increase over the camp week for beginning, advanced, and overall skills. These effect sizes were even greater than the first general "confidence working with technology," meaning girls' confidence with specific tasks increased more than their general sense of confidence. This finding resonates with the literature on self-efficacy beliefs that it might take a plethora of individual successes to build up a girl's holistic confidence (Pajares, 2005). It's also notable that girls showed the lowest pre-test mean score for advanced level skills, which fits with the expectation for girls to be seeking to advance their skills at camp. Building girls' confidence in these advanced technological skills seems particularly important for encouraging girls to continue to seek them.

Parents' survey responses at the end of the week corroborate the results from the girls' own self-efficacy assessments. Asked to rate their agreement with the statement, "After attending Alexa Cafe, my child seems more confident in her technology skills," parents on average rated 4.05 (SD=.940), again on a 1 (strongly disagree) to 5 (strongly agree) scale, as shown in Figure 2.

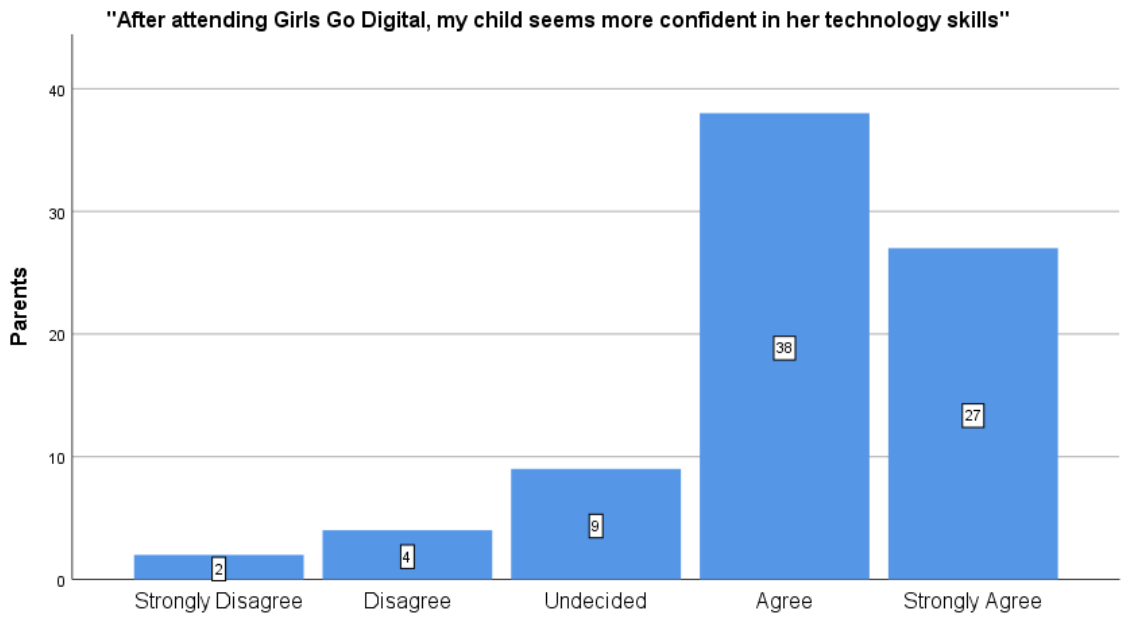

Figure 2: Parents' Assessment of Girls' Confidence Growth

A note on the negative responses here: 6 out of 80 parents disagreed or strongly disagreed that their child's confidence grew. I also asked the reverse question, whether their child seemed discouraged about their tech skills at the end of camp, which 4 parents agreed or strongly agreed with. Though it's not the research itself that led to these negative impacts, they still don't necessarily sit well with the human research imperative to do no harm, as it seems a few parents feel that camp actually did damage to their daughter's confidence. In the context of camp, unfortunately a few negative experiences are hard to avoid. Given that most camp staff are undergraduates in one of their first job experiences, mistakes are going to be made. And it's also fair for some girls to learn at camp that a future in STEM isn't actually right for them. Kids Go Digital does work hard to respond to clients who have negative experiences, asking what went wrong and often

following up when something needs to be made right. This study is also working to identify tactics that can help improve the camp experience for everyone.

Technology Attitudes: Beyond self-efficacy, the student survey also looked at a range of attitudes relating to technology, adapted from the Computer Attitudes Survey (see Appendices B and C). This section of the study produced sub-scores for girls' ratings of Technology Importance, Technology Enjoyment, Study Habits, Empathy, Motivation/Persistence, Creative Tendencies, and Anxiety. As shown in Table 5, all attitudes scores showed statistically significant increases over the camp week at $p < 0.05$.

Table 5: Computer Attitude Scores

	Monday Mean	**Friday Mean**	**Mean Difference**	**T-Test**	**Effect Size**
Technology Importance	4.0111 SD= .60285	4.1207 SD= .62455	.1096	t(202)= 2.447 *p*= .015	*d* = .178561
Technology Enjoyment	3.6463 SD= .44145	3.7498 SD= .45819	.0975	t(202)= 3.170 *p*= .002	*d* = .230052
Study Habits	3.9421 SD= .61593	4.0973 SD= .67033	.1552	t(202)= 3.749 *p*= .000	*d* = .241104
Empathy	4.1931 SD= .58135	4.3198 SD= .54280	.1054	t(202)= 2.820 *p*= .005	*d* = .225282
Motivation/ Persistence	3.7155 SD= .69478	3.8485 SD= .75544	.1330	t(202)= 3.042 *p*= .003	*d* = .18326
Creative Tendencies	3.8888 SD= .52816	4.0922 SD= .52214	.2034	t(202)= 6.004 *p*= .000	*d* = .387312
Anxiety	3.5337 SD= .37575	3.5993 SD= .38731	.0657	t(202)= 2.139 *p*= .034	*d* = .17192

The largest attitude shifts over the course of the camp week were made in girls' creative tendencies. I was initially surprised by this result, as I hypothesized that girls would come into camp already with strong creativity based on their gendered socialization toward such soft skills. However, the growth in creativity does reinforce that Girls Go Digital is implementing the technofeminist principles put forth by Blair et al. Asked questions about finding new things to play with, thinking about the future, and creating unique things, girls' gains in this area echo Blair et al.'s emphasis on promoting girls' technological agency and visualization of their literacies into the future. Similarly, growth in empathy attitudes reflects the technofeminist tactic of promoting the use of technology to create change, as operationalized in Girls Go Digital's project theming on social impact. It is interesting to see empathy scores grow, as the research suggests that girls already have strong empathy, or at least a strong desire to help people--and girls' pre-test scores for empathy were the highest of the group with a mean of 4.1931 (SD= 0.58135). Channeling girls' empathy and the desire to help people is intended to be a strategy to spark girls' interest in technology, rather than a needed target for growth itself, but it seems focusing on empathy at camp also further strengthens girls' empathetic attitudes.

Another interesting attitudes result is that study habits increased more significantly than motivation/persistence. The study habits measures included questions about applying learning to everyday life and asking instructors questions, whereas the motivation/persistence questions focused on working through difficult problems. Considering the importance of growth mindset to girls pursuing STEM interests (Dweck & Leggett, 1988; Blackwell et al., 2007; Dweck, 2006, 2008), we would hope to see

girls' attitudes about persistence grow at camp. Girls' scores did go up by a modest mean difference of 0.1330, but it seems camp is more effective at building girls' comfort with asking questions and applying learning than it is at teaching girls to persist through challenges. Since the survey did not include an explicit measure of growth mindset, results here can't be taken too far, but this does perhaps suggest an area for development at camp. Both study habits and motivation/persistence showed a positive correlation with girls' self-efficacy ratings, meaning girls who are more confident in their technology skills also tend to have stronger study habits and motivation/persistence attitudes. Interestingly, the correlation between study habits and self-efficacy increased between Monday and Friday, whereas the correlation between motivation/persistence and self-efficacy decreased over the camp week. Perhaps this speaks to girls' fatigue with persisting through challenging work by the end of the week.

Though all of the attitudes subscores showed statistically significant gains, attitudes scores grew less dramatically than self-efficacy scores over the course of the camp week, as illustrated by the mean differences and effect sizes. For instance, girls' overall self-efficacy showed a mean difference of 0.3264 for an effect size of 0.5738, while girls' motivation/persistence increased by 0.1330 for an effect size of 0.1833. For education research, Hattie (2009) argues that the bar for meaningful effects of educational interventions should be set at $d = 0.4$; so the self-efficacy scores meet this threshold, while the attitudes scores do not. This bar for educations effects was proposed because it's become a truism in educational research that everything seems to work; 90% of effect sizes for educational studies are positive (Hattie, 2009). Swamped with interventions that "work," Hattie argues that there is a need to set a benchmark for

interventions that produce clear, noticeable change. This benchmark will help to identify interventions worth making, as opposed to those with smaller effects that warrant more investigation before, say, reinventing an entire educational system in their favor. Because the average effect size on the normal distribution curve of effect sizes for educational research is $d = 0.4$, Hattie proposes $d = 0.4$ as that threshold for meaningful impact. Effect sizes below 0.4 are below the average, and therefore may point to a need for further research before hailing the educational intervention a success. It is important to note that Hattie's proposed threshold is based on a synthesis of effects on student performance, whereas my study is measuring changes in attitudes and beliefs, since the research on girls in STEM shows it's not girls' performance that matters as much to their persistence with STEM. Still, the $d = 0.4$ threshold for effect sizes offers a valuable perspective to help frame my results with a sense of proportion. Yes, girls' attitudes about technology grew at camp, but those gains were more modest than the strong effects on girls' self-efficacy, suggesting that girls' attitudes about technology may be an area warranting further research or new strategies for intervention at camp.

Interest and Stereotypes: Finally, the survey asked girls about their career interests, as well as their belief in gendered stereotypes. Following the literature, more girls on Monday expressed interest in a future career where they could help people than a career using technology, but girls' interest in tech careers grew more significantly over the course of the camp week, as shown in Table 6. Girls' interest in a technology career was correlated with their self-efficacy ratings, though this correlation was weaker than self-efficacy's correlation with study habits and with motivation/persistence. The

correlation between tech career interest and self-efficacy also decreased over the camp week.

Table 6: Girls' Career Interests

	Monday Mean	**Friday Mean**	**Mean Difference**	**T-Test**	**Effect Size**
Interest in job using technology	3.73 SD= .981	3.93 SD= .956	.193	t(201)= 3.530 *p*= .001	*d* = .206488
Interest in job helping people	4.13 SD= .835	4.26 SD= .757	.124	t(200)= 2.259 *p*= .025	*d* = .163121

For gendered stereotypes, girls already showed disagreement with distinctions between boys and girls on Monday, responding to the statement "Boys are better at using computers than girls." with a mean of 1.41 (SD= 0.743), or between "Strongly Disagree" and "Disagree." They did not show a statistically significant change at the end of the week. The lack of camp's impact on stereotypes calls into question the nature of gendered stereotypes for today's youth. Considering the number of girls who seek out Girls Go Digital instead of mixed gender Kids Go Digital camps, there must be some social motivation for girls-only campers, but perhaps gendered stereotypes are more nuanced and subtle than can be measured by a direct survey question. Girls receive direct "girl power!" messages even in mainstream advertising for feminine products, so when confronted with a blatant stereotype, they may be inclined to reject it. But the growth of their confidence ratings at camp does suggest that girls' self-belief had room to grow, and perhaps stereotypes did have something to do with it. The self-efficacy growth does seem

to fit in with the studies on stereotype threat showing not that students openly believed stereotypes, but that their exposure to stereotypes negatively impacted their performance of skills. Perhaps the refutation of gendered STEM stereotypes at camp created an environment for girls' self-efficacy to grow. I'll explore this possibility further in Chapter 4.

Parents' Perceptions: At the end of the camp week, parents were asked about their perceptions of their child's STEM interest, aptitude, and confidence both entering and leaving camp, as shown in Table 7 and Figure 3. Like the girls themselves, parents seem less certain about their child's interest in a future STEM career than about their child's growth in STEM confidence. Considering the girls at camp are 10-15 years old, perhaps the uncertainty about career interests is reasonable, though again, the girls themselves seem more certain about helping people than about STEM. Interestingly, parents rated their child's pre-camp STEM interest and STEM aptitude almost identically. Because the girls' aptitudes were not tested, it's hard to tie these parent perceptions meaningfully to data from the girls, but this result does suggest something about how parents see their child's interests and skills as linked. I thought these questions might help parse reasons why parents sent their child to camp, perhaps to promote interest where there was already aptitude or vice versa, but it seems interest and aptitude aren't so easily separated in parents' eyes. In parents' open responses about why they signed their daughter up for camp, 26 parents out of 80 included reference to "interest" and 20 parents included reference to "skills" or "learning". Parents were about evenly split on rating whether their child had a female role model in STEM outside of camp, and

responded very positively to their perceptions of camp staff's impact on girls. I'll explore the role of camp staff in relationship to girls at camp further in Chapter 4.

Table 7: Parent Response Means

	Mean	**Standard Deviation**
Before attending Girls Go Digital, my child expressed interest in STEM subjects.	4.18	.952
Before attending Girls Go Digital, my child showed an aptitude for STEM subjects.	4.23	.900
Before attending Girls Go Digital, my child lacked confidence in her STEM abilities.	2.51	1.131
After attending Girls Go Digital, my child seems more interested in a possible career in a STEM field.	3.74	.990
After attending Girls Go Digital, my child seems discouraged about her technology skills.	1.54	.871
After attending Girls Go Digital, my child seems more confident in her technology skills.	4.05	.940
Outside of Girls Go Digital, my child has visible female role models who work in STEM.	3.30	1.275
Girls Go Digital staff had a positive impact on my child.	4.22	1.129

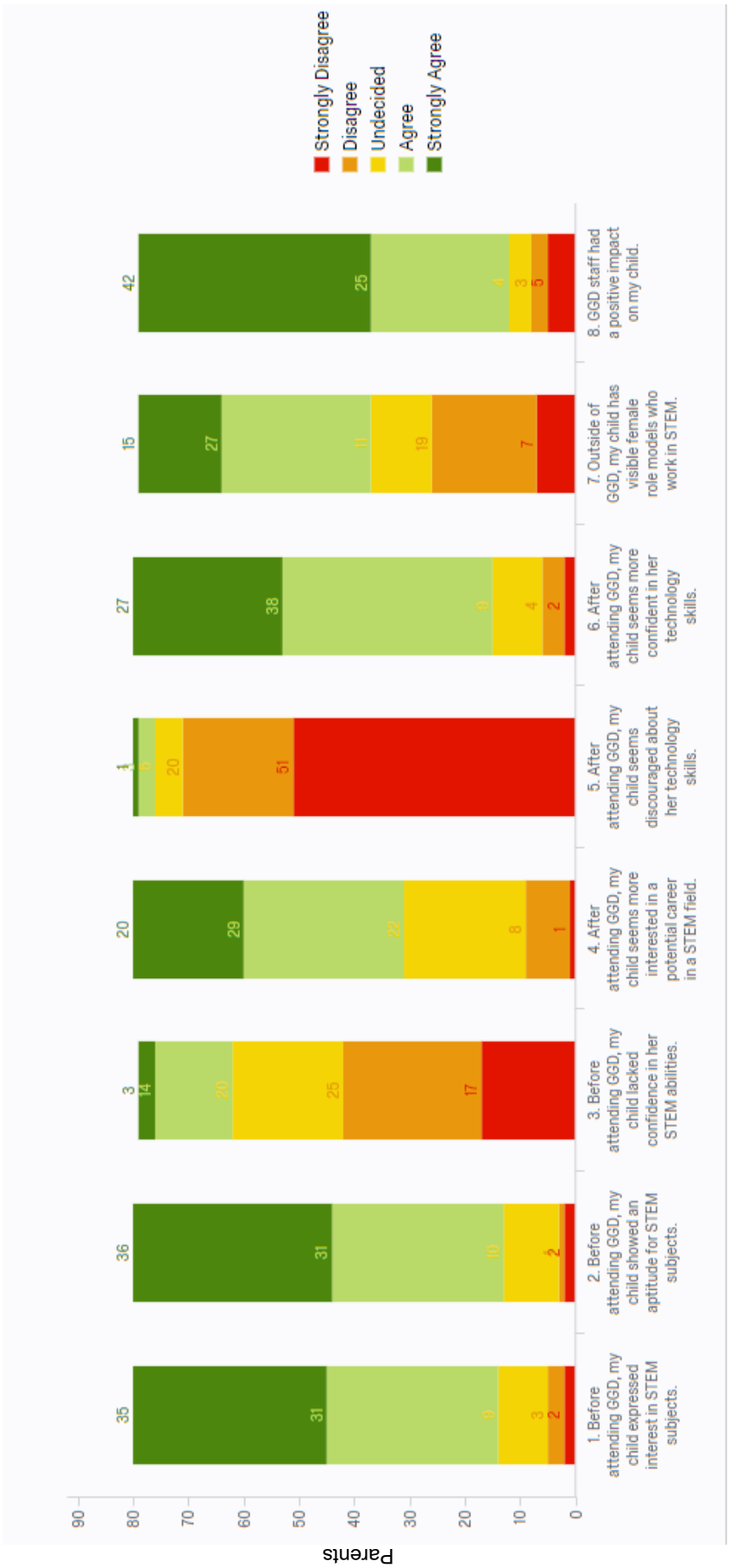

Figure 3: Parent Response Ratings

Diversity at Camp: It's no secret that black and Latina students are in the minority at Girls Go Digital and all Kids Go Digital camps, just as they are underrepresented in STEM fields. In my survey, 7.9% of students identified as Black/African American, and 8.9% identified as Latino/Hispanic. The camp also costs around $1000 for a single week, which is prohibitively expensive for many families. Girls Go Digital does offer a small number of scholarships to students. Originally, it was a goal of this dissertation to conduct a case study at a camp location sponsoring an entire "scholarship week" to investigate how the impact of camp changes for students with less privileged backgrounds. Unfortunately scheduling didn't work out for this portion of the study, but I do have some data collected by Girls Go Digital themselves at a scholarship camp.

At the scholarship camp location studied, 50 girls attended for one week sponsored by a local charity. This camp took place while we were in the midst of developing our survey instruments, and leadership at corporate decided to go ahead and conduct a survey themselves while they had access to this population of girls. The survey instrument they used was the original Computer Self-Efficacy Scale, which had not yet been updated to address outdated computer tasks. Still, the results on that first question about confidence alone are dramatic. The camp used the likert scale in reverse, so high confidence ratings are closer to one. Girls' Monday mean confidence with technology was 2.16, and their Friday mean was 1.36, which means girls confidence increased by 0.80 for a statistically significant effect size of 1.037. This is more than double the effect size of confidence improvement for the main survey population, and far above Hattie's threshold for meaningful change. Though this is just one limited measure, it makes sense that camp would have a much stronger impact for girls attending on scholarship, who

may not have access to the same kinds of technology resources in schools or parents working in technology as Girls Go Digital's normal clientele.

A finding like this about the difference in impact for girls attending camp on scholarship again calls the ethics of for-profit engagement into question. Though Girls Go Digital was also struck by these findings, they are still a for-profit company, and aren't going to suddenly become a non-profit in order to make a bigger impact on girls with more need. However, I do see a path forward in collaborating with Girls Go Digital to find ways to offer more scholarships in order to bring Girls Go Digital's impacts to more diverse students. I'll elaborate on my proposal in Chapter 5.

3.3 Quantitative Conclusions

In all, Girls Go Digital has a significant positive quantitative impact on girls' technology self-efficacy and attitudes. Camp's effect on self-efficacy is much greater than its effect on attitudes. Self-efficacy, or girls' confidence in their technology abilities, was the main target of the study, as the research shows that it is a strong predictor of girls' likelihood to pursue STEM interests. Self-efficacy also made sense to target at a girls' technology camp, where instruction aims to build girls' technology experience and skills in a supportive all-girls environment. The data confirms that camp is building girls' confidence.

Further research is warranted to understand how attitudes about technology impact behavior and how these attitudes are shaped at camp, like how attitudes about technology's importance and enjoyability may connect with girls' pursuit of STEM interests. Growth mindset is an area where previous research has shown its importance to girls' persistence with STEM, and attitude indicators of study habits and

motivation/persistence did increase at camp and are correlated with girls' self-efficacy scores. However, study habits and motivation/persistence gains were modest, and growth mindset is an area in need of more robust measurement at camp as well as perhaps further targeting in camp design. Girls' gains in creativity and empathy, though not identified as targets needed for growth in order to encourage girls in STEM, do reflect the implementation of technofeminist principles in the design of Girls Go Digital camps. The strategy of connecting girls' desire to help people with the possibilities of technology is supported by previous research, and this study shows that Girls Go Digital's camp design is further strengthening girls' already strong creativity and empathy, and this may also be playing a role in creating a space for girls to build their technology confidence and interests.

Girls interest in technology careers was not as strong as girls' interest in a career helping people, but girls' technology career interest did grow more dramatically at camp. Girls did not show a change in agreement with gendered technology stereotypes, which they already rejected coming into camp. Parents' perceptions of their children support the pre- and post- test data from the students themselves. Parents identified their daughter's interest and aptitude in technology before camp, and many enrolled their child in camp to support that interest. Parents overwhelmingly agreed that Girls Go Digital built girls' confidence in their technology abilities and that staff had a positive impact on their child.

In the next chapter, I'll further explore what may be producing these quantitative outcomes at camp, connecting the design of the camp with instructors' reflections on their role at camp.

CHAPTER 4: INSTRUCTORS AS ACTIVIST TECHNICAL COMMUNICATORS

The girls' survey shows that Girls Go Digital is having a statistically significant positive quantitative impact on girls' confidence in their technology skills. Camp is also having a positive impact on girls' interest in technology careers and attitudes relating to technology, though these effects are not as large. In this chapter, I want to delve deeper into exploring what specifically is happening at camp that may be leading to these effects. I've already given an overview of how Girls Go Digital is designed to reach girls, and we can reasonably infer that the design of Girls Go Digital has something to do with its impact. In this chapter, I want to add insights from camp staff, who are the ones on the ground delivering instructional content and facilitating the camp experience, as well as my own autoethnographic observations from five summers of Kids Go Digital and Girls Go Digital camp experience.

To be clear, here we are leaving the realm of quantitative proof and entering the realm of qualitative evidence. The girls' survey results show that the intervention--one week of camp at Girls Go Digital--had a positive impact on girls' technological self-efficacy, but the survey can't point to what it was about the intervention that caused the impact. Qualitative evidence can help fill in the gaps to piece together a more holistic picture of how camp is impacting girls. While humanities researchers are likely comfortable with such experiential modes of knowledge creation, I am striving to have this project speak to STEM audiences as well, and as such I want to be both clear and careful about my qualitative claims. This chapter will use qualitative and quantitative survey data from instructors as well as my own autoethnographic experience to explore

what strategies seem to be having the biggest impact on girls at camp. While I cannot claim causation from this data, I do believe that instructors' trust-building methods emerge as essential to creating camp's positive effects on girls' confidence. I will argue that these trust-building techniques are relevant for consideration for the field of technical communication.

4.1 Girls Go Digital Staff Profile

Before we dive into Girls Go Digital's staff's techniques, first let's address who Girls Go Digital employees are. Kids Go Digital recruits its staff primarily from college campuses, so instructors wind up being a lot of undergraduate students in STEM fields, or sometimes students in non-STEM fields with some technical savvy and experience working with kids. Instructors are also occasionally graduate students or teachers seeking summer employment. Management staff come from a wider range of backgrounds (education, healthcare, technology, childcare, graduate students) and tend to be older than instructors. Each camp location has a dedicated camp director to manage daily camp operations and supervise instructors, which is the role I played at a variety of camp locations for five summers. Girls Go Digital staff are usually handpicked by hiring managers (a role I also played for one season) from the general pool of Kids Go Digital applicants. Applicants select which branches of Kids Go Digital they are most interested in, and hiring managers try to find staff for Girls Go Digital who relate to the camp's inspirational goals.

Table 8 shows the breakdown of staff roles for the 37 Girls Go Digital staff survey participants. The survey allowed participants to select more than one role, as staff may have different positions for different weeks of camp. Lead instructor is a hybrid

management/instruction role, so lead instructors would have selected both “lead instructor” and one or more instruction subject area on the survey.

Table 8: Survey Participant Camp Staff Roles

Staff Position	**Count**	**% (of 37 respondents)**
Director	4	10.81%
Assistant Director	1	2.70%
Lead Instructor	9	24.32%
Programming Instructor	15	40.54%
Design/Game Design Instructor	7	18.91%
Photography/Video Instructor	14	37.83%
Engineering/Robotics Instructor	9	24.32%

To try to understand where staff were coming from in their own lives as they worked at camp, I asked about their motivations for working at Girls Go Digital and about their own goals in STEM. As Shown in Figure 4, staff motivations for working at Girls Go Digital were varied, of course including financial needs and the desire for more professional experience, particularly with technology. Serving as a role model was identified as a motivation with moderate frequency by 15 staff members. One instructor commented, “I would have loved a program like [GGD] at 10-15 yrs old, so I'm extremely passionate about the opportunities provided to the girls and the culture of support that's fostered.”

Asked if they intend to pursue a career in a STEM field, 32 respondents said yes, 4 said they were unsure, and 1 said no. Asked to rate their top reasons for their decision whether to pursue STEM, the clear top response was "enjoyment of STEM work," as shown in Figure 5. Other top answers included "potential impact of STEM work," "earning potential," and "aptitude for STEM subjects." I think there's something to be teased out from these responses about enjoyment of STEM work as more important than simply being good at it. This finding resonates with Weinberger's (2005) finding that it's frequently not the top math and science students who wind up in those fields. Or, instructors' responses here simply indicate that their passion for STEM matters more to them than their talent for it. The literature on girls' pursuit of STEM seems to have a bit of a gap when it comes to "enjoyment," instead framing individuals' likelihood to pursue a career path through measures of interest, values, self-efficacy, etc. The girls' survey results showed their scores for enjoyment of technology to be slightly lower than most other attitude scores.

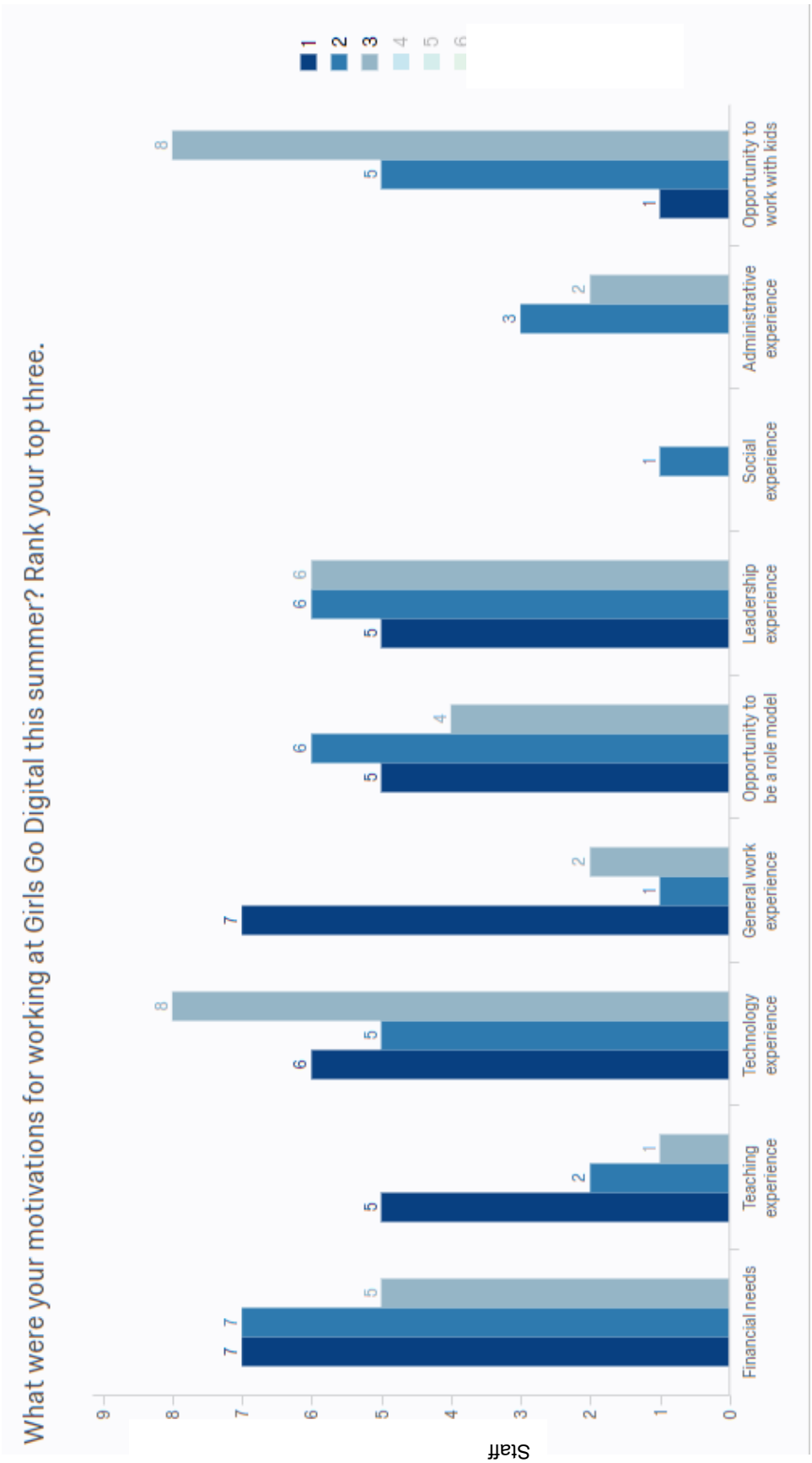

Figure 4: Instructors' Motivations

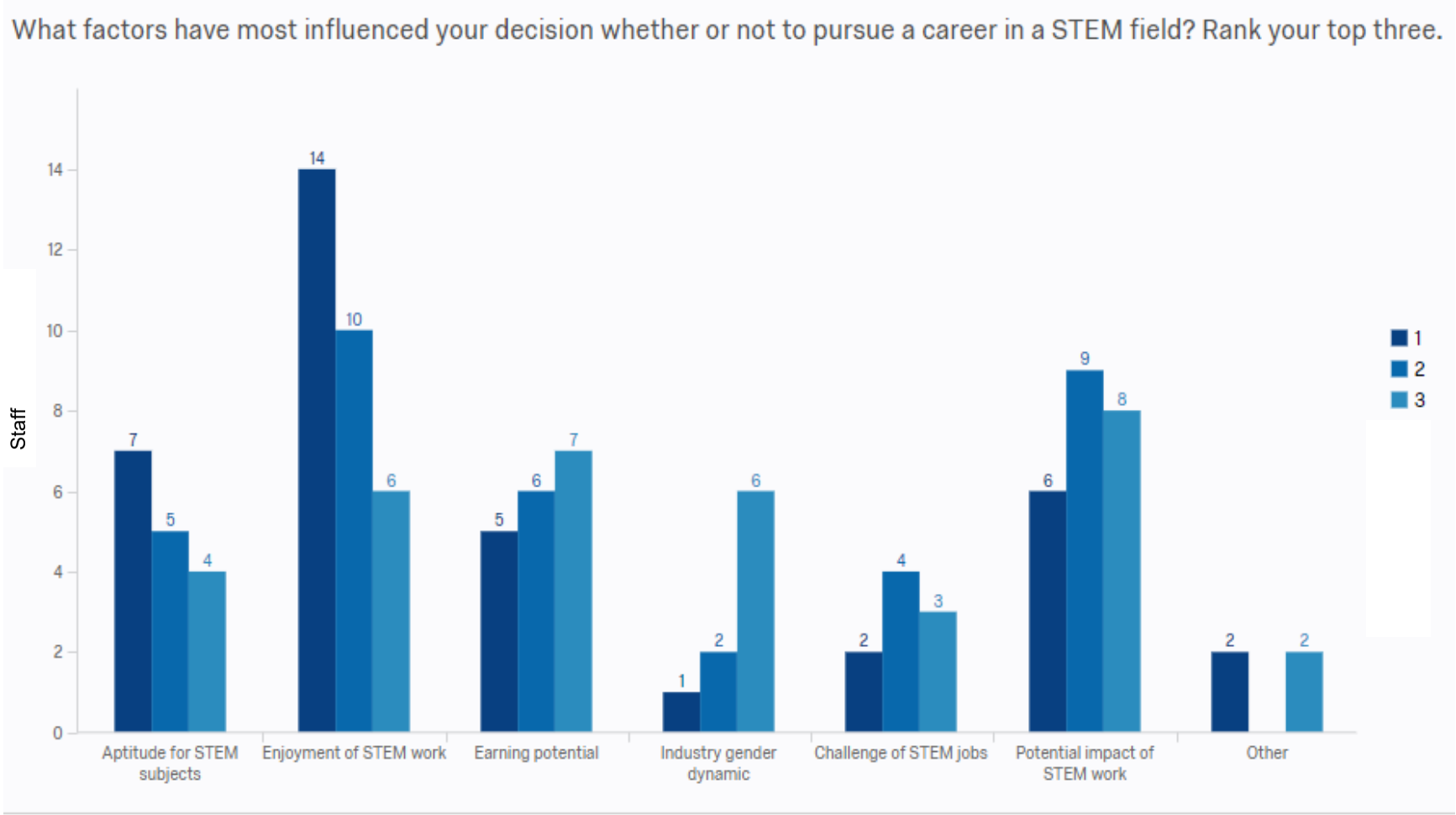

Figure 5: Instructors' STEM Career Influences

This result from instructors about the significance of their enjoyment in STEM leads me to wonder about the relationship between confidence and enjoyment of STEM work. I would think that the ability to foster such enjoyment, enough to want to pursue STEM as a career, must be somehow connected to confidence, though I didn't ask instructors explicitly about their confidence in their STEM skills. Do you need to have a base level of confidence in your ability to do something in order to really cultivate your enjoyment of it? I suppose a confidence-enjoyment connection doesn't hold well with hobbies, where people frequently enjoy spending time doing things they may not excel at. But yet we know that lack of confidence leads girls away from STEM interests. It seems that both confidence and enjoyment must matter. Perhaps enjoyment simply offers an additional lens for strategizing approaches for intervention at camp. One instructor's comment about her role at camp seems to encompass fostering enjoyment as part of her holistic aims: "Camp at [GGD] is a time for girls to have fun, build confidence in themselves and learn new skills. My job is to be a mentor and role model for these girls through teaching them those new skills so they can experiment with what they want to do."

Instructors' answers about their reasons for pursuing STEM careers also show that aptitude still matters, as does the ability to connect their work to positive impacts on the world, as the design of Girls Go Digital echoes with its social entrepreneurship theme. The industry gender dynamic received only nine votes in respondents' top three reasons whether to pursue a STEM career, but one respondent did poignantly note, "I started out in this field of study because I wanted to help the gender dynamics in the working field, but now the gender dynamics are why I am very close to giving up." Another instructor

elaborated on the development of her interests, echoing two different influencing factors documented in the literature: role models and potential for impact, plus possibly a growth mindset. She says:

> *I grew up in a family of engineers so I've always seen going into STEM as an option. The fact that I'm a girl never changed that possibility. My sister, the oldest in my family, decided to become a chemical engineer and because of that I always believed that girls could be engineers too. I've always loved math and science, and I truly have a hunger for learning. Knowing that going into engineering is giving me the tools I need to possibly change the world for the better is SO exciting.*

In all, Girls Go Digital staff tend to be capable young women on the path to pursuing a career in STEM. They have a variety of understandable reasons for seeking summer employment with Girls Go Digital, like financial needs and wanting to develop technology and leadership experience. By their own accounts and by the fact that they were recruited to work at Girls Go Digital in the first place, we can conclude that Girls Go Digital staff are conscientious of the gendered barriers facing young girls interested in STEM, and many explicitly sought out the opportunity to make a difference for young girls like themselves. Next, we'll see how Girls Go Digital's staff's backgrounds come to bear on what happens at camp.

4.2 Instructors' Role at Camp

In order to get at what might be leading to Girls Go Digital's positive effects on girls' confidence, I wanted to ask instructors about how they conceptualized their jobs. However, I didn't just want them to list their responsibilities, which of course include

keeping kids safe and supervising them for the day. I wanted to find out what staff see as most important to what they do. As shown in Figure 6, staff were asked to rank the top three most important things to their role at camp from a list of 10 choices. By far, the choice most frequently rated most important was "building girls' confidence." The most common number-two rated choice was "encouraging girls' interests." Both choices far outnumber the third most commonly selected choice, "explaining course concepts." 27 instructors chose "building girls confidence" as among the top three things they do at camp, 24 instructors chose "encouraging girls' interests," and 14 chose "explaining course concepts." "Leading social discussions" and "giving individual feedback" rated lowest, with 2 and 3 selections respectively. If the primary question of this chapter is, how are camp staff building girls' confidence at camp? One answer is clear: they're doing it intentionally.

These results are actually surprising to me. Girls Go Digital instructors were hired to teach STEM courses, yet explaining course concepts and other traditional teaching tasks weren't in camp staff's top two answers for what is most important to their role at camp[3]. I also want to put this finding into perspective: camp staff are not trained on the research about what leads girls to persist in STEM. They haven't read my previous chapters about targeting girls' confidence. Camp staff identified "building girls' confidence" and "promoting girls' interests" on their own as more important than the actual instruction that they do at camp.

[3] Management staff, who usually don't teach, are also included in these results, but not in high enough numbers to nullify the results here.)

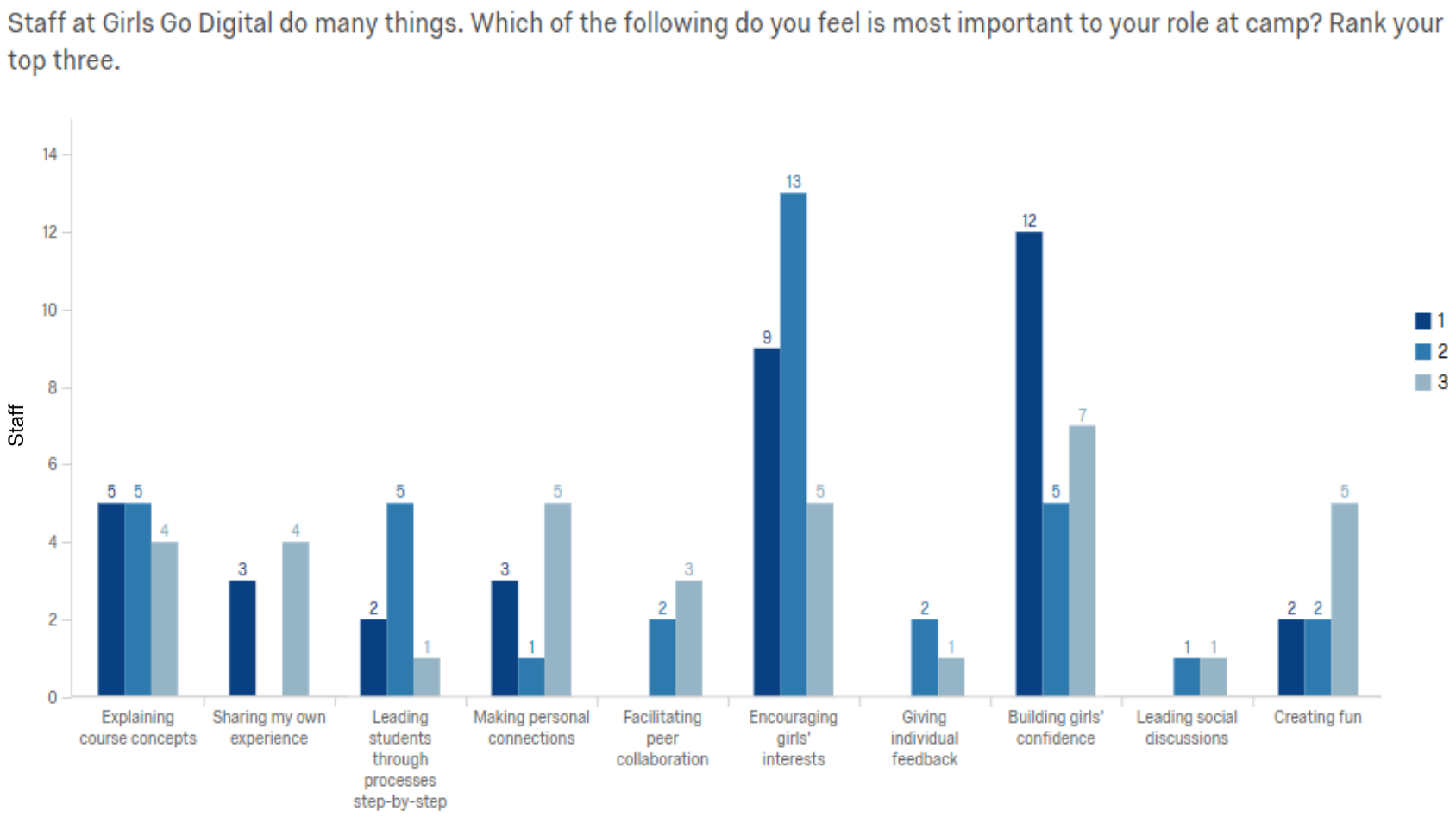

Figure 6: Instructors' Priorities at Camp

Why aren't Girls Go Digital staff trained on the importance of self-efficacy? Well, after this study, I'm going to propose that they are (as I'll elaborate on in Chapter 5). Staff training for Girls Go Digital staff is primarily integrated with the rest of Kids Go Digital. All new instructors receive a weekend of training on supervising and caring for children, teaching techniques and lesson planning, safety and emergency protocol, and camp culture and games. Girls Go Digital staff is separated for special sessions on the daily camp schedule and camp culture. The camp culture sessions are where staff and managers do discuss what makes Girls Go Digital unique as a camp and talk explicitly about its girl empowerment aims, along with ideas for how to foster community at camp. But trainers don't explicitly say, "Building girls' confidence at camp is more important to your job than actually teaching them the skills we've hired you to teach." In all, I'd say that Girls Go Digital training doesn't ever refute the importance of building girls' confidence, and it may very well be a contextual message that staff take from how camp is discussed, but they also aren't fully brought in on the research about the importance of girls' confidence to STEM persistence.

Even without training on the research, many staff comments go beyond simply prioritizing building girls' confidence and encouraging their interests to get to the heart of what the research shows about how girls relate to STEM. One instructor comments:

> *Skills can be learned, confidence and a love for oneself comes from hard work on yourself and from external stimuli. I find my most important role this past summer was not teaching the concepts, but instilling positive attitudes and the desire to grow as creatives, helping to grow confidence in students to try new things and express themselves freely.*

This instructor identifies that it's girls' mindset toward learning and self-belief that help them succeed in STEM fields as they grow up, and these factors can be influenced socially. The "skills can be learned" intro suggests a stance like the literature shows that with the personal armor of confidence, the skills are an easier task.

Another instructor, incredibly, seems to address nearly all the research in her conceptualization of her role at camp, even influencing factors that weren't available answer choices. This quote is long, but worth considering in full to illustrate the experience and awareness that staff bring to their work at Girls Go Digital (and to let the instructors speak for themselves):

> *Given the way we socialize children and the sometimes vicious nature of secondary education, I think it's tough for a girl to be confident in herself. I think it's even harder to maintain whatever confidence you do have as you go on through life, so it's important to try to give these girls the most solid level of confidence possible in a one week course. That doesn't necessarily mean teaching them everything there is to know about the subject, but letting them know that learning is a process and it's okay to make mistakes, and that everyone is capable of improvement. Also encouraging them to ask questions, letting them know that there are no dumb questions when it comes to learning. Encouraging girls' interest in STEM is pretty self-explanatory, but I do want to elaborate on my third choice. I've been to a handful of conferences . . . and I think one of the most valuable experiences I had was hearing about other people's journeys and the paths they took to get where they are. Realizing that life is an entire process of*

self-discovery and that I don't need to know exactly what I want to do and that I'm not a failure for NOT having my dream job yet was invaluable.

This instructor identifies not only the importance of building confidence, but also shows an awareness of the finding that girls tend to lose their confidence through middle school. Next, she points to fostering girls' growth mindset for learning, teaching girls that "it's okay to make mistakes" and "everyone is capable of improvement." Growth mindset wasn't even directly an answer choice (in hindsight, it should have been), but this instructor seems to understand that girls may be brought up to think that school is about being inherently smart and to struggle is bad. The instructor also suggests that shifting girls' learning mindset is more important than the content instruction, that camp "doesn't necessarily mean teaching them everything there is to know about the subject." Finally, she makes an observation about her selection of "sharing my personal experience" as her third most important role at camp, which was a seldomly-selected choice. Her response here aligns with the research on the impact of role models, that seeing someone like you succeed can build up your own self-efficacy. Here, the instructor also adds that being transparent about challenges helps even further to innoculate against a fixed mindset and giving up.

This instructor's seemingly intuitive alignment with the research on what leads girls to persist in STEM, without explicit training, shows the value of staff bringing their own experiences as girls learning STEM to bear on their work at camp. As the survey demonstrates, most Girls Go Digital staff are themselves women trying to pursue careers in STEM, so they've faced and persisted through the barriers that the girls at camp are heading into. It makes sense that they would naturally understand the importance of

building girls' confidence over concrete skills, even though I was initially surprised at staff's lower prioritization of the content they were hired to teach. However, I think it also makes sense to go ahead and make explicit the priorities for encouraging girls' persistence when training staff. Though confidence is already being intentionally targeted by staff and leading to impacts for girls at camp, other persistence factors may be less intuitive for staff. For instance, the instructor above was one of only a few to prioritize sharing her own experience, which is an important part of role modeling and mentoring and can also lead to positive self-efficacy gains. I lay out my proposal for new staff training measures in full in Chapter 5.

Girls Go Digital staff show an intentional prioritization of building girls' confidence and encouraging girls' interests at camp, drawing on their own experiences growing up as girls interested in STEM. Instructors' efforts must be contributing to the positive impacts that camp has on girls' confidence working with technology. However, these results still don't quite get at how instructors go about targeting girls' confidence in the context of camp. In the next section, I'll put forth my theory of how instructors use trust-building tactics as part of their technical communication of course content in order to encourage girls.

4.3 Activist Technical Communication through Trust-Building

At this point, the survey data has shown that camp positively impacts girls' confidence, and that instructors are intentionally targeting girls' confidence in their work with campers. Now, I want to offer a theory about how instructors are enacting this intentional confidence-building, based on more instructor comments and my own experiences at camp. I am consciously venturing out on an analytical limb here. As I've

mentioned, my study originally intended to include case study observations at camp, which would have bolstered conclusions about what qualitatively is happening at camp that leads to its quantitative impact. However, I still believe it's worthwhile to put forth a theory for what's going on at camp, even as I recognize that further research is needed to support these claims. Ultimately, I want to argue that Girls Go Digital instructors are activist technical communicators using integrated trust-building tactics as part of their instruction in order to reach girls.

First, let's address the activism claim. Though Girls Go Digital as a company has shyed away from explicit "feminist" and "activist" language to maintain political neutrality for clients as much as possible, I believe camp staff (and corporate leadership really as well) are aware of and intentional about doing activist work. As illustrated in Chapter 3, the camp is designed intentionally to target factors that studies show influence girls to pursue STEM. And instructors' survey responses show their intentions of intervening in girls' STEM development by promoting their confidence or directly seeking the opportunity to play a role for girls they wish someone had played for them. Staff may disagree about whether they conceptualize this work of building girls' confidence at a STEM camp as a political act, but by technofeminist standards, Girls Go Digital staff are doing on-the-ground activist work to change the gender balance of STEM fields. Some instructors are very explicit about their aims, as one comments about her priorities at camp: "They can go out and have fun anywhere. Girls are constantly pushed to fix the world's problems regardless of their experience or preferences, but I wanted to be able to build girls confidence and give them skills they can use when fighting for themselves." To me, this comment suggests some indignation at the way girls

are socialized to be helpers, and perhaps this instructor isn't entirely happy about the "social impact" theming of camp. But she does clearly care about helping girls to persist in STEM fields, using the strong language of "fighting for themselves" to show her awareness that girls' success in STEM is indeed a fight. Arming girls for battle sounds like activism to me.

> Another instructor expressed more direct disagreement with the camp's design: *I think for an all girls camp to be successful, it simply needs to be an all-girls version of a "normal" technology camp. I feel like the extras of motivation talks and social advocacy felt unnecessary and sometimes rather pandering. It's enough to meet and learn from women who are studying STEM — the girls would have more fun without the extra stuff.*

This comment comes back to the debate about the girliness of camp discussed in Chapter 3. It's going to be more effective for some students than others, but theming the camp around social impact discussions does align with the research that shows girls are strongly interested in helping people. At my own camp, I vividly remember one film class where the girls drove all of their projects toward creating a campaign against animal kill shelters. It was one of the most energized and collaborative weeks of camp, because the girls tapped into a real-world impact that they could use their new video skills to rally behind. The girls even exchanged contact information at the end of the week to continue collaborating toward putting their message out into the world. This weight of thinking about real-world impacts also resonates with my own service-learning work, where students often become more committed to their projects for class when they are working with real clients.

But to this instructor's point, I do want to note that the social impact theming of camp can be executed with varying degrees of effectiveness and authenticity depending on the specific camp location's staff and leadership. "Girl power" messaging can easily become sappy, and Stowers & Barker (2010) show that inauthenticity or overly positive encouragement without nuance in mentoring relationships can backfire. The risk of becoming "pandering" in motivational and social advocacy talks may provide further support for the need to be clear in training about the importance of confidence. If staff are aware that girls' confidence matters so much to their persistence in STEM, methods for targeting it can be discussed more explicitly, including how to avoid generic encouragement that rings hollow. In any case, the instructor's comment disagreeing with the design of Girls Go Digital is a disagreement of methods rather than aims. While staff may have differing perspectives about how best to impact girls, they seem to agree that encouraging girls to pursue their interests in STEM is an act of activism.

Next, let's address the elephant question in the room: what does Girls Go Digital's activism have to do with technical communication? My argument is that instructors' activist confidence-building work is inextricable from their instruction of technical skills in the context of camp. From my own experience directing a Girls Go Digital location, here's how I've seen instruction work: The best instructors build trust with their students. Yes, there are basic teaching skills at play--can you explain a concept clearly? Can you walk students through the process one step at a time in a way that they can follow? These are traditional measures of technical instructions. But in the camp setting, teaching is very personal, with a maximum of only 10 students per class and often fewer. Really instruction at Girls Go Digital and Kids Go Digital is a hybrid of

teaching and one-on-one tutoring, with a strong emphasis on coaching students through personalized individual projects. All the best Kids Go Digital instructors are good at building personal relationships with students and encouraging their interests too. But when paired with the activist design of Girls Go Digital and instructors' explicit aims to make a difference for girls, those connections somehow take on different meaning.

To illustrate: I watched one teenage girl become the shadow of her photography instructor. Both were African American, and my instructor sharing her own path to follow her artistic dreams seemed to ignite something for the student, who came into camp very hesitant and quiet, and left proudly with a portfolio website, having given a national TV interview, and beginning to take on the role of mentoring younger girls at camp. The instructor took time to build trust with this student through personal connection, and that encouraged the student to open up and absorb not only new photography skills, but build confidence in pursuing her interests. I could envision the same student at a Kids Go Digital camp learning how to use a camera, but otherwise staying just as reserved and uncertain as when she walked in. In fact, I saw many girls react this way at mixed gender Kids Go Digital camps. To reach some girls who lack confidence or feel uncertain or influenced by stereotype threat, this careful building of trust is a necessary activist tactic.

One instructor effectively points to what I'm getting at when talking about her priorities at camp:

> *So many girls at the age they're at are self-conscious and have low self-confidence. However, they obviously don't want to admit that and instead are either quiet or even rude to other girls. Once they realize they are in an*

> *environment where they can truly be themselves and be rewarded for that instead of judged, it makes everything else that much simpler. I saw a huge difference from day one and the end of the week.*

This instructor observes the change that I myself witnessed many times over at camp, and that is demonstrated in girls' pre- and post-test surveys. Their confidence grows. This instructor identifies the camp environment as enabling that change, and I agree with this analysis. However, I think it's the staff that really makes this happen; they're facilitating the camp environment. What the instructor is pointing to here as "everything else" becoming simpler, I want to argue includes instruction. In order for the girls to digest and hang onto those technical skills that instructors are guiding them through, instructors have to build trust with them first. As much as the technical instruction itself, girls learning STEM need emotional support and encouragement. As the studies show, the skills by themselves don't matter--it's confidence that gets them to continue with STEM. And instructors infuse that confidence by encouraging girls right alongside and intertwined with their technical instruction.

Another example illustrating how I see the trust-building as intertwined with the technical is how skillful instructors respond to girls' frustration in class. At Girls Go Digital, tears aren't uncommon. Girls are working pretty persistently on a project for several hours a day for a week. Though the work is broken up with breaks and activities, they are still learning a lot of new content in a short period of time. And, especially given the research showing girls are more often socialized to have fixed learning mindsets, it makes sense that sometimes girls are going to hit a wall of frustration with their work. Responding to girls' emotions during frustration is an important part of instructors' job.

The best instructors really listen to girls' frustration, then convey the growth mindset message that frustration is okay, and it doesn't mean they aren't smart. They walk girls through where they're stuck, then have the girls demonstrate the skill they got stuck on to prove that they now understand it and to rebuild girls' confidence after a small failure. The question becomes: are instructors' strategies for rebuilding students' confidence part of their technical communication? Or is the "technical" communication limited to just the clarification of the steps the student has missed? My argument is that the emotional work and the technical instruction work here can't be separated--both are part of Girls Go Digital's activist technical communication toolkits and deserve consideration as technical communication techniques.

Another instructor's comment reinforces this relationship between the technical and the personal:

> *I felt that an important part of the program was using the course material to allow the girls to explore their personal interests so they could become more confident sharing what they are passionate about. I had a couple of girls share with me [some] big dreams that they had for their futures and I just encouraged them to keep planning and sharing ideas, and also offering ways they could use what they learned in photography to help that dream become reality.*

This instructor emphasizes how she's "using the course material" to facilitate her encouragement of students' interests—she's connecting her technical instruction to her emotional support, and proposing new pathways for the girls to pursue is also part of the same work. As these instructors point out, the technical instruction and the more emotional, personal work of building confidence and encouraging interests are connected

tasks. And in the case of girls in STEM, it's the trust-building that's actually more important as the outcome of the technical communication, rather than the technical skills.

I see instructors' trust-building tactics as complicating traditional notions of clarity and efficiency in technical communication and pointing toward broader implications for the field. Like pushes in the 90s to expand technical communication cases to include women's communication concerns, Girls Go Digital's instructors' strategies warrant an expansion of technical communication principles to accommodate cases where the biggest concerns aren't clarity and efficiency. How would current rubrics for effective technical instructions fit onto camp instructors' techniques? An entire facet of what they're doing would be excluded, and an instructor could be deemed successful even if her student left camp in tears, so long as her steps were accurate.

I also see trust-building not just as a one-off concern for girls in STEM, but an important consideration for other disenfranchised audiences too. For instance, following public health crises like in Flint, Michigan, communicating critical safety information becomes complicated by broken trust between public health officials and the public. Moore's (2017) case study of black feminist technical communicators utilizing dialogic methods for a transportation environmental impact study is certainly an example where trust-building strategies became part and parcel to technical communication efforts. For groups with a history of good reason not to trust those providing technical information, how do you actually convey the necessary technical details and rebuild trust? I see Girls Go Digital instructors' trust-building tactics as just one case needed for a wider collection of technical communication situations calling for pointed tactics of trust-building. I believe many such cases have already been written about in technical communication,

like Moore's study of a black feminist dialogic approach to an environmental impact study and Koerber's (2013) examination of the transformation of public perceptions of breastfeeding. However, bringing such cases together through the lens of trust-building could lead to generalizable strategies for technical communicators to build trust when trying to reach skeptical audiences. Eventually, integrating trust-building as a core principle of effective technical communication would be a strong step toward embracing social justice aims as central to the field.

In this chapter, I've explored instructors' role at camp in order to try to better understand how the positive gains in girls' confidence might be created. Instructors' reasons for seeking employment at Girls Go Digital are varied, but as women pursuing careers in STEM, they each bring valuable experience from growing up as girls interested in STEM that informs their work at camp. Even without explicit training, most staff identified building girls' confidence as one of the most important things they do at camp, and their comments show an awareness of an activist approach that is necessary to help encourage girls in STEM. I argue that instructors' efforts to build girls' confidence through personal connections are intertwined with their more traditional technical instruction techniques, and their trust-building tactics warrant consideration as relevant to many technical communication situations in which audiences may not trust the speaker or their goals.

CHAPTER 5: CAMP OUTCOMES AND FUTURE DIRECTIONS

Now that we've discovered that camp is having a positive impact on girls, thanks in large part to staff's explicit work to build up girls' confidence, where do we go from here? In this chapter, I'll lay out my proposed changes for Girls Go Digital based on the study's findings, future directions for girls' camp research, takeaways for others doing feminist digital literacy work, and implications for the field of technical communication.

In envisioning my project as a reciprocal engagement partnership with Girls Go Digital, it's been important since the beginning of our study to think about outcomes for camp. Girls Go Digital has expressed interest in using the findings of the study as a public relations tool to show that they are having a positive impact on girls, as well as participating in knowledge-building about promoting gender equity in STEM fields more broadly. However, I think there are also some clear takeaways from the study about relatively simple changes that could be made at camp with the potential for big impact, namely with staff training. There are other, bigger changes that I would like to propose in this chapter as well for the mixed gender camps and investing in Girls Go Digital scholarships. I believe these steps are worthwhile for their possibilities for positive change, though ultimately the decision of whether to implement them is up to Girls Go Digital, and I will be working with my partners there to work through these ideas. I also want to lay out directions for future research, including another iteration of this study to include new survey measures, instructor interviews, and case studies at camp. A longitudinal study is also a logical next research step to investigate what happens months and years after girls leave camp. Do they persist with their STEM interests?

In thinking about the scholarly implications of the study, I believe there are a number of transferable takeaways for others creating digital literacy interventions, including intentional design of the experience and training for staff/volunteers. This research contributes to the body of work on how particular literacies get promoted for particular groups, and offers a case study for the process of targeting the development of a particular literacy for a particular group. For technical communication, girls STEM camps offer an example of how technical communicators can build trust with a skeptical audience in order to break down barriers to the communication. Further case studies are needed to build a generalizable toolkit for trust-building in technical communication.

5.1 Changes for Kids Go Digital to Maximize Impact

Explicit Research-Based Training for Girls Go Digital Staff: One of the biggest takeaways from the study is that instructors are already being intentional about building girls' confidence about camp. Though we can't prove causation, girls' confidence at camp showed the strongest gains of the attitudes measured, which suggests that instructors' intentional efforts may be working. So why not make all efforts toward impact at camp even more intentional, by bringing staff in on the research about factors that most influence girls' persistence in STEM? While building confidence and encouraging girls' interests seem to be intuitive tasks for staff who have themselves grown up as girls facing barriers to pursuing their STEM interests, some influencing factors from the research may be less intuitive. For instance, growth mindset seems to be a lesser-known challenge for girls in STEM. It wasn't until this project that I realized I was totally guilty of having a fixed learning mindset as a child myself. Some feedback from the parent survey also supports the need for training on growth mindset for staff:

> *I was surprised by the feedback the counselor gave to the children at the end. It was very focused on being nice, and helping others, and being positive every day rather than their technical progress and achievement - she also used "smart" and "she was a natural" which is fixed mindset language and something we are trying not to use. It would have been great to hear "she worked so hard", "she figured out that you had to make sure the objects were connected by rotating the picture", "she explored outside of her comfort zone"*

While some staff in the survey discussed their intentional work to shift girls' learning mindset, not everyone is familiar with this issue, and explicit training is an easy measure that can be taken to remedy well-intentioned missteps like the one this parent describes. Giving instructors an introduction to the research on factors that influence girls' persistence in STEM can help better equip them to make the most positive impact possible, and encourage discussion of the best strategies to do so.

Briefly, here's how I would lay out such a training session. Replacing one of the Girls Go Digital camp culture sessions, I would call this training something like "Impacting Girls at Camp: Research-Based Strategies for Encouraging Girls in STEM." I would organize the session to walk through one factor that impacts girls at a time, providing an overview of what studies show, then providing practical examples of how to act on the research at camp, and activities to discuss and practice strategies. Factors to address should include: confidence/self-efficacy, growth versus fixed learning mindsets, role modeling and mentoring, stereotype threat, and connections to interests. Trainers can discuss how to implement key strategies, like how to promote growth mindsets by providing effort-based praise, and the importance of staff sharing their own paths in

STEM and discussing possibilities for the girls to pursue their own interests. Even for building confidence, which many staff members already know is important, it can't hurt to make goals explicit to make these impacts a more intentional part of camp, not just by the camp's design but through instructors' jobs as well.

Small Changes for Inclusivity at Kids Go Digital: The question about Girls Go Digital's design that I struggle the most to answer is why the boys don't also get taught about helping people. As some staff articulated, girls tend to be socialized from a young age that they should help people. Women tend to go into "helping" professions like nursing, childcare, and administrative assisting at disproportionate rates. I think Girls Go Digital's design to incorporate social advocacy themes makes sense as a tactic to try to help girls see that STEM can connect to their existing interests in helping people. But I also think that Kids Go Digital has an opportunity to make a difference in the gender dynamic in STEM not only by encouraging more girls to pursue it, but also by helping to make the next generation of male technology leaders more inclusive, and thereby perhaps influencing the problematic sexist culture that exists in so many STEM workplaces today. Girls shouldn't be the only ones responsible for helping people. I'm not proposing that mixed gender Kids Go Digital camps become just like Girls Go Digital, because I know the existing camp culture is the reason so many kids of both genders love Kids Go Digital. But, there are small changes that could be made at mixed gender camps to help push back against the gendered socialization that contributes to girls feeling uncomfortable in STEM fields. For instance, why not make collaboration a more explicit emphasis at Kids Go Digital? The boys don't have to sit on pink bean bag chairs like the girls do, but more encouragement for collaborative activities could go a long way. Right

now collaborative activities are an option for instructors to incorporate, but it really varies by location how often they are practiced.

One collaborative practice that Girls Go Digital does that would be easy to integrate at all camps is project elevator pitches. The girls write and practice mini-presentations about their projects, which they practice with each other and then present formally to all parents at the end of week showcase. Elevator pitches help to build leadership skills, but they also help to break students out of singular focus on themselves. They become part of a community with their classmates, responsible for listening to others' ideas and sharing their own, and conceptualizing how their work contributes to wider conversations in their field. I tried elevator pitches at my own mixed gender camp for a few weeks, and the initial resistance we saw from some of the boys is precisely why I think this is a valuable measure. It pushes students to grow in collaborative ways that we are promoting with girls; we should promote such collaborative skills with boys too. Maybe it will help down the line when these boys become young men who need to collaborate with young women on developing an app for a college course or in the workplace.

Sponsoring More Scholarship Students at Girls Go Digital: As the results from the survey of girls attending Girls Go Digital on scholarship showed, camp has the potential to have an even more dramatic impact on girls who don't come from the privileged backgrounds of Girls Go Digital's usual clientele. This scholarship-only camp week was sponsored by an outside organization, but Girls Go Digital also provides a limited number of scholarships for girls at locations across the country. I believe it is an ethical imperative for Girls Go Digital to find avenues to sponsor more students to attend

camp on scholarship; of course, the challenge lies finding the funding to do so. Girls Go Digital leadership has told me that they've tried to seek partnerships with technology companies to sponsor more scholarship students, but they haven't received much interest in return. I wonder if it'd be possible to leverage results from this study to help convince technology companies to use sponsoring scholarship students at camp as a public relations opportunity.

Right now, we have the results that show the greater confidence gains for scholarship students, but I believe there's also a broader argument to be made about the value of diversity at camp. The national survey aimed to identify individual girls attending camp on scholarship, in an effort to see if having scholarship students at camp would change the experience for other girls as well. Unfortunately, too few scholarship students took the survey (or self-identified) to be able to investigate these effects, so this would be a measure to reformulate in future iterations of the survey. However, at the beginning of the study, I did interview a Girls Go Digital camp director who hosted a pair of scholarship students one week at camp and observed a change in the camp dynamic. She brings to her interpretation a background as a PhD student in sociology who studies working class family relationships and how teen media impacts girls[4]. Here's what Grant (personal communication, 2017) had to say about the camp week with the girls attending on scholarship:

> *Everything was more meaningful. Campers were so nice to each other. Because they were so open about being scholarship kids, it changed the whole way camp worked. Like none of the campers there told me about the fancy trip they go on*

[4] She is also my sister, Annaliese Grant. Our conversation early on about her unique experience and its relationship to her background in class and gender was formative to the study.

> *with their private school like they usually do every week. Other campers who had other struggles who were there overnight--like one camper was bulimic, and she came to me [and talked to me about it]…There was just a camp full of girls who ended up being extremely close, even though it was the most awkward first day, because they ended up--they were so open about what their backgrounds were. And even though we had these upper class girls from private schools that usually didn't get that much out of it, there was a noticeable connection between all the girls...it seemed to me that it was because there was so much openness about backgrounds.*

As Grant explains, having girls from diverse backgrounds changed the camp dynamic for everyone. As the more privileged students saw that other girls have had different experiences than their own, they were able to put their own experiences into a broader context and learn to share across difference. I hope that we can build on this case for diversity at camp in order to persuade tech companies to sponsor more students as part of a publicized diversity initiative.

5.2 Future Research Avenues

Second Iteration of Girls Go Digital Study: I believe another iteration of the present study is warranted to expand on the current findings. A second iteration of the student survey would allow for more complete measures of girls' learning mindset, additional exploration of technology enjoyment factors, and more systematic inclusion of girls attending camp on scholarship. Additionally, the scope of the study could expand to include interviews with instructors and case studies of particular camp weeks, which

would enable deeper understanding of how the positive gains for girls' confidence are being produced.

Longitudinal Study: It's great to demonstrate that Girls Go Digital is building girls confidence over the course of one camp week, but further questions remain about the long-term impacts of camp. How likely are Girls Go Digital attendees to wind up majoring in a STEM subject in college? How do they reflect on the impact of their Girls Go Digital experience one year later, or as adults? Do the gains in self-efficacy stick over time? There is potential here for a larger study to follow Girls Go Digital graduates over time, which could offer extensive insights into the factors that shape girls' pursuit of STEM interests as they transition into adulthood.

5.3 Takeaways for Digital Literacies and Technical Communication

Digital Literacies: For others doing technofeminist intervention work with young girls, I hope that this study has provided insights for your own camp or mentoring program design. I found by reviewing the literature on girls and STEM that there are a plethora of factors known to influence girls' persistence, and that many of these factors are possible to target at camp through intentional design of the girls' experience. Though it won't be a perfect fit for all girls, it seems that "girliness" in camp design can indeed be a valuable attractor to camp for girls who are otherwise intimidated by male-dominated settings, particularly if you can help girls connect the impact of STEM work to their other interests, like helping people. It also seems that some factors influencing girls necessitate more planning and training than others. Girls' confidence showed the most growth at camp, and many instructors intuitively knew to target it based on their own experiences as girls in STEM. Growth learning mindset, on the other hand, is a concept not everyone

will be familiar with or able to promote with students without some explicit training. Like the lessons coming out of the Digital Mirror Camp (2011), I found instructors' role modeling and mentoring by making personal connections with the girls to be incredibly impactful in encouraging girls to be more confident and pursue what interests them.

More broadly for rhetoric and composition, this study contributes to the body of work on how particular literacies exist in a literacy economy, and some are promoted for particular people over others. In this case, despite decades of efforts to change gender distributions, technological literacies remain more accessible for boys and men than girls and women. This study demonstrates how such unequal literacy distributions can be targeted for intervention. Beyond just being relevant for those who run girls' technology camps, I believe composition instructors more broadly can also adopt strategies from this study to help build trust with students hesitant about their own technological literacies.

Technical Communication: This study contributes to calls in technical communication for research that embraces social justice aims and tactics for communicating technical information involving disenfranchised speakers and audiences. As activist technical communicators aiming to promote girls' persistence in STEM, Girls Go Digital instructors utilize trust-building tactics intertwined with their transferring of technical skills. For their audience of middle school girls, the technical information doesn't matter unless their communication efforts simultaneously build up girls' confidence enough for them to want to continue to pursue STEM. This prioritization of emotional outcomes challenges technical communication's conventional emphasis on efficient communication of technical processes. I see Girls Go Digital instructors' methods as just the first case in a wider project to compile trust-building principles that

can be implemented across varied technical communication situations in order to more effectively reach disenfranchised or skeptical audiences.

Takeaways for Teaching: As both technical communication and composition instructors regularly bring technology into their classrooms, striving to prepare students for the technological adaptability that today's communication demands, this study offers some new tactics to consider. Like Girls Go Digital's instructors, we can keep in mind that some students need encouragement more than perfected skills in order to push through complex personal relationships with technology. Girls Go Digital's camp design echoes and supports pedagogies that encourage low-stakes technological play. We, too, can work to build trust with our students as mentors, in order to help build their self-efficacy and encourage a lifelong pursuit of further communication and technology skills.

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APPENDIX A: COMPUTER SELF EFFICACY SCALE (CSE)

(Developed by Murphy et al., 1989)

Please indicate the degree to which you feel confident with the statements below.

VL Very Little Confidence L Little Confidence S Some Confidence A A Lot of Confidence QA Quite a Lot of Confidence

1. I feel confident working on a personal computer.
2. I feel confident getting the software up and running.
3. I feel confident using the user's guide when help is needed.
4. I feel confident entering and saving data (numbers or words) into a file.
5. I feel confident escaping/exiting from a program or software.
6. I feel confident choosing a data file to view on a monitor screen.
7. I feel confident understanding terms/words relating to computer hardware.
8. I feel confident understanding terms/words relating to computer software.
9. I feel confident handling a floppy disk correctly.
10. I feel confident learning to use a variety of programs (software).
11. I feel confident learning advanced skills within a specific program (software).
12. I feel confident making selections from an onscreen menu.
13. I feel confident using the computer to analyze number data.
14. I feel confident using a printer to make a "hard copy" of my work.
15. I feel confident copying a disk.
16. I feel confident copying an individual file.
17. I feel confident adding and deleting information to and from a data file.
18. I feel confident moving the cursor around the monitor screen.

19. I feel confident writing simple programs for the computer.
20. I feel confident using the computer to write a letter or essay.
21. I feel confident describing the function of computer hardware (keyboard, monitor, disk drives, processing unit)
22. I feel confident understanding the three stages of data processing: input, processing, and output.
23. I feel confident getting help for problems in the computer system.
24. I feel confident storing software correctly.
25. I feel confident explaining why a program (software) will or will not run on.
26. I feel confident using the computer to organize information.
27. I feel confident getting rid of files when they are no longer needed.
28. I feel confident organizing and managing files.
29. I feel confident troubleshooting computer problems.

APPENDIX B: COMPUTER ATTITUDES QUESTIONNAIRE (CAQ)

(Developed by Knezek, Christensen, & Miyashita, 1998)

Key:

The seven subscales from the YCCI (v5.14) are
Computer Importance (I);
Computer Enjoyment (J);
Study Habits (S);
Empathy (E);
Motivation/Persistence (M);
Creative Tendencies (C);
and School (SC).
For the CAQ (v5.14) an eight subscale Anxiety has been added (A).

This survey consists of 6 parts. Within each part, read each statement and then circle the number which best shows how you feel.

SD-Strongly Disagree D-Disagree U-Undecided A-Agree SA-Strongly Agree

1. I enjoy doing things on a computer. (J)
2. I am tired of using a computer. (J)
3. I will be able to get a good job if I learn how to use a computer. (I)
4. I concentrate on a computer when I use one. (J)
5. I enjoy computer games very much. (J)
6. I would work harder if I could use computers more often. (I)
7. I know that computers give me opportunities to learn many things. (I)
8. I can learn many things when I use a computer. (I)
9. I enjoy lessons on the computer. (I)
10. I believe that the more often teachers use computers, the more I will enjoy school. (I)
11. I believe that it is very important for me to learn how to use computer. (I)
12. I feel comfortable working with a computer. (J, A)

13. I get a sinking feeling when I think of trying to use a computer. (J, A)

14. I think that it takes a long time to finish when I use a computer. (A)

15. Computers do not scare me at all. (A)

16. Working with a computer makes me nervous. (J, A)

17. Using a computer is very frustrating. (A)

18. I will do as little work with computers as possible. (A)

19. Computers are difficult to use. (J, A)

20. I can learn more from books than from a computer.

Part 2 SD-Strongly Disagree D-Disagree U-Undecided A-Agree SA-Strongly Agree 21

21. I study by myself without anyone forcing me to study. (S, M)

21. If I do not understand something, I will not stop thinking about it. (M)

21. When I don't understand a problem, I keep working until I find the answer. (M)

21. I review my lessons every day. (S)

21. I try to finish whatever I begin. (S, M)

21. Sometimes, I change my way of studying. (S)

21. I enjoy working on a difficult problem. (M)

21. I think about many ways to solve a difficult problem. (M)

21. I never forget to do my homework. (S, M)

21. I like to work out problems which I can use in my life every day. (S)

21. If I do not understand my teacher, I ask him/her questions. (S)

21. I listen to my teacher carefully. (S)

21. If I fail, I try to find out why. (S)

21. I study hard. (S, M)

21. When I do a job, I do it well.

Part 3 SD-StronglyDisagree D-Disagree UUndecided A-Agree SA-StronglyAgree

36. I feel sad when I see a child crying. (E)

36. I sometimes cry when I see a sad play or movie. (E)

36. I get angry when I see a friend who is treated badly. (E)

36. I feel sad when I see old people alone. (E)

36. I worry when I see a sad friend. (E)

36. I feel very happy when I listen to a song I like. (E)

36. I do not like to see a child play alone, without a friend. (E)

36. I feel sad when I see an animal hurt. (E)

36. I feel happy when I see a friend smiling. (E)

36. I am glad to do work that helps others. (E)

Part 4 SD-Strongly Disagree D-Disagree U-Undecided A-Agree SA-Strongly Agree

46. I examine unusual things. (C)

46. I find new things to play with or to study, without any help. (C)

46. When I think of a new thing, I apply what I have learned before. (C)

46. I tend to consider various ways of thinking. (C)

46. I create many unique things. (C)

46. I do things by myself without depending upon others. (C)

46. I find different kinds of materials when the ones I have do not work or are not enough. (C)

46. I examine unknown issues to try to understand them. (C)

46. I make a plan before I start to solve a problem. (C)

46. I invent games and play them with friends. (C)

46. I invent new methods when one way does not work. (C)

46. I choose my own way without imitating methods of others. (C)

46. I tend to think about the future. (C)

Part 5

59. Which would you rather do? (circle one of each pair):

read a book	or	write
write	or	watch television
watch television	or	use a computer
use a computer	or	read a book
read a book	or	watch television
write	or	use a computer

60. Which would be more difficult for you? (circle one of each pair):

read a book	or	write
write	or	watch television
watch television	or	use a computer
use a computer	or	read a book
read a rook	or	watch television
write	or	use a computer

61. Which would you learn more from?

read a book	or	write
write	or	watch television

watch television	or	use a computer
use a computer	or	read a book
read a rook	or	watch television
write	or	use a computer

Part 6

62. I really like school. (Sc)

62. School is boring. (Sc)

62. I would like to work in a school when I grow up. (Sc)

62. When I grow up I would not like to work in a school. (Sc)

62. Do you use a computer at home? Yes No

62. Do you have World Wide Web (WWW) access at home? Yes No

APPENDIX C: COMBINED ADAPTED SURVEY

Key:
CSE Subscores:
Beginning Technology Skills (B)
Advanced Technology Skills (A)
CAQ Subscores:
Computer Importance (I);
Computer Enjoyment (J);
Study Habits (S);
Empathy (E);
Motivation/Persistence (M);
Creative Tendencies (C);
School (SC);
Anxiety (A).

1. What is your name:
2. What is your gender?

   M, F, Other
3. What is your age?
4. What is your race/ethnicity?

   (allow multiple selection) White/Caucasian, Black/African American,

   Asian, Latino/Hispanic, Native American, Pacific Islander, Prefer Not to

   Answer, Other
5. Did you receive a scholarship to attend Alexa Cafe this week?

   Yes, No, Unsure
6. Does one of your parents have a job using technology?

   Yes, one parent. Yes, both parents. No. Unsure.
7. How often do you use a computer at home?

Less than once a week, a few times a week, up to an hour per day, more than an hour per day

Students rate each of the following statements using a likert scale of: SD-Strongly Disagree D-Disagree U-Undecided A-Agree SA-Strongly Agree

Self Efficacy, adapted

1. I feel confident working with technology. (B)
2. I feel confident learning to use a variety of computer programs. (A)
3. I feel confident learning advanced skills within a specific program. (A)
4. I feel confident making selections from an on-screen menu. (B)
5. I feel confident getting help for technology problems. (A)
6. I feel confident using a mouse or trackpad. (B)
7. I feel confident using the computer to write a letter or essay. (B)
8. I feel confident saving my work on the computer. (B)
9. I feel confident copying an individual file. (B)
10. I feel confident coding simple programs. (A)
11. I feel confident troubleshooting technology problems. (A)
12. I feel confident understanding how technology works. (A)

Attitudes, adapted

Part 1

1. I enjoy doing things with technology. (J)
2. I am tired of using technology. (J)
3. I will be able to get a good job if I learn how to use technology. (I)

4. I would work harder if I could use technology more often. (I)
5. I can learn many things when I use technology. (I)
6. I enjoy lessons using technology. (I)
7. I feel comfortable working with technology. (J, A)
8. I get a sinking feeling when I think of trying to use technology. (J, A)
9. Technology is difficult to use. (J, A)

Part 2

1. I study by myself without anyone forcing me to study. (S, M)
2. When I don't understand a problem, I keep working until I find an answer. (M)
3. I enjoy working on a difficult problem. (M)
4. I think about many ways to solve a difficult problem. (M)
5. I like to work out problems which I can use in my life every day. (S)
6. If I do not understand my teacher, I ask him/her questions. (S)
7. If I fail, I try to find out why. (S)

Part 3

1. I sometimes cry when I see a sad play or movie. (E)
2. I get angry when I see a friend who is treated badly. (E)
3. I feel very happy when I listen to a song I like. (E)
4. I feel sad when I see an animal hurt. (E)
5. I am glad to do work that helps others. E(E)

Part 4

1. I examine unusual things. (C)
2. I find new things to play with or to study, without any help. (C)

3. When I think of a new thing, I apply what I have learned before. (C)
4. I create many unique things. (C)
5. I invent new methods when one way does not work. C(C)
6. I tend to think about the future. (C)

Part 6

1. I really like school. (Sc)
2. I really like working with technology.
3. I am interested in doing a job using technology when I grow up.
4. I am interested in doing a job where I can help people when I grow up.
5. Boys are better at using computers than girls.
6. Girls can do anything boys can do.
7. What was your favorite thing about camp? (open answer)

APPENDIX D: PARENT SURVEY

1. What is your child's name?
2. I am my child's:

   Mother, Father, Other

SD-Strongly Disagree D-Disagree U-Undecided A-Agree SA-Strongly Agree

3. Before attending Alexa Cafe, my child expressed interest in STEM subjects.
4. Before attending Alexa Cafe, my child showed an aptitude for STEM subjects.
5. Before attending Girls Go Digital, my child lacked confidence in her STEM abilities.
6. After attending Girls Go Digital, my child seems more interested in a possible career in a STEM field.
7. After attending Girls Go Digital, my child seems discouraged about her technology skills.
8. After attending Girls Go Digital, my child seems more confident in her technology skills.
9. Outside of Girls Go Digital, my child has visible female role models who work in STEM.
10. Girls Go Digital staff had a positive impact on my child.
11. Why did you sign your child up for Alexa Cafe? (open answer)
12. What impact do you feel Alexa Cafe has had your child? (open answer)

APPENDIX E: INSTRUCTOR SURVEY

1. What are your motivations for working at Alexa Cafe this summer? Rank top 3.
    a. Financial needs
    b. Teaching experience
    c. Technology experience
    d. General work experience
    e. Opportunity to be a role model
    f. Leadership experience
    g. Social experience
    h. Administrative experience
    i. Opportunity to work with kids
2. (Optional) Anything else you'd like to share about your motivations for working at Alexa Cafe this summer?
3. What is your role at camp this summer? [Allow multiple selection]
    a. Director
    b. Assistant Director
    c. Lead Instructor
    d. Programming instructor
    e. Game design instructor
    f. Photography/video instructor
    g. Engineering instructor
4. What do you feel is most important to your role at camp? Rank all.
    a. Explaining course concepts

   b. Sharing my own experience
   c. Leading students through processes step-by-step
   d. Making personal connections
   e. Facilitating peer collaboration
   f. Encouraging girls' interests
   g. Giving individual feedback
   h. Building girls' confidence
   i. Leading social discussions
   j. Creating fun

5. (Optional) Would you like to elaborate on what you feel is most important to your role at camp?
6. Do you intend to pursue a career in a STEM field?
   a. Yes
   b. No
   c. Unsure
7. What factors have most influenced your decision whether to pursue a career in a STEM field? Rank all.
   a. Aptitude for STEM subjects
   b. Enjoyment of STEM subjects
   c. Earning potential
   d. Industry gender dynamic
   e. Challenge of STEM jobs

8. Anything else you'd like to share about why you do or do not plan to pursue a career in a STEM field?

VITA

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Arizona State University, May 2012

Barrett Honors College, Summa Cum Laude

Honors Thesis: "The Inkless Press: Digital Publishing for Literary Presses and Magazines"

PUBLICATIONS

Grant, Carrie. "Tactics for Connecting Entrepreneurship and Technical Communication through Community Engagement: Experience Report" *Proceedings from the 36th ACM International Conference on Design of Communication.* August 2018.

Grant, Carrie and Daniel Ernst. “Localizing Standardization with Common Assignments: A Case Study at Purdue University.” Under review at a peer-reviewed publication.

Grant, Carrie. “Navigating Data Use in Academic-Community Partnerships: An Ethical Framework” *Being Counted: The Rhetorics of Data-Driven Food and Environmental Justice*, edited by Donnie Sackey and Dawn Opel. Proposal accepted.

CONFERENCE PRESENTATIONS

“Teaching Entrepreneurial Design Thinking through Community Engagement.” The 36th ACM International Conference on Design of Communication (SIGDOC), Milwaukee, WI, August 2018.

“Feminist Approaches to Digital Phronesis: Fostering Girls’ Digital Literacies at Tech Camp” Computers and Writing, Fairfax, VA, May 2018.

“Teaching Digital Content Marketing: Aligning Form and Content in Context.” Conference on College Composition and Communication, Kansas City, MO, March 2018.

“From Community Outreach to For-Profit Tech Camps: Technofeminist Interventions into Girls’ Digital Literacies.” Conference on Community Writing, Boulder, CO, October 2017.

“From Transaction to Coordinated Transformation: Pedagogies of Deep Engagement in Technical Communication.” Association of Teachers of Technical Writing, Portland, OR, March 2017.

“When Graduate Students Teach Service-Learning: Building Infrastructures that Support Sustainable Partnerships.” With Kathryn Yankura and Stacy Nall. Conference on Community Writing, Boulder, CO, October 2015.

"Online Feminism's Intersectionality Problems: New Shades of Historic Tensions." Feminisms and Rhetorics, Tempe, AZ, October 2015.

"Investigating Digital Communities in the Muck of Participation." Computers and Writing, Stout, WI. May 2015.

"Are We Blogging in Circles?: Ecologies of Online Intersectional Feminism." Conference on College Composition and Communication, Tampa, FL, March 2015.

"Wireless Women: Gender and Access in the 'Wide Open' Web." Conference on College Composition and Communication, Indianapolis, IN, March 2014.

"Student Publications and the Honors Experience." National Collegiate Honors Council Annual Conference, Phoenix, AZ, October 2011.

TEACHING EXPERIENCE

ENGL 203: Introduction to Research for Professional Writers (1 section)
Course for undergraduate professional writing majors and minors introducing research projects, mixed research methods, and research ethics for professional writers. Syllabus designed with a focus on neighborhood data analysis and outreach program development in partnership with a new community center.

Intern Coordinator: Northend Community Center Digital Display Project (Summer 2018)
Managed 5 undergraduate interns to create content for an interactive digital display about the past and present of Lafayette neighborhoods. Students wrote grants, conducted archival, digital, and local interview research, managed image permissions, and wrote content to be accessible for a new neighborhood community center, debuting at a 3000-person grand opening event.

ENGL 420-E: Business Writing for Entrepreneurs (3 sections)
Specialized version of business writing emphasizing innovation and problem-solving skills for entrepreneurs. Two sections taught as hybrid online/in-person courses. Course scaffolded with the design thinking process and projects focus on creative proposals for course clients.

ENGL 420: Business Writing (3 sections)
Prepares students for professional writing contexts by introducing rhetorical principles and practical scenarios, including job application documents, research reports, and media plans.

ENGL 421: Technical Writing (1 section)
Students learn to communicate technical information for different purposes and audiences. Projects include ethical email scenarios, job application documents, technical instructions, content marketing, and collaborative technical development proposals.

ENGL 108: Accelerated First-Year Composition - Engaging Public Discourse (3 sections)
First-year writing course focusing on writing with/in specific community contexts and exploring principles of civic engagement. Projects include promotional YouTube videos for a canal park, grant research for historic cemetery restoration, and client experience initiatives for a WIC office.

ENGL 106: First-Year Composition (6 sections)
Sections taught with "writing about writing" and "digital rhetorics" approaches. "Writing about writing" assignments apply academic concepts to personal experiences using a variety of genres and media, including profile articles, blogs, and YouTube documentaries. "Digital rhetorics" assignments explore the role of technology in writing and discourse, with assignments like rhetorical analyses, digital literacy narratives, and digital community ethnographies.

Peer Writing Tutor (Arizona State University Writing Center, 2 semesters)
Worked with undergraduate and graduate writers to improve skills planning, drafting, revising, and editing writing projects.

ACADEMIC ADMINISTRATIVE EXPERIENCE

Assistant Director of Introductory Composition

Introductory Composition at Purdue University, Fall 2017 – Spring 2018

Collaborated with the WPA to plan program initiatives, events, and policies. Coordinated a ground-up assessment initiative to institute a common assignment across all sections of introductory composition, leading a graduate student committee to develop, pilot, and assess six common assignment options. Organized annual writing showcase with students poster presentations attracting attendees across the university. Developed new transition process and annual report format for assistant director position. Participated in program hiring decisions, syllabus review, instructor development, and public relations efforts.

Service Learning Graduate Assistant

Purdue University Office of Engagement, Fall 2017 – Present

Worked with the Director of Service Learning to propose a university-wide service learning course designation. Promoted service learning principles and facilitated Service Learning Faculty Fellow development. Developed new Office of Engagement website and wrote service learning web content. Helped plan and host annual Purdue Engagement Summit. Participated in Engagement Associate Deans meetings and student service learning grant award committee.

Editorial Intern

Peitho Journal, August 2013 – May 2014; August 2015 – May 2016

Worked with editors Jennifer Bay and Patricia Sullivan to update journal identity and streamline production process. Managed submissions and compiled reader reports. Designed journal layout and promotional materials using Adobe InDesign.

INDUSTRY ADMINISTRATIVE EXPERIENCE

Hiring Manager

Kids Go Digital Summer Camps, November 2016 – September 2017

(camp pseudonym used to protect dissertation study)

Recruited and hired candidates to instruct programming and game design courses at summer technology camps. Conducted up to 10 interviews per week to identify qualified candidates with skills for camp success. Planned camp logistics including computer lab setup. Presented training sessions to 200+ new staff. Coached and managed summer staff at 6 camp locations to ensure satisfaction for more than 300 clients per week. Resolved client complaints, made needed staffing changes, and evaluated performance of 50+ summer staff.

Camp Director

Kids Go Digital Summer Camps, Summers 2013 – 2016

Designed and managed summer technology camp program operations; hosting up to 128 students ages 8-18 per week-long session. Organized and directed camper check-in, daily camp activities, and end-of-week family showcase. Supervised team of 16 instructors and management staff to provide fun, engaging, and challenging coursework and camp experience. Addressed parent concerns, oversaw medication adinistration, and responded to emergency situations.

Outreach and Graduate Program Assistant

Arizona State University Department of English, May 2011 – July 2012

Led project to redesign informational fliers for English graduate programs. Published annual department newsletter using Adobe Dreamweaver. Created and distributed promotional materials for department events. Tracked faculty publications, identified funding opportunities for faculty and students, and responded to inquiries about English graduate programs.

Publishing Intern

Poisoned Pen Press, independent mystery publisher, May – August 2011

Content Coordinator and Blogger
Superstition Review, online literary magazine, January – December 2011

COMMUNITY PARTNERSHIPS

Northend Community Center (Faith Community Development Corporation and the City of Lafayette). Developed undergraduate course partnership and summer internship for neighborhood demographic research projects and new program proposals. Lafayette, IN, Spring 2018 - Fall 2018.

Food Finders Food Bank. Project manager for undergraduate course partnership developing organizational impact report and client needs assessment. Lafayette, IN, Fall 2017.

Purdue Center for Advocacy, Response, and Education. Developed undergraduate multi-course partnership producing program development plans for a new campus rape crisis center. With Erin Brock Carlson, Jeffrey Gerding, and Michelle McMullin. West Lafayette, IN, Spring 2016.

Tippecanoe County WIC (Women, Infants, and Children Supplemental Nutrition Program) Office. Developed undergraduate course partnership conducting vendor surveys and producing multimedia materials to meet organizational needs. Lafayette, IN, Spring 2015.

Tippecanoe County WIC (Women, Infants, and Children Supplemental Nutrition Program) Office. Participated in graduate course partnership conducting client usability testing and client experience surveys. Lafayette, IN, Fall 2014.

Historic Greenbush Cemetery. Developed undergraduate course partnership writing grants for cemetery restoration and applications for historic designation. Lafayette, IN, Fall 2014.

Wabash and Erie Canal. Developed undergraduate course partnership producing promotional videos and social media plan. Lafayette, IN, Fall 2013.
Area IV Agency on Aging. Participated in graduate course partnership conducting client feedback surveys and interviews. Lafayette, IN, Summer 2013.

DEPARTMENT SERVICE AND WORKSHOPS

Introductory Composition at Purdue

Assessment Committee. Member, Fall 2017 – Summer 2018.

Pedagogical Initiatives Committee. Leader, Fall 2017 – Spring 2018.

Introductory Writing Committee. Member, Fall 2014 – Spring 2015; Fall 2017 – Spring 2018.

Graduate Opportunities Forum (Purdue Rhetoric Society of America). Presenter, February 2018.

Common Assignment Pilot Forum. Organizer and facilitator, December 2017.

Goals, Means, and Outcomes Revision Committee. Member, Spring 2015.

Professional Development Workshop: Video Resources at Purdue. Presenter, November 2013.

Purdue Office of Engagement

Service Learning Course Designation Committee. Member, Spring 2018.

Student Service Learning Grant Review Committee. Member, Fall 2017 – Spring 2018.

Purdue Engagement Associate Deans Council. Member Fall 2017 – Spring 2018.

DIGITAL PROJECTS

Assignments Taught

Documentary and Explainer Videos

Promotional YouTube documentary-style videos for local canal park (ENGL 108)

Discourse community documentaries (ENGL 106)

Video resumes (ENGL 420)

Animated explainer proposal videos (ENGL 106)

Social Media and Design

Online community participatory ethnographies (ENGL 106)

Infographics (ENGL 420 & ENGL 106)

Website design (ENGL 420 & ENGL 106)

Content marketing (ENGL 421)

Marketing materials and logo suite (ENGL 420)

Data visualization (ENGL 203)

Content management for an interactive display (Northend Internship)

Professional Projects

Purdue Office of Engagement: Website redesign and content development (Summer 2018)

Northend Community Center: Digital display content coordinator (Summer 2018)

Food Finders Food Bank: Annual report design (Fall 2017)

Introductory Composition at Purdue: Website redesign (Summer 2015)

Technology Proficiencies

Design: Adobe InDesign, Photoshop, and Illustrator, Microsoft Office, Google Suite, Canva

Video: Adobe Premiere, iMovie, Windows Movie Maker, Powerpoint

Web: Wordpress, Drupal, Wix, Cascade, HTML, CSS

AWARDS AND GRANTS

Office of Engagement Service-Learning Faculty Fellowship for partnership with the Northend Community Center. Purdue University, Fall 2018 – Spring 2019.

Finalist for the Janice M. Lauer Award for Dissertation Excellence. Purdue University, Spring 2018.

Graduate Research Workshop Scholarship. Association of Teachers of Technical Writing, Spring 2018.

Office of Engagement Student Service-Learning Grant. Purdue University, Spring 2018.

PROMISE Grant (Promoting Research Opportunities to Maximize Innovation and Scholarly Excellence). Purdue University, Fall 2017.

Crouse Internship Scholarship in Academic Publishing. Purdue University, Spring 2013.

Quintilian Award for Continuing Development. Purdue University, Spring 2013.

Moeur Award for graduation with 4.0 cumulative GPA. Arizona State University, Spring 2012.

Phi Beta Kappa. Inducted Fall 2011.

College of Liberal Arts and Sciences Dean's Undergraduate Research Scholarship in the Humanities for "The Inkless Press." Arizona State University, Spring 2011.

Sheldon Davidson Family Research Scholarship for "The Inkless Press." Arizona State University, Spring 2011.

COURSEWORK

Professional and Technical Writing

Methodological Praxis (Patricia Sullivan)
Professional Writing Theory (Patricia Sullivan)
Grant and Proposal Writing (Richard Johnson-Sheehan)
Professional Writing Teaching Practicum (Michael Salvo)
Rhetoric, Technology, and Digital Writing
Computers in Language and Rhetoric (Michael Salvo)
Gender and Technology (Samantha Blackmon)
Digital Technologies in the Classroom (Shelley Staples)

Public Rhetorics

Experiential Learning and Engagement Theory (Jennifer Bay)

Gender, Rhetoric, and the Body (Jennifer Bay)

Minority Rhetorics (Samantha Blackmon)

Discourse Analysis (James Paul Gee)

Postmodern Blackness (Marlo David)

Rhetoric and Composition

Introduction to Composition Theory (Kendall Leon)

Postmodernism and Composition Studies (Thomas Rickert)

History of Rhetoric: Classical Period (Richard Johnson-Sheehan)

History of Rhetoric: Modern Period (Patricia Sullivan)

Empirical Research in Writing (Patricia Sullivan)

Research Methods in Rhetoric and Composition (Maureen Daly Goggin)