

**Labor, Play, and Futurity of the Twenty-First Century Girl Coder**

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University of Pittsburgh, 2022

Beginning in the second decade of the twenty-first century, computer coding for girls became a cultural imperative in the United States. Computer coding books, shows, educational initiatives, websites, and toys marketed toward girls proliferated, offering a variety of ways to take part in the movement. This dissertation explores both the rhetorical creation of the coding girl in the United States in the twenty-first century as well as the creative acts and educational theories of actual girl coders. My research argues for understanding girls' educational coding performances as labor, and it asks why girls choose to invest in this labor beyond the promise of becoming future neoliberal working subjects. In addition, it destabilizes the connection between "girl" and "coder," interrogating what happens in educational systems where time is limited, the future is always looming, and students refuse feminist or economic narratives. This research recognizes girls coding culture as a key site of crystallization of twenty-first century neoliberal transformations in economics, feminism, and education. Methodologically, I balance rhetorical and textual analysis with a year-long ethnographic study. The first half of the dissertation engages in rhetorical analysis of coding artifacts, namely organization websites, books, and television shows. The second half moves into ethnographic accounts of real middle school girls and their experiences in girls-only coding environments.

I have found that while national rhetorics of computer coding for girls place the stakes in economic gain and feminist empowerment, the reality of computer coding in schools is often met with a lack of in-school instructional time as well as by girls' absence of interest in computer science as a career path. Instead, they find joy in minute moments of weird sounds, programmed jokes, and

incomplete and imperfect projects. Some girls refuse to buy into the hype of computer coding altogether. This dissertation explores those moments and places them in conversation and tension with cultural narratives.

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This dissertation is dedicated to my grandpa (Poppy), who always described getting a PhD as "neat" and was just a few months shy of seeing it happen.

## 1.0 Introduction

In 2015, while babysitting an energetic tween, I watched *Game Shakers*—a Nickelodeon show about two girl app developers—for the first time. While I found the show curious, the girl I was babysitting barely thought about it. Almost a decade later, she’s never sought out a coding class and barely remembers the few coding games she played in middle school. For me, the show sparked an interest in what seemed to be a cultural fascination with girl tech geniuses that I was just beginning to see. As I began graduate school, the interest lingered, tugging on me, forcing me to acknowledge and write about it. As I continued digging (and I didn’t have to dig deep), I found *Game Shakers* sits among a gamut of computer coding narratives for girls in the second decade of the twenty-first century. Computer coding organizations, fiction books, television shows, educational initiatives, and websites form just some of the artifacts that have marked gendered computer coding as a movement since 2011 (the birth year of Black Girls Code). This dissertation explores these narratives—from the rhetoric of coding clubs and television shows to educational attempts to teach girls to code.

Despite the overwhelmingly positive reception of girls’ coding initiatives, my work argues that it is necessary to understand the coding girl as a figure influenced by the bonds between new forms of digital labor, popular neoliberal feminism, and neoliberal marketplaces and education in the twenty-first century. I draw attention to the ways in which girls maneuver in these systems through ethnographic research with girls who are actually learning to code, and I destabilize the now common connection between “girl” and “coder” as a productive pairing, interrogating what happens in educational systems where time is limited, the future is always looming, and students refuse feminist or economic narratives. Though education attempts to make clear meanings and goals of computer

coding, girls' use of the medium expands beyond the narratives given to them—into sounds, dances, and conversations that are not always legible to the school in which the conversations take place.

The central concern of this study, then, is how these two different aspects of research fit together—how do narratives of the imagined girl coder stack up to real girl coders themselves? How do narratives of economic futurity play out in the present moment alongside or against personal coding goals? These questions and the resulting dissertation bring into focus the ways in which children are simultaneously imagined as exempt from labor while also performing labor that is legible through the lens of human capital development. In many ways, I argue that young girls are actually the ideal neoliberal homo economus of the twenty-first century where self-appreciation is of central importance and feminism seems to have “fixed” gender equality.

To make these connections, I trace three key terms that surfaced throughout both the rhetorical and ethnographic portions of this work: emotion/affect, labor, and future. I argue that these terms help to highlight both similarities between these two aspects of the research as well as how girl coders relate to larger neoliberal economic structures in the twenty-first century. I also focus on these three terms because of their extensive histories in the fields of children's studies and feminist studies. Ultimately, I understand the image of the coding girl as a crystallization of neoliberal labor and feminism in the twenty-first century. These terms also allow me to highlight the ways in which girls pointed to meanings of coding beyond economic empowerment.

To understand human capital as the organizing principle of labor in the late twentieth and twenty-first century fundamentally shifts how we might think of childhood and labor. This exploration of girls' computer coding culture is useful for its development of new articulations of child labor under the neoliberal regime of human capital development. It provides a way to understand the connections between child and adult labor and how that calls us to take children's educational labor seriously. In

looking closely at girls' role in this changing terrain, it sheds a light on the ways in which feminism has interacted with and adhered to neoliberal ideas of economic empowerment within these shifts.

Over the course of ethnographic research, girls' bedroom culture also emerged as a key research area within the changing terrain of school and home learning during the Covid-19 pandemic. Girls' coding work brings together girl-led bedroom culture and school-centered labor in new ways, complicating the role of the bedroom in labor and learning. Most coding is done on personal computers that can be carried around the house, to school, and frequently in the bedroom (where many interviews for this research also took place). This work, then, contributes to the field of girlhood studies by drawing on the central role of bedroom culture to girls' lives and marking it as productive in new and conflicting ways that consider both personal and school investment. Importantly, girls' coding culture and compulsory coding education expands in multiple directions pointing to widescale economic shifts, educational desires in the twenty-first century, and peer-to-peer forms of community building that grow sideways from classroom learning.

### 1.1 A Cultural Moment

In perhaps one of the most contentious lines in his 2017 work, *Kids These Days: The Making of Millennials*, Malcolm Harris claims that “the kids would have been better off if they had never learned to code”.<sup>1</sup> Harris's claim comes from a particular literary example, *Danny Dunn and the Homework Machine* by Jay Williams and Raymond Abrashkin, that he connects to the overall intensification of work that students have undergone and its particular differences from waged labor.<sup>2</sup> Throughout *Danny Dunn*, we see Danny and his friends Irene and Joe use Professor Bullfinch's MINIAC computer to do their homework so that they might enjoy more leisure time. What promises to be an easy

deintensification of work is anything but, and we as (adult) readers are acutely aware that the time that the trio spends programming the computer to answer questions correctly is much more than it would have taken to do the homework in the first place. Miss Arnold, the group's teacher, and Mrs. Dunn, Danny's mother, catch on to the scheme and steadily intensify the level and amount of homework that the three students must work through. In the end, the children realize they have had to learn all the material in order to program the computer and that their teacher has actually given them more difficult work than other students.

I want to sit with and explore Harris's particular interest in Danny and the problem of computer coding as a route to work intensification. Danny, Irene, and Joe use MINIAC in a way that is quite legibly labor to the readers, it is part of the joke of the book. We laugh alongside Miss Arnold and Mrs. Dunn as we imagine the kids trudging down into the basement to program facts from their textbooks. However, despite Danny's ultimate failure at lessening his work load, I have to admire his attempts to exploit MINIAC for his own purposes, in order to work outside of the school system and make more time for baseball. The homework machine seemed to stand in stark contrast to the educational goals of the adults in his life. The lesson for Danny and his friends at the end of the book, as voiced by Joe, is that "you can't beat the system...teachers are too smart for kids. That's all there is to it." However, Danny, in the final lines of the book, suggests that he should begin to develop a "teaching machine."<sup>3</sup> This teaching machine is never developed in the fifteen-book series.<sup>4</sup>

In the twenty-first century, it becomes difficult to imagine children willingly spending hours programming computers to get out of their math assignments. Technology and children meet in a new social milieu in which computers have become not only a tool to aid in learning but a subject in and of itself, and, more recently, a supposed ticket to lucrative careers within a tech economy. Unlike Danny's covert programming, computer coding education has moved to the forefront of national consciousness. This, of course, draws on a line long of coding initiatives that began shortly after

William's and Abrashkin's work was published that imagined coding as an underlying literacy that would restructure schools (as discussed in the introduction). From Danny to initiatives like Barak Obama's CS for All Initiative (2016) there is a through line of excitement about the capabilities of computer programming particularly when paired with children. Recent narratives of coding kids capture and hold this excitement.

Beyond this positive affect, however, is a deeper anxiety about what it might mean to prepare children for an increasingly tech-centric world, particularly girls of color. Much of this anxiety draws the lack of women and people of color in Silicon Valley as well as a broader shortage of computer programmers. Objects marketed toward girls have increasingly taken this issue to heart, proliferating in a mass emergence of coding education goods—organizations, clubs, books, television shows, and coding apps. The unbridled excitement and self-governed usage of computers that Danny, Irene, and Joe had now is turned toward educational pipelines that understand children, girls in particular, as future tech workers. Girls' excitement now must exist within (or sometimes against) a trajectory of labor preparation.

I understand the girl coder not as a break with earlier versions of ideal girlhood, but as the most recent iteration of ideal girlhood that has increasingly become tied to the neoliberal imagination. Anita Harris has famously coined these girls "can-do" and elaborated on the ways in which these girls are understood to have unfettered access to good choices, making failure their own independent shortcoming. However, this image, as this dissertation reveals, is constantly in flux and in contention with competing discourses that attempt to arrest the same identity.<sup>5</sup> The coding girl, then, is one specific version of the can-do girl in the twenty-first century. She is a remarkably unstable point of contact that seems to constantly elude its own definition and goals.

Since Danny's miraculous failure with his homework machine, children have continued programming in real life, in books, and in television shows, through a variety of means. In addition to

coding organizations, coding books, particularly for girls, have flourished in the years since 2015—with the earliest text *Lauren Ipsum: A Story About Computer Science and Other Improbable Things* by Carlos Bueno being released in 2011. In 2017, a range of new books starring girl coders was released for readers from elementary to high school including *Sasha Savvy Loves to Code* by Sasha Alston (younger audiences), *The Friendship Code* by Stacia Deutsch (a middle grades series in partnership with Girls Who Code), and *Warcross* by Mary Lu (young adult). Those were only a few of the books published that year, with 2018 following with an equal interest in this new figure (see Appendix A for a selected list of books). In these two years alone, girls began to not only see themselves reflected as computer coders in print media but through digital tie ins to both these books as well as larger franchises. Every book in the Girls Who Code series features a foreword by Reshma Saujani, the director of Girls Who Code, connecting the fictional narratives of the girls with the girls in her program—the narrators are “just like the girls in our program...[they] build cool things, meet other amazing coders, and have fun”.<sup>6</sup> At a base level, the books introduce the girls to Saujani’s program. Books for younger audience like *Rox’s Secret Code* (discussed more below) and *Hello Leyla: Adventures in Coding* connect girls to coding through websites and downloadable apps. Even completely analogue books like *Secret Coders* and *Lauren Ipsum* ask readers to hone coding skills through exploitation of the physical attributes of the book—page turns and endings of books in the *Secret Coders* series are often moments where the narrator asks the reader to solve the coding puzzle. Unlike coding manuals or workbooks, these books narrativize the experience of coding instead of explicitly leading children to learn to code through their pages—though this is often a secondary element of the texts themselves.

Narratives also exist in the form of television series for children that feature coding girls, androids, and other coding adjacent narratives. One of the clearest examples (which will be explored below) is Nickelodeon’s *Game Shakers* series (2015-2019) which features two girls that start their own gaming company in Brooklyn. In addition to this show, Nickelodeon produced the show *I am Frankie* (2017-



2018) based on the telenovela *Yo soy Franky* (2015-2016) which follows an android girl as she attempts to remain safe from the corporation that created her. Outside of television sitcoms, there also exists educational programming related to STEM more broadly with focuses on computer programming including TVOntario Kid's *Annedroids* (2014-2017) and Public Broadcasting System's *Sci Girls* (2010-2020). While *Annedroids* is still fictionalized, both educational shows aim to get girls excited about STEM and computer programming.

Outside of coding books and shows, media and toy companies like Nickelodeon, Disney, and Mattel also launched online coding tutorials, character-based games, and television shows. Children in the United States could code Spongebob and Sky Whale through Nick's "Code a Character"—the game has since been removed from the U.S. site though it can still be played through Nickelodeon's Africa and Greece websites. Nick United Kingdom offers a more comprehensive coding program called "Code It" that allows users to create animations with multiple characters through action stacks. Disney, through a partnership with Code.org's Hour of Code, has multiple coding courses setup where children can code with Anna and Elsa, build a Star Wars galaxy through code, code Baymax, and help Moana find fish. More recently, Disney has launched Codeillusion in partnership with Life is Tech!, a program marketed to adults, children, and gamers for learning language-based coding. Consumers can choose between the "prime" version for \$499 or the "enchanted" version for \$899. Meanwhile, Mattel launched their Robotics Engineer Barbie in 2018 and partnered with Tynker, an educational coding platform for kids, to create a coding website where users can explore how computer coding is used in a variety of careers including a musician, a beekeeper, and an astronaut.

Beyond children's media driven resources exist other online platforms and material iterations for computer coding. Coding websites for children abound including well known websites like Code.org, Code Academy, and Khan Academy. Often, long lists of these websites and others are compiled into blogs, webpages, or sites that specifically focus on getting girls and women into tech. Websites also

compile toys and robots that might help get girls into coding. Many of the options are gender-neutral (for instance Botley, Dash Robot, and Lego Boost Creative Toolbox), but there are other options that have distinct gendered elements (for instance, Unicornbot Building and Coding Kit and Coding Critters). The more gendered robots feature cute animals typically associated with young girls along with gendered colors like pink and purple. Unlike the mostly free online resources, coding toys and bots can range from \$15 to upward of \$200 depending on the sophistication and openness of the software.

The variety of materials, tutorials, and tools available to girls draw on the belief that girls need both visible representations of girls coding as well as material access to technology in order to gain and maintain interest. They also flood the educational market with the message that opportunities abound outside of public education—a virtual smorgasbord for girls to choose their own coding adventure. This iteration of the girl coder directly ties to Anita Harris’s conceptualization of the can-do girl under a neoliberal regime, the flexible ideal subject that becomes responsible for her own success. With coding opportunities existing in every nook of the internet and across the United States, from free resources to paid classes and software, girls future value exists in terms of private investment within the economic rationalization of human life.<sup>7</sup> Importantly, this investment is moved from state-sponsored education to individual narratives of empowerment and neoliberal feminism.

## **1.2 Coding Education**

In the 1970s, Seymour Papert worked to introduce computer coding into schools. His method of coding involved a physical Turtle that could be programmed to move around the child’s lived environment as well as a Turtle that students could control on the computer screen. While computer

programming was a key element being learned, Papert also believed that learning to code with the Turtle could help children connect in other areas of learning, particularly math, and that it had the ability to transform school learning as a whole:

When a child learns to program, the process of learning is transformed. It becomes more active and self-directed. In particular, the knowledge is acquired for a recognizable personal purpose. The child does something with it. The new knowledge is a source of power and is experienced as such from the moment it begins to form in the child's mind.<sup>8</sup>

Papert, then, viewed computer coding as an integral part of the school environment beyond the designation in computer science. Even “computer science” he argued was misnamed and should rather be called the “science of descriptions and descriptive language.”<sup>9</sup> In Papert’s vision for computer coding, children would use mathematical and mechanical thinking to help problem solve through concrete and personalized thinking. Computer coding provided an opportunity to completely revolutionize the school environment, altering the ways in which learning might occur and making education more student-centered and multi-directional.

Papert’s ideas about computer coding and computer science sparked an underlying movement in coding literacy—a movement interested in positioning computer coding as a core element of twenty-first century literacy less focused on computer science proper and more interested in coding as a flexible skill. Along these lines, simplified coding languages were developed specifically for children or for non-professional uses such as Andrea DiSessa’s Boxer programming in the 1980s and Mitchel Resnick’s Scratch block programming language in the early twenty-first century. These developers understood the ways in which computer coding might be used to teach other subjects, help with producing digital content, and form artistic and creative communities. Early movements in computer coding education, then, focused less on the professionalization of computer coding and more on aspects of computer coding that might benefit non-programmers.

However, as Annette Vee argues in her work *Coding Literacy*, “literacy’s rhetorical malleability allows it to get repurposed for many different agendas, anxieties, and societies,”<sup>10</sup> so that in the second decade of the twenty-first century economic focuses on computer coding exist alongside and within movements for core literacy practices.<sup>11</sup> As the digital economy continues to grow, fears over worker shortages create a space (in fact a seemingly necessary call) for computer coding to be closely aligned with computer science and future economic success.<sup>12</sup> Importantly, as Vee outlines, computer coding existed before computer science and is too useful to too many professions to easily become the domain of professionals only.<sup>13</sup> And though computer programming/coding is an important element of computer science, it is only one element (as computer science teachers often point out). Despite these histories, computer coding is often articulated as the domain of computer science in educational literature even when it is incorporated into other core subjects.

In the public education sector, Computer Science Teachers Association (CSTA) has fleshed out what computer science education might look like through incorporation in other classes as well as standalone courses offered in middle and high school curriculums. CSTA has also been adamant in drawing clear lines between what counts as computer science and what is more broadly considered “computer literacy” (most often understood as using computers to complete other assignments or as tools).<sup>14</sup> Organizations straddle the line between conceptualizing computer science education as a core literacy and as useful for future employment. Though these uses of computer science education clearly overlap, the weight instilled in each varies between different organizations, reports, and movements. For instance, early reports like CSTA and the Association for Machine Computing’s *Running on Empty* acknowledge the computer science might open “opportunities” for all students beyond computing careers while Google and Gallup’s early report entitled *Women Who Choose* focuses on the need for a diverse workforce and overall shortages in the tech field.<sup>15</sup>

While broadly interested in the incorporation of computer science for all students, women and underrepresented groups are often the key target of both quantitative and qualitative educational reports. Reports such as Gallup and Google's *Women Who Choose* and *Diversity Gaps in Computer Science* argue that bolstering diverse participation in computer science will not only help to fill empty computing jobs, but might also help to create "technological innovations that align with the needs of society's demographics".<sup>16</sup> In some of the reports, then, diverse participation in the workforce is imagined as an "input to increased efficiency, innovation, market domination, and capital accumulation" that mirrors diversity in tech at large.<sup>17</sup> Improving access to early lines of computer science education and doing the non-political work of encouraging girls in and exposing girls to computer science not only creates a more diverse workforce to draw from but also takes pressure off employers for job training and purposeful retention of women through workplace policy and promotion. This train of thought, of course, is clearest in reports funded and carried out by companies like Google who have a monetary stake in the future of computer science.<sup>18</sup>

Perhaps what is most interesting about the evolution of computer coding to computer science education in the United States is the way in which Papert's original idea of coding disrupting school as we know it has gotten completely lost. Coding no longer seems to offer a "revolution of ideas,"<sup>19</sup> but rather an additional core subject that must be taught in order to be competitive in the twenty-first century economy. This has been particularly salient in the case of girls and minoritized students for whom the major focus on computer science, and more broadly STEM education, has centered around job preparedness.

Computer coding organizations for girls crystalize this focus on computer coding for job preparedness and draw on popular and neoliberal feminist tenets to pinpoint girls of color as particular subjects in need of extra investment. Black Girls Code, one of the first national coding organizations for girls, began in 2011 with the goal of building pathways for Black girls in the tech marketplace with

a particular emphasis on computer programming. The organization consists of fifteen local chapters across the United States and in South Africa that cater to girls aged 7-17. Chapters host summer camps, after school programs, and one-time events for girls and their families. Girls Who Code, perhaps the most well-known coding organization for girls of color, began one year later in 2012 and has an international reach. Similar to Black Girls Code, Girls Who Code reaches girls through after school programs, camps, and classes but has recently expanded beyond teens and youth into colleges. Their goal is to close the gender gap in tech by fixing the pipeline problem in computer science. Both of these organizations, then, seek to prepare girls for futures in tech and computer science to varying degrees, with Girls Who Code having a clearer emphasis on computer science as a singular goal. Both of these entrepreneurial non-profits, along with various other computer coding educational artifacts discussed in chapters one and two, show a deep investment in and crystallization of the economized can-do girl.

### **1.3 Feminism, Girlhood, and Futurity**

Girls' computer coding culture draws on a long history of feminism in the United States though it is almost exclusively invested in more recent forms of feminism that focus on girls and economics. These recent forms of feminism—postfeminism,<sup>20</sup> popular feminism,<sup>21</sup> and neoliberal feminism<sup>22</sup>—work together to uphold both the centrality of the girl in feminist rhetoric as well as specific ideations of labor and futurity. Though not “feminist” in any outright claim, the computer coding movement for girls relies on circulating and culturally accepted forms of feminism in order to make sense—versions of feminism that are widely accepted and embraced by popular culture. Much like these versions of feminism that have done little to critique neoliberal rationality during late capitalism,<sup>23</sup> I

ultimately argue that computer coding culture does not critique capitalist structures but rather asks girls to better themselves in order to take part.

Postfeminism, beginning circulation at the end of the twentieth century, was one of the first versions of feminism to rest heavily on the image of youth, arguing that the hard work of feminism has been “superseded”<sup>24</sup> and marking earlier forms of feminism as decisively aged.<sup>25</sup> Unique to postfeminism was the way in which freedom and choice became inextricably bound to youth, positioning feminism as both already in effect for young women as well as unnecessary, what McRobbie has referred to as “feminism taken into account.”<sup>26</sup> Postfeminism, then, relies on the world seeming ready and open for girls to be full equals. Any lack of success is a personal choice.

Popular feminism is influenced by and exists alongside postfeminism in the twenty-first century, turning back toward feminist values and gender inequalities. In some ways, popular feminism appears to take up the call of earlier forms of feminism—interrogating why women have differing experiences than men in a wide variety of areas. At the same time, the empowerment imagined in popular feminism is couched in neoliberal themes of self-esteem, confidence, and competence which also act as goods for sale in an economy of visibility.<sup>27</sup> As Banet-Weiser writes:

Despite this seeming contradiction, between disavowal and avowal of feminism, it does not necessarily mean that popular feminism critiques the roots of gender asymmetry; rather, popular feminism tinkers on the surface, embracing a palatable feminism, encouraging individual girls and women to just *be* empowered.<sup>28</sup>

Popular feminism, then, is not a new iteration of feminism that supplants postfeminism, but rather a “mutually sustaining” project that relies on the shape of postfeminism’s beliefs in entrepreneurial spirit, resilience, and gumption.<sup>29</sup> In adopting many of neoliberalism’s main tenets, both post and popular feminism turn away from systemic structures of oppression. And, while not primarily focused on youth, popular feminism’s investment in images and media circulation make themes of self-esteem,

confidence, and competence easy to sell to young girls.<sup>30</sup> These attributes of success are clearly marketed to both parents and girls in girls' coding camps where the focus is computer coding and more flexible markers of successful human capital accumulation.

Finally, what Catherine Rottenberg has termed neoliberal feminism sustains investments in coding culture, fleshing out what I understand as coding's orientation toward futurity. While post and popular feminism are clearly understood and articulated through girlhood, partially because of what Negra and Tasker have understood as a "distinct preoccupation with the temporal"<sup>31</sup> and their focus on youth, neoliberal feminism is largely (through Rottenberg's conceptualization) understood through adulthood. Rottenberg argues that feminism has become easily compatible with neoconservative political and economic agendas which results in a cultural preoccupation with work-family balance and visible high-powered women.<sup>32</sup> For young middle-class women in particular, this means that rhetoric turns away from mitigating future risk to management of future fulfillment and empowerment, any work done now will surely pay off in the future.<sup>33</sup> It also means a newfound interest in delaying child rearing through the ever-increasing availability of biomedical technologies (egg freezing) and alternative methods of producing offspring (surrogates). The interest in high-powered women and delayed maternity creates two woman subjects: the "worthy capitalist-enhancing feminist subject" and the "unworthy disposable female other".<sup>34</sup> As neoliberalism creates a bifurcated economy for all, women are divided into those that are heavily involved in recognized forms of capital and those that take over the care work previously designated for all women, including childcare.

These two versions of womanhood operate as potential outcomes for girlhood, aligning closely with what Anita Harris has termed at-risk and can-do girlhood. Anita Harris argues that while white boys previously held the attention of future orientation, in the late twentieth century it was girls that held this central position due to the perceived influence of feminism and the meeting of neoliberal ideology.<sup>35</sup> Used widely by feminist scholars in an attempt to understand the dichotomy of girlhood



in the twenty-first century, Harris's conceptualization centers around the newfound interest in girlhood as the key to the county's social and economic future:

At the same time that young women's fortunes are seen as intricately interwoven with late modernity, the fortunes of late modernity are equally interwoven with young women. This intense interest in them, and, specifically, the new depictions of girls as either can-do or at-risk, suggests that what it means to prevail or lose out in these new times has become bound up with how we understand girlhood. Their public presence indicates that both actual young women and the symbolic value of girlhood have been deeply invested in and that they have come to stand for a number of hopes and concerns about late modernity.<sup>36</sup>

The "can do" girl leads to the ideal neoliberal feminist subject while the "at-risk" girl is likely to become the "unworthy disposable female other," both of whom are empowered to make their own choices whether good or bad. This trajectory is carefully monitored through surveillance and management of individual choices that are understood as disconnected from larger societal, economic, raced, and gendered structures, turning the labor to girls themselves.<sup>37</sup> The success or failure of girls are built around four main pillars: individuation and responsibility, success at work and in labor markets, participation in the consumer sphere, and delayed motherhood that bolsters economic success. These four pillars work to support neoliberal economic goals while relying on the central feminist theme of empowerment as an affective form of self-monitoring for girls and women. Empowerment acts as the key to economic citizenship, mediating between ideas of social justice, compassion, and collective responsibility and more right-leaning ideas of commodification and labor.<sup>38</sup> As a flexible term, empowerment gives a single term that has the ability to unite partners from different ideological backgrounds under a de-politicized guise. This project pays particular attention to the second pillar, success at work, though it draws heavily on individualization and responsabilization as avenues to this ultimate goal.

Attention to girls' economic success creates new avenues for understanding children's connections to the future, particularly as new versions of feminism drastically alter the role of motherhood. If Edelman's well-known theory of reproductive futurism relied on sexuality and procreation as keys to the future, then a new theory of futurity must exist under the umbrella of neoliberal feminism. J. Gill-Peterson argues that we now must understand children and their future through labor and materiality—childhood into futures trading. Through a focus on labor and human capital accrual, race, gender, and class become coefficients that materialize in children's bodies in different ways in their movement toward the future.<sup>39</sup> These coefficients are invested in differently from state and private enterprises, meaning that children must often prove that investors will gain returns once the children reach maturity. The future, then, manifests continuously as children become entrepreneurs of the self. Though these conceptualizations do not exactly line up with Harris's conceptualization of the “can do” and “at risk” girl, they always hold to potential to collapse into one another with race and class affecting what populations receive funding and attention.

For my work, adopting a theory of futurity through labor not only allows us to move outside of Edelman's call to “fuck Annie,”<sup>40</sup> but it might make children less queer<sup>41</sup> and allow for a space of political movement. Human capital accrual starts as soon as one is born (perhaps even before).<sup>42</sup> Children, while excluded from paid labor, are key players in the neoliberal game of human capital accrual that promises to result in future returns as their sole job is to invest in their future self. Adults, in many ways, also play at this game through continuing education, on-the-job training, and the self-help economy. Through this viewpoint, we might think of children as subjects that are constantly working on self-appreciation meaning their labor could be taken seriously as labor whether online or in a classroom. This might be a space to divorce the child from the future and instead see them for people in the present, taking seriously their choices, creations, and education for present purposes.

## 1.4 Education and Labor

The construction of twentieth and twenty-first century childhood depends on the divorce of children from traditionally understood free labor. However, as human capital—the personal attributes that make a person useful in production processes—increasingly structures labor, new connections between adult labor and children’s educational labor arise. Much like neoliberalism more broadly in which the boundaries between life and work are broken down, human capital presupposes no difference between production and reproduction:

The various things I do, in any existential domain (dietary, erotic, religious, etc.), all contribute to either appreciating or depreciating the human capital that is me, no less than does my diligence as a worker or my ability to trade my professional skills.<sup>43</sup>

Everything that a person does can influence their ability to sell themselves in the market economy where they are for sale as much as what they can produce. Feher marks neoliberal sentimentality as the point where labor shifts from free labor—where labor is something that can be sold as separate from the person who owns it—to human capital—investment in the self that is intimately tied to all aspects as a person. In this way, the developmental psychology and socialization frameworks of childhood lend themselves to neoliberal narratives of self-investment and personal growth,<sup>44</sup> blurring the conceptualizations of learning and labor that took root over a century ago.

In 1938, after decades of debates between child labor advocates and child labor reformers, the Fair Labor Standards Act prohibited children under 16 from working barring extenuating circumstances.<sup>45</sup> Previously, children were employed in a variety of jobs that made them the family’s second wage earners, but between the 1870s and 1930s, the child transitioned from a wage-earner to the non-working child.<sup>46</sup> However, as Viviana Zelizer outlines, child “work” did not end but rather became “justifiable as a form of education” that would benefit the child alone and the adult they

would become.<sup>47</sup> Malcolm Harris echoes Zelizer's conceptualization of American schooling, arguing that since "children are legally excluded from the wage relation except under exceptional circumstances, children's work was reclassified as 'learning'".<sup>48</sup> Any labor that a child performed outside of their educational work, for instance on a family farm or newspaper delivery, had to be justified by means of developing good habits or character rather than through any monetary gain that might come from the occupation.<sup>49</sup> In this way, benefits of labor were delayed until adulthood, accumulating over time in pockets of creative, knowledge, social, and emotional capital. This arrangement for children has largely remained the same, with education being a compulsory part of the childhood experience.

Harris goes on to assert that human capital is the "basis for the American education system," which makes schooling one of the earliest chances for human capital accrual.<sup>50</sup> Opportunities to self-appreciate start when one is born and now continue well into adulthood, formal education being the most obvious and sustained opportunity to acquire human capital. Where education serves as a space to imagine "citizen worker[s] of the future,"<sup>51</sup> things like on-the-job training, self-help literature, and independent learning serves to push this type of learning and human capital accrual into adulthood as well. Learning is the labor of human capital, and the circumstances for new relations between children and labor solidify under the neoliberal economic regime which includes the increasing interest in continuing education and focus on bettering the self for economic profit.

This shift to human capital and self-investment closely mirrors the historical role of women in capital structures. Nancy Folbre has conceptualized women's unique role in civilization and now the market economy as the "invisible heart"—family values of love, obligation, and reciprocity—that temper the masculine self-interest of the market.<sup>52</sup> This has led women to hold jobs more closely associated with emotional labor and has structured the market in a way that women are often forced into precarious working conditions because of their primary role in reproductive labor. However, with

neoliberal market conditions, more work has shifted to resemble the precarious conditions of earlier feminine labor where women are increasingly working in male-dominated industries while workforces as a whole adopt traits previously associated with women workers. This workforce is sustained through the mass de-regulation of markets and working conditions historically associated with women workers: no regular wages, benefits, or job protection.<sup>53</sup> Workers are promised more stable labor and continual upward mobility if they continue to develop human capital.

As Erica Burman argues, the incitement to work on oneself (psychologization) alongside the newfound focus on emotional literacy and relational skills has aided in the feminization of work which I also argue makes current labor imperatives closer to the human capital accrual for childhood.<sup>54</sup> This is the space where overlaps between adult labor and childhood labor become most apparent, particularly for girls who are further enticed to work on themselves. While children's labor is "disregarded and unregulated" due to its classification as learning, adult labor has historically been regulated and waged.<sup>55</sup> However, with increased feminization of labor and human capital projects extending beyond traditional schooling years, adult work and children's work begin to mirror each other more and more, particularly for women. The lines between the two in terms of self-investment become increasingly difficult to uphold and child and adult work collide in new ways under the neoliberal investment in human capital. For instance, if you did not get to attend a coding camp as a child, there are plenty adult-focused coding camps that can give you a step up in the job market.

## 1.5 Coding Workforce and Labor

Computer coding offers one cultural microcosm where the transitions in economies and human capital have played out in gendered terrain. Counter to current movements to ramp up the number of girls pursuing computer programming, women haven't always been locked out of computer coding careers. As multiple scholars have addressed, the history of women in computer coding is plagued with gendered ideas of professionalization and feminization.<sup>56</sup> Women were the first computers, writing programs during World War II in the United States and Britain to help with war efforts in what was considered low-status clerical work.<sup>57</sup> However, by the 1950s, the belief that programming required creative expertise meant that women were no longer suitable for the work and they began to be pushed out of the profession by new laws around entry and advancement.<sup>58</sup> Shortly after, computer science solidified as a field of study, incorporating computer programming into its domain.

Currently, the lack of women in computer science is largely conceptualized through discourse of a leaky pipeline that connects future labor with childhood: girls are falling through holes somewhere along the way from grade school to college graduation. In the report *Women Who Choose*—a title that embraces the empowerment rhetoric of popular feminism—writers link the pipeline issue to exposure to computer science, self-perception, social encouragement, and career perception, steps that can be reconciled through early education.<sup>59</sup> Increasing participation in computer science, then, is conceptualized through individual educational goals that bolster human capital (particularly emotional human capital) and encourage self-actualization and empowerment. The issue of gender disparity in computing, in this formulation, is less about interrogating larger racist and sexist structures and more about personal barriers that prohibit girls and women from finding success in the field. As Mauk, Willett, and Coulter argue:

By focusing on the pipeline and not the structural issues in technology, the industry is able to shift attention away from the systemic sexism and racism of the industry and instead place blame on education; a classic neoliberal tactic that is buoyed by the neoliberal refrains of popular feminism that emphasize individualized solutions such as entrepreneurship, self-confidence and empowerment.<sup>60</sup>

Coding initiative targeting girls rely on these versions of feminism as well as the wide-scale embrace of human capital development as an acceptable form of early education.

Other scholars shed light on issues with the pipeline narrative including its shift away from looking at the workplace,<sup>61</sup> ignorance of social and psychological factors beyond education,<sup>62</sup> and focus on traditional educational trajectories and the unrealistic promise of employment.<sup>63</sup> As scholar Safiya Noble has pointed out, the pipeline issue and coding initiatives focused at Black girls serves to reorient lack of tech participation by Black adults as a lack of preparation instead of a marginalization issue.<sup>64</sup> Black girls (and girls more broadly) are tasked to fix an issue they did not create through pure tenacity and the lean in mentality, willfully overlooking the decades of gendered and raced practices in Silicon Valley and beyond.

Importantly, recent calls to entice girls to enter computer coding professions relies on gendered understandings of labor and affect that further risk the feminization of the workforce (particularly for women). Girls and women are positioned as uniquely able to imagine tech for good, moving the onus from in-house analysis of technical outcomes to a gendered understanding of care and affect. To this end, organizations and reports imagine girls' interests as stemming from the personal imperative to do social good in the world and assignments are often developed with this in mind. In organizations like Girls Who Code (discussed in chapter one), shows like *Game Shakers* (discussed in chapter two), and in the classroom during my own ethnographic experience (chapters three and four), assignments are designed with gendered affect in mind, asking students to imagine a coded artifact

that might “benefit humanity” or “change the world.” Important work, but work that appears to fall only on the shoulders of women and girls, relying on gendered beliefs about human emotion and motivation, adopting the popular and postfeminist belief that being a woman equates with feminism,<sup>65</sup> and positioning women as the invisible heart that holds tech accountable in a neoliberal workplace.

Companies that invest in and sponsor coding initiatives for marginalized groups often do so with hopes of diversifying their workforce while having a larger labor pool to pick from. The call for diversifying voices in tech “remains comfortably within the discourse of (neo)liberal multiculturalism and entrepreneurial citizenship”<sup>66</sup> and conscripts particular bodies to do particular work within the neoliberal workplace. As Costanza-Chock goes on to argue, while diversity is widely known to increase profit, diverse workforces are rarely present in the upper echelons of management, meaning that diversity only moves so far up the corporate ladder. In the particular instance of computer coding rhetoric focused on women’s ability to change the troubled world of tech, affective labor silently attaches itself to job descriptions and becomes a seemingly natural connection. It is this “natural connection” that is often a factor in why women get paid less in jobs than men do in the same jobs.<sup>67</sup>

The history of and current push toward computer coding for girls raises concerns about how women are imagined as productive worker citizens in tech. It also points toward severely limiting imaginings of what girls might do with computer coding or how they might use coding skills outside of computer science and tech work proper. Importantly, these ideas of computer coding for girls rely on the popular and neoliberal idea of empowerment while making markers of the self (like race and gender) legible and marketable in a neoliberal market, things that more clearly come to light with human capital as an organizing principle. This dissertation takes these issues seriously while also looking toward what girls are actually doing in computer coding spaces meant to be the beginning of their human capital accrual—the computer coding classroom.



## 1.6 Project Description

This project is methodologically two-fold, moving from rhetorical analysis to ethnographic accounts. In its design, it seeks to grapple with the complex ways in which adult-created accounts of computer coding inform, depart from, or completely elide what actual girl coders are doing. The first part of this project takes a broad look at narratives that exist for and about the girl coder, mostly created by adults. After establishing the coding girl as a figure of central interest in the twenty-first century, I pull apart some of the most well-known and complex formulations of the figure that exist in clubs, fictional books, television, and apps. The goal of this portion of the project is to establish what narratives adults are imagining for girls and computer coding. I sat with various materials over the course of several years, watching television episodes for girls, seeing what accounts of coding surfaced on organizational websites and social media, and paying attention to what fell out of favor. I analyzed these various forms of media with focus on gendered ideas of labor, learning, and technology. With this focus in mind, I chose texts that spoke to the particular aims of this project most pointedly and that spanned across various media outlets for the most ability to reach real girls in the age group that I worked with for the ethnographic section.

The second part of this project is based on a year-long ethnographic exploration at an all-girls' school in Pittsburgh, Pennsylvania—Silverstream Academy.<sup>68</sup> The ethnography took place throughout the 2020-2021 school year during the Covid-19 global pandemic. While Silverstream was one of the few schools in the Pittsburgh area to return to in-person learning, strict rules about temperature checks and outside visitors kept me from meeting with participants in person. This arrangement also meant that teachers were often juggling students in class (socially distanced and wearing masks) with at least one student at home (who possibly didn't submit their daily health check on time). Vacations and breaks usually had a two-week buffer period after them when students were learning from home with

abbreviated schedules to allow screen time breaks. As the computer science teacher was attempting to manage using online technology to teach students that were both in class and working from home, it became increasingly difficult to imagine adding another person into the mix full time. My research protocol shifted to small focus groups that were conducted remotely during class time and one-on-one interviews conducted remotely.

In the first two weeks of each trimester (when elective classes changed for students), I introduced students to my research and answered any questions. I also made available an open Zoom drop-in for parents that had questions about the research. Once consent forms were signed, I began meeting with focus groups during every computer science class barring extenuating circumstances due to Covid learning. I rarely observed full class sessions at the request of the teacher who was still learning to juggle online teaching with in-person instruction. In total, thirty-one girls were involved in the research over seven classes (two fifth grade sections of Creative Programming, two sixth grade sections of Creative Programming II and Robotics, Mobile Robotics, iOS Apps by Design, and Girls Who Code).

My ethnography, then, is composed of weekly/bi-weekly meetings with small focus groups that ranged in size from three to five students. Because these meetings were during class time, most groups were homogenous in grade level—either being all fifth, sixth, or eighth graders—other than the Mobile Robotics and Girls Who Code classes that were a mixture of seventh and eighth grade students. Classes for fifth and sixth grade students met bi-weekly for one hour and twenty minutes. Seventh and eighth grade electives met every week, alternating between a forty-minute period and an hour and twenty-minute period. Electives ran on trimesters with each class having a total of around ten class meetings. Most classes had few enough participants that we met in one focus group (five or fewer students). The only class that met in two separate groups was one sixth grade class that had eight participants.

Focus groups generally took place near the end of class for roughly twenty minutes. This meant that students had already done large class activities for the day and were working either independently or in a group to finish an assignment. Often, the girls would step out of the classroom (when they were in person) with their individual laptop and find a place to talk. Other times, girls shared a single screen or stayed in the classroom though both of these practices were less common. The girls usually left their cameras on, but there were times when the Wifi was slow and so cameras had to be sacrificed in order to eliminate glitching and audio stutter. Generally, the teacher was not around the girls when focus groups were being conducted as she remained in the classroom with students not involved in the study. Occasionally she would appear to check on students or clarify an assignment for me. The school was remarkably open to girls wandering the halls to find a random place to sit and talk.

We usually spent focus groups looking at the work that the students had done or working through struggles/questions that they had about specific projects. Other times we discussed more pointed topics like being at an all-girls school, what computer coding might be good for, or what thoughts they had on gender and computer programming. I usually let these focus groups flow freely without much direction, particularly for the younger groups that were working on projects independently and were often coding for the first time. I tended to push older students a bit more, particularly the iOS Apps class in which a few students had extensive experience coding. Inevitably, there would be interruptions to our conversations either because of random dancing, a joke, or commentary on pets that made appearances in the background. Often students also wanted to show me interesting areas of the school that they had chosen to meet from. The library and the gym were particularly exciting.

In opposition to focus groups, interviews were conducted individually. Students would sign up for a time through an online scheduling service that was sent to their school email, then we would meet virtually through Zoom. I reminded students during focus groups to sign up for interviews, but I also did not require interviews in order to be in the study. As a result, some participants chose not to sign

up for individual interviews. Those students that did sign up chose between meeting during their study hall time—a thirty-minute work period that occurred most school days—or after school. Interviews were generally between fifteen to thirty minutes and involved both general questions about the girls' experience with coding and more specific questions based on my own observations in focus groups. They often took place at random spots in the school or in girls' bedrooms. At the end of each interview, I gave the interviewee a chance to ask me any questions that they had. Both focus groups and interviews were recorded and transcribed.

Perhaps one of the most exciting parts of the research for the girls was getting to choose their own pseudonym for the final product. While some of the girls were visibly bummed that they could not use their own names and faces in order to “get famous,” most girls remembered the naming protocol from my research pitch to them. As we neared the end of the study, girls chose names that reflected favorite anime characters, mystical animals, Greek goddesses that they were learning about in other classes, names that they just liked, and mashups of some of their favorite things/names. No names were off limits, though I did set the rule that it must be a name and not a descriptor—one student wanted to be “The Future President” to which I promised it could go in parenthesis after her chosen name. For students that either did not want to choose a name, I chose a random name for them.

## **1.7 Chapter Outline**

This project is broken down into four core chapters that move from the rhetorical aspects of the project to the ethnographic. The first two chapters, “What is a Child Coder if She Does not Have a Future?” and “What is a Child Coder if She Does not Play?,” interrogate the current interest in girl

coders on the national level through coding organizations, books, television shows, and phone apps. These chapters serve as the theoretical underpinnings of the rest of the dissertation, defining and fleshing out feminist, economic, and affective aspects of the girls' coding movement that come to bear on real girls themselves. The first chapter focuses on coding organizations websites, social media, and middle reader series. I identify futurity and affect (particularly understood as sisterhood and friendship) as key terms in developing an aged and raced girl coder in the twenty-first century.

The girls called forth by organizations sit alongside fictional representations of coding girls that I explore throughout the second chapter. It is here that I turn toward a Nickelodeon series, picture book, and phone app to uncover theories of play, learning, and labor that both articulate coding as important in the here-and-now and the future. In exploring these fictional girls, I follow Katherine Bond Stockton's claim that fantasy is the place where children get "thick with complication".<sup>69</sup> Through these chapters I define, complicate, and rearticulate the girl coder and her various goals as one specific materialization of Anita Harris's "can-do" girl. I look at texts that latch onto one another as much as they propel away. Importantly, I follow many queer and children studies scholars in positioning fictional representations of children as connected to and constitutive of the experiences of real children. These chapters build the base for the chapters to come, setting up the "figure of the child" so that we might understand how embodied children live inside it.<sup>70</sup>

This turn leads into the following two chapters which focus on ethnographic work with girls at Silverstream Academy. Chapter three, "Bedrooms and Classrooms, Classrooms in Bedrooms," conceptualizes computer science learning during Covid-19 as a recent iteration of girls' bedroom culture where new understandings of productivity emerge. It considers how the classroom and bedroom overlapped when students moved to learning from home in terms of physical space, labor, and individual uses of computer coding. I ruminate on these movements through three projects completed at Silverstream Academy that bring the classroom and bedroom together clearly: one girls'

llama doodle that was coded from her bed, one group's use of pop culture references in a final project, and another group's failed attempts at introducing a traditionally understood girl genre into the classroom environment.

Chapter four, "The Experience of Groundwork: Labor Leading to the Future," hones in on one iOS Apps by Design elective class at Silverstream Academy and their work toward completing phone apps. I follow two group projects that, though promising and exciting, never came together in any coded form. This chapter, then, makes sense of the learning labor that took place in a coding class with no coding. I position the five girls in this class as theorists about human capital and time, asking them to reflect on their own understanding of learning labor and the point of computer coding without coding. In addition to views on learning labor, this chapter compares coding platforms that the girls articulated as either requiring or not requiring coding knowledge, questioning the clear-cut boundaries of code and its usefulness as a literacy skill. Girls' ability to articulate the usefulness of coding as well as to demarcate what programs "count" as coding has implications for how we might approach computer coding education and understand its ties to adult labor.

The conclusion, "The Selling of a Movement," tackles a more recent iteration of the girl coder and her continued presents in popular culture: Doja Code, a codeable music video by Girls Who Code and Doja Cat. I analyze the messages of empowerment in Doja Code alongside the limits placed on potential girl coders through the artifact. I pair this with a brief look at how Doja Cat music has surfaced in more user-driven projects on Scratch and what purposes these projects serve for child-created communities of practice. The conclusion serves as a final rumination of the connections between economies of empowerment and economic empowerment.

## 2.0 What is a Child Coder if She Does not Have a Future?

Part of the popularization of girls coding has come from the creation of multiple coding non-profits that focus on reaching underserved communities such as Black Girls CODE (founded by Kimberly Bryant in 2011) and Girls Who Code (founded by Reshma Saujani in 2012).<sup>71</sup> Both organizations began from Bryant and Saujani's personal experiences as women of color: Bryant through personal isolation during undergraduate computer science courses and her daughter's similar experience in coding summer camps; Saujani's observation of the gender division in computer science education while running for U.S. congress. However, neither of these women considered themselves coders by profession. In a blog post from 2012 Bryant reminisces on being a newbie to coding and only having one "true" coder in the beginning of Black Girls CODE. Saujani claims she was "one of those girls that was terrified of math and science" and confirms that she is not a coder. These claims both rely on a professionalized version of computer coding (if not done professionally it doesn't "count" as coding) and elides the vast experiences that both women did have in biotechnology and pharmaceuticals (Bryant) and law, public speaking, and political organizing (Saujani). A "true coder," from the beginning, seems to be understood as divorced from other areas where coding clearly is applicable and useful. Bryant and Saujani created clubs from their own personal experience in order to help girls, particularly girls of color, to become future tech leaders, divorced from the clearly meaningful lives that they led prior.

Black girls CODE, the first organization of its kind, began a few miles outside of Silicon Valley and now extends to seven U.S. states and Johannesburg, South Africa. The organization focuses on introducing elementary and middle school girls to computer programming and technology through workshops, after-school programs, and summer camps in areas like HTML programming, game

development, and robotics. Black Girls CODE generally has the funds to supply equipment, meaning that girls do not need to bring laptops or other devices with them, but workshops can cost anywhere from \$35 to \$100 with a limited number of scholarships available. Over the course of its existence, the organization has partnered with companies like Netflix and Nike as well as cultural icons like Mariah Carey to attain funds as well as reach audiences.<sup>72</sup> At the time of this writing, Black Girls CODE has reached around 30,000 students with fifteen chapters across the country in addition to virtual programming.<sup>73</sup> Kimberly Bryant has recently been under fire for creating a toxic work environment and suspended indefinitely from her post.<sup>74</sup>

Starting one year after Black Girls CODE, Girls Who Code seeks to meet many of the same goals targeted toward underserved populations as the intersection of race and gender through after school clubs, summer immersive camps, and a college looping program—where tech interested college students meet weekly. Together these modes of engagement instill coding knowledge as well as build ongoing community support for women in the field of computer science. As of 2020, Girls Who Code had over 8,500 programs worldwide in the United States, Canada, United Kingdom, and India—outside of North America, most programs are after school clubs for girls in fifth through twelfth grade. In addition to working directly with girls and young women, Girls Who Code publishes research reports and works with legislators to close gender gaps in public education. They also partner with cultural producers such as Nickelodeon, Apple, and American Girl in attempts to alter the cultural conception of computer coding. As of 2021, Reshma Saujani stepped down as CEO and moved on to work on establishing pay equality for women with a particular focus on mothers. She released her book *Pay Up: The Future of Women and Work (And Why it's Different than You Think)* in March of 2022.

Both of these organizations are at the forefront of the girls' computer coding movement, led by strong women that are well-known in the field and beyond. Significantly, both of these organizations appear to focus on the outcomes of learning coding as a girl child—the political implications as well



as the implications for the *future* lives of the girls involved to different extents. This chapter takes these organizations as a starting point for the girls' coding movement, exploring what identities, career options, and types of labor are established through their websites, social media activities, and other forms of outreach. I start by considering the websites of each organization—their mission statements and framing of girl coders. From here, I focus exclusively on Girls Who Code because of their extremely active cultural presence. Through their middle reader book series and Instagram, I elucidate the girl coder as a racially diverse icon that prizes affective friendships and labor in various ways for different ages. I end by looking at Saujani's recent work that marks a stark relief to the work she's been carrying out through Girls Who Code in the past ten years.

## **2.1 Organizational Websites and the Racialized Girl Coder**

Organizational websites most clearly speak to parents of girls and investors, highlighting the importance of computer coding for girls' futures. Clearest on both websites is the concern over the digital divide, which is both raced and gendered, while mention of the affective experience of coding in feminist groups is buried in subsequent pages. To this end, girl-focused coding clubs position themselves alongside state-supported education as an addendum. School curriculum is not properly prepared for the digital economy, so the market provides education and training. Girls and parents are then responsible for choosing opportunities that will move them forward into productivity, particularly in a creative tech economy.<sup>75</sup> The individualizing impulse of neoliberalism causes both childhood and adulthood to become increasingly dependent on opportunity (or lack thereof) during the twentieth and twenty-first century. Despite widespread interest and increasing availability of computing classes through initiatives like President Obama's "CS for All" initiative (2016), girls and

minoritized students are still not equally served in these spaces.<sup>76</sup> And, because the current focus on computing education is understood primarily through job security, organizations amplify and specify this interest solidifying the connections between human capital accrual and coding *as* computer science. The potential failure of underrepresented coders falls to the girls instead of considering the broader structures of coding work that might keep girls out of the field—the “brogrammer” culture and general attitudes toward women in the field which might also be present in K-12 classrooms.

A closer look at both organizations’ websites help to tease out the ways in which they are framing race, girlhood, and future in respect to computer coding. Black Girls CODE’s “measuring our impact” section (2018) states:

Black Girls CODE has set out to prove to the world that girls of every color have the skills to become the programmers of tomorrow...Black Girls CODE's ultimate goal is to **provide African-American youth with the skills to occupy some of the 1.4 million computing job openings expected to be available in the U.S. by 2020, and to train 1 million girls by 2040**...And though we at Black Girls CODE cannot overstate our happiness with the results of our classes, this is just the first step in seeking to bridge the digital divide.<sup>77</sup> [bold in original]

A statement by Reshma Saujani, founder of Girls Who Code, has similar theme “women and girls across the country are coming together to correct centuries-long power imbalances across lines of gender, race, sexuality, and more.”<sup>78</sup>

Girls, then, are framed as future change makers that are coming together in childhood to imagine a future where their specific form of stored capital drastically changes economic stratification and job gendering. The Black and brown bodies of the girl programmer are called forth by the overwhelmingly white field of computer programming—noticed because of their absence. The clubs themselves exist to corral these bodies and to position them toward the future. This might serve as the first step on the

road toward occupying a tech board room. It's difficult to tell how much of the rhetoric on the websites is for the girls and parents and how much might be to attract venture capital and partnerships with tech companies, particularly in the future-oriented rhetoric above. Though these organizations are both run by women of color, the overwhelming focus on future orientation glosses over any other types of support that might be offered by these clubs, of which I'm sure there are.

Girls Who Code aims to “change the image of what a programmer looks like and does.” Black Girls CODE hopes to train a “new generation of coders...who will become builders of technological innovation and of their own futures.” Both sites concentrate heavily on the “look” and “generation” of the programmer, presenting slideshow images of girls smiling at the camera, huddled in groups around computers, and engaging with mentors. In this way, they seek to break the lone programmer image—the “scruffy, bearded, long-haired programmer” that is “usually curt [and] antisocial”<sup>79</sup>—and proffer something else in its place—the smiling, young, friendly Black and/or brown girl coder. Underpinning many of these images is a focus on sisterhood and friendship—a theme popular in girls' media more broadly where emotional insight acts as a form of superpower for girls.<sup>80</sup>

The changing image of the coder, then, seems clear, but the alteration of what a programmer does is less clear. Girls Who Code has a distinct interest in the future computer science graduate—fewer than one in five computer science graduates are women according to their website. Statistics, such as this one, seem to justify the organization's goal of helping girls to fill entry-level tech jobs while also being the *raison d'être* for the club itself. Conflating computer science, coding, future labor and organizational work adheres to traditional views of computer programming and may preclude “many other potential values and possibilities for computer programming” that lie outside of the field of computer science.<sup>81</sup> Girls Who Code can imagine these other “potential values and possibilities,”—buried on their summer programs page they mention art and storytelling—but they seem only able to talk about them *through* and *as* a trajectory to a degree in computer science.

This is supported by Girls Who Code’s discursive focus on the “pipeline problem” in tech. The notorious “pipeline” refers to the entrance and retainment of people in STEM education from elementary school to doctorate work, with a “leak” referring to people who leave the field or do not make it to a STEM career. The rhetoric of the pipeline problem is omnipresent in coding initiatives for girls, which Mauk et al. argue shifts “attention away from the systemic sexism and racism of the industry and instead place[s] blame on education”.<sup>82</sup> Concerns over the STEM pipeline also have the tendency to focus on singular pathways to STEM careers,<sup>83</sup> solidify benchmarks (such as high school calculus) and render them invisible to scrutiny,<sup>84</sup> and ignores the ways in which STEM is valuable beyond the singularly valued degree.<sup>85</sup> Though Girls Who Code does not put a distinct focus on graduate work, there is an interest in the pipeline narrative and the importance of moving girls through predestined and academically demarcated STEM spaces with the ultimate goal being a computer programming degree.

In their vision for 2020, however, the organization sought to move “beyond the pipeline,” claiming that they had “disrupted the idea of a pipeline problem in tech” and “solved the so-called ‘pipeline problem’”.<sup>86</sup> The framing of the report both calls the pipeline problem into question through the use of descriptors such as “so-called” and relies on its existence to support organizational work. Though Girls Who Code as a whole is interested in research and policy reform,<sup>87</sup> this bursting of the pipeline is fully attributed to the organization’s ability to reach individual girls and create a pathway for university computer programming study.

As a part of this, Girls Who Code hopes to instill core values of bravery, sisterhood, and activism meant to sustain alumni through to the workforce where girls should be prepared “to lead it, to improve it, to completely and totally transform it.” Carefully chosen testimonials work to support this specific version of affective success. For instance, on the home page, Girls Who Code alumna Andrea Gonzales claims, “Girls Who Code changed my life. I found a new interest that eventually became a

plan for a college major, and a new confidence in my ability to accomplish things because I want to, not because they're easy." As the only testimonial on the homepage of the organization, Gonzales's understanding of her own experience in GWC points to the ways in which it fits into a singular academic trajectory tied to the goal of closing the gender gap in tech. At the same time, her experience frames coding education as an avenue to acquire broader life skills: confidence and determination. So, while all girls might not go on to have tech careers (even if it is the hope), computer coding can still be useful to a range of girls cuing the two sometimes competing narratives of club participation, academic choices, and achievement. Within this framework, Girls Who Code's core values reflect an amalgamation of twentieth century empowerment discourses married with traditional feminist ideas and actions. It is difficult to imagine, though, what these core traits look like in the always already individuating and competitive neoliberal marketplace that Girls Who Code launches their alumni into.

Central tenets such as those espoused by Girls Who Code, as Amalia Sa'ar points out, are structured into the very idea of economic citizenship and its interest in rhetoric of empowerment:

Ideas of economic citizenship link together notions of rights, self-fulfillment, belonging, and inequalities, and offer odd discursive mixtures of collective responsibility, compassion, and justice on the one hand, and utilitarian, commodifying approaches to people and labor on the other. The language of empowerment, with the importance it assigns to emotional articulations of the self, serves as a good mediator of such seemingly contradictory ideas and worldviews.<sup>88</sup>

Girls Who Code, then, is simultaneously invested in the liberal project of bridging the gap between racial and gendered inequalities and neoliberal discourses of individual empowerment and success. This ambivalence characterizes their overall mission as well as more general conversations around girls' coding initiatives that set their articulated mission as success in a neoliberal marketplace.

While Black Girls CODE relies on similar statistics on their website, particularly focused on the number of jobs that will be available in computing by 2020 and their desire for Black youth to fill

these jobs, they do not seem to singularly focus on this goal. Instead, the organization's vision is articulated, in part, as a means to “empower girls...to become innovators in STEM fields, leaders in their communities, and builders of their own futures through exposure to computer science and technology.” In this iteration of girlhood coding, STEM remains one of the options for alumna, but attention is also paid to a more comprehensive understanding of future that involves communities and individuality beyond economic means. Moreover, Black Girls CODE seems much more interested in positing coding as a material gain in the lives of Black girls instead of only figuring the Black girl as a future programmer.

Black Girls CODE's pivot between computer coding as computer science and computer coding as material empowerment draws on what Annette Vee has understood as the co-existing narratives of literacy from which coding literacy movements draw.<sup>89</sup> While employability might be evident in both clubs, Black Girls CODE also contracts individual empowerment and collective progress (divorced from economic collective progress) as arguments for childhood coding, particularly for groups not typically represented in the field proper. In their formulation, the digital divide is not only about future employment but also about access and ability on a fundamental level through understanding computer technology being an “essential tool for surviving the 21<sup>st</sup> century.” While Black Girls CODE does not spell out particular attributes that girls in their clubs will learn (like GWC's explicitly referenced tenets of bravery, sisterhood, and activism), it is clear that they envision their members as part of a larger cultural network in which they have influence beyond the world of tech.

## 2.2 Girls Who Code Book Series: Girlfriendship and School Learning Labor

While websites are more clearly directed at adults (whether parents, venture capitalists, or companies), Girls Who Code has done a lot of work to reach girls as well. Girls Who Code's public presence includes an expansive collection of fiction and non-fiction literature, local programs, material objects, partnerships, corporate investors, and girls that create a vast network of converging and diverging goals and interests. Each of these elements of Girls Who Code reaches out to touch other cultural objects and people, creating a multi-layered understanding of how coding connects to economies, girls, and literacy more broadly. Girls Who Code's programmatic reach has drastically expanded since 2012, particularly in 2018-2019 when they began clubs in Canada and the United Kingdom and 2019-2020 when the first clubs in India started. College loop programs—clubs on university campuses that bring together tech-interested college students—also launched in 2018, making Girls Who Code an organization dedicated to girls and women from third grade on. During this time of massive expansion—both geographically and in terms of age—Girls Who Code launched their fiction book series for middle grades readers. The first book, *The Friendship Code*, had a partnered release date in 2017 with Sujani's own book *Girls Who Code* which offers a more direct and hands-on approach to computer coding and girl's empowerment. Together, the two books offer middle school readers both a narrative and how-to guide to computer coding.

The narrative Girls Who Code book series, my focus here, follows a group of sixth and seventh grade girls that meet in their coding club at Halverston Middle school—some of whom are happier to be there than others. The four-book series takes place over one school year during which Lucy Morrison, Sophia Torres, Maya Chung, and Erin Roberts—later joined by Leila Davis in book two—work through coding projects, friendship troubles, and family drama together. Their friendship is nurtured by their eccentric computer coding teacher, Mrs. Clark, who left corporate coding culture in

order to teach (she returns to the corporate world when offered a data scientist job at TechTown in book four). Each book begins with a forward by Girls Who Code founder, Reshma Saujani, to highlight the themes of the book and tie it back to the organization. Each book is narrated by one of the main characters, charting her own unique problems and how her computer coding friends come together to help.

Book one, *The Friendship Code* by Stacia Deutsch, is narrated by Lucy and details the beginnings of the friendship that solidifies around secret coded notes that appear on Lucy's locker. The main themes are teamwork and problem solving. Book two, *Team BFF: Race to the Finish* by Stacia Deutsch, is narrated by Sophia and takes the team (including the newly added Leila) to a hackathon which Sophia is worried she won't be able to attend. At the fore front of book two is sisterhood, a main tenet of the Girls Who Code organization. Book three, *Lights, Music, Code!* by Jo Whittlemore, is narrated by Maya as she over-commits to coding projects and deals with a bad influence that has transferred to Halverston Middle School. The focus here is on creative coding. Book four, *Spotlight on Coding Club* by Michelle Schusterman, is narrated by Erin who we learn struggles with anxiety as she prepares for the school talent show. This book, again, directs readers' attention toward the importance of sisterhood in helping get through tough times. As of 2022, these were the only books in the series—it is unclear if Leila will get her own book.

The promotional material describes the books as being “perfect for fans of *The Babysitters Club* and anyone interested in computer science,” drawing a line between ensemble girls' series of previous decades and the newfound interest in girl coders.<sup>90</sup> This rhetoric places the series in a long line of girls' serial literature through which the “ideal girl” is played out and reformulated over time.<sup>91</sup> The very nature of serial literature and its predictability allows for a singular image to be naturalized, core tropes to be solidified, and new traits to be absorbed.<sup>92</sup> In this way, the books in the Girls Who Code series simultaneously include tropes of ideal girlhood while creating new inflections, most noticeably the



focus on tech-savvy girls.

In many ways, the *Girls Who Code* series does bear resemblance to *Baby Sitters Club*—Ann M. Martin’s series that follows a middle school group of babysitters (1986-1999). Altogether, the *BSC* original series comprised 130 books and sparked multiple spin-offs. The narrative structure and friendship dynamic are startlingly similar. Like *GWC*, each *BSC* book is narrated by one of the girls as they work through family and/or friendship issues, and each girl group is flexible enough to invite new members. However, unlike *BSC*, the girls of the *GWC* series do not embark upon an entrepreneurial venture and instead use their labor in school-related activities: solving puzzles for coding club, competing in hackathons, and developing a light show for the school dance. If we take seriously Harper’s claim that serial literature is a place where girls are exposed to “visions of girlhood”,<sup>93</sup> then it is worth exploring both the similarities and differences that appear between the *BSC* and *GWC* series. Notably, *BSC* ends in its original form right before the turn of the century with *The Fire at Mary Anne’s House* (May 1999) though the girls’ storylines do continue in *The Baby-sitters Club: Friends Forever* which lasts from August 1999 to November 2000. Barely lasting into the twenty-first century, then, the series speaks to a different historical moment of girlhood, one less characterized by media that shapes the girls of the *GWC* series.

This section explores the framing of sisterhood in the *GWC* series and its adherence to girlfriendship in line with earlier girl’s serial literature. I consider this girlfriendship as working alongside the dynamics of domesticity and family for the middle school girls in both series, particularly book two of *GWC*. I then interrogate the points where *GWC* departs from girl’s serial literature in relation to learning and labor. The first book sets up school learning as the primary form of labor in the series. Book three intensifies this labor for Maya, giving the clearest attempts of the school to control and reclassify children’s learning labor as fun. Together, these examples give a chance to focus on computer coding as school labor that is unpaid, unregulated, and reclassified continuously through

adult desires oriented to the future.

### 2.2.1 Multicultural Girlfriendship

Of central importance in the Girls Who Code series and perhaps the clearest connection to *The Baby-Sitters Club* books is the centrality of girl friendships. Like the girlfriendship that structures social media interaction, the Girls Who Code book series maintains girl friendships, here understood as sisterhood, as a primary concern of their characters and readers. This sisterhood is conceptualized through coding, a space that brings the girls together and pushes them closer. It is also marked as explicitly multi-cultural: Lucy is African American, Leila is Pakistani, Maya is Chinese, Sophia is Latina, and Erin is white. Though cultural background helps set the backdrop for the series, it does not necessarily play a major role in the ongoing drama of individual books but seeps through occasionally to remind the reader of the multi-cultural mix of the group. At the same time, the racial and ethnic makeup of the group does not just serve as another marker of individuality like Harper argues it does in *BSC*.<sup>94</sup> The characters' eclectic cultural heritage serves, at times, to highlight the general gendering and whitewashing of the field of computer science. For example, Lucy dreams of being the first Black woman to win a Turing Award. This multi-ethnic girlfriendship stands in contrast to Winch's understanding of adult girlfriendships in which "black and white women are rarely represented as relating through the complexities of girlfriendship".<sup>95</sup> Here, perhaps because of youth, the girls are able to connect across cultural lines, giving the authors a chance to show a variety of girls coding.

In her introduction to book 2, *Team BFF: Race to the Finish*, Reshma Suajani writes: "In addition to robots, this book is about another favorite topic of mine: sisterhood. A sisterhood is a supportive group of friends who are always there for you when you need them—it's one of the most important things we teach in our programs at Girls Who Code."<sup>96</sup> This theme resonates in the book as Sophia

doubts her friend's capacity to understand and forgive her for being unable to attend a hackathon they have signed up for. As the hackathon approaches, she avoids telling her teammates that she will be unable to attend; she has been tasked with watching her younger siblings the same day while both parents are working. Her omission threatens to disqualify the team since it is past the team alteration cutoff. It is clear that watching her siblings and helping around the house is a regular occurrence even though her grandmother, Abuela, also helps out. Sophia strikes a deal with her parents—if she can get all of her chores done, then they will hire a babysitter for the day. Her friends surprise her to help her meet this goal. Only the final quarter of the novel is dedicated to the hackathon. In this way, the drama of the novel focuses on Sophia's placement within her own family—the oldest child of two working parents that is often asked to help with her sisters. This narrative is situated alongside and against her friendship with the Maya, Erin, Lucy, and Leila.

Early in the book, Sophia voices a sadness at her mother being too busy to support her at school related activities, particularly missing the football games that she helps to oversee. She invites her mom to the hackathon, hoping to show off everything she has learned in her coding class so far. While the same sentiment does not necessarily exist for Sophia's father, it is clear that he is also busy, attending real estate conferences on weekends, and that this workload affects Sophia emotionally and logistically. In the opening scene with her family, we see a well-oiled family machine that works to make dinner, get the younger siblings to bed, and load the dishwasher. Each member plays an important and supportive role in the functioning of the domestic space, and often members are asked to step up and offer extra time when necessary.

This form of teamwork and support is mirrored in both Sophia's coding club and her involvement with the school football team where she is the student manager. During his pre-game pep talk, the football coach reminds the players that they have to “watch out for one another” because “what good is a quarterback if he doesn't have his team backing him up”.<sup>97</sup> This mentality slips over into the

sisterhood created by the main characters. Despite all of the girls being over-extended—this seems to be an underlying theme in the books—they make time to help Sophia with her chores in order to ensure her participation at the hackathon. They even go so far as to bring their own supplies and line up a babysitter for after the chores are done. The labor here is not done contentiously or out of fear of being disqualified. Rather, the girls offer up their labor because they want to do the hackathon together, as a team. Unlike the family dynamic, the coding sisterhood does not ask individuals to give up their own interests and desires for the good of the group. If sacrifices have to be made, they rarely interfere with the individuality of the girls.

These various levels and types of teamwork/sisterhood do not ask the girls to choose between family or friendship. Sophia ultimately understands why her parents are unable to make it to the hackathon and her mother acknowledges that “sometimes grown-ups get caught up in things and might not see things from their kids’ point of view”.<sup>98</sup> To add to this, not only is Abuela able to attend the hackathon demonstration, but she gushes over the group’s robot. In this way, the supportive friendship of the girls does not disrupt or cause tension within the family home but rather supports and upholds its structure and Sophia’s domestic duty within the space. She remains firmly positioned as a key player in her hackathon team and in her family’s domestic space, neither of which needs to be sacrificed. She seems to be able to “have it all” by “doing it all”. These books, then, situate themselves outside of what Banet-Wiser points to as earlier conversations around education versus entertainment and adult versus children.<sup>99</sup> The book also works outside of the dichotomy of school-type learning and coding initiatives that Mauk et. al. find in their research.<sup>100</sup> Instead, the school, the family, and the sisterhood are all upheld as important and desired aspects of aspirational girlhood that is represented through a variety of ethnicities and backgrounds. This girlfriendship also extends beyond the bounds of their own group as they often help other girls around them (even during the hackathon which is technically a competition).

It is perhaps this girlfriendship that bares the closest resemblance to *The Baby-Sitters Club* series and the attachments that it carries to the family. Like Sophia and the other girls, the babysitters are often forced to navigate the boundaries and overlaps between family and friendships—Kristy often has to rush home to watch her brother after school; Mary Anne must negotiate how she can spend her money with her protective father and friends; and Stacey must navigate when and how to share her diabetes with her friends. Both series firmly place the middle school protagonists in the domestic space whether literally in the case of *The Baby-Sitters Club* or through undeniable attachments to family structures in the GWC series. The beginnings of both series actually start with these attachments to family that motivate participation. In the GWC series, Lucy joins the coding club so that she can create an app to help her uncle remember to take his cancer medicine. In *The Baby-Sitter Club*, Kristy has the idea for the club after watching her mother struggle to find a babysitter for her younger brother, David Michael. The ideal girl in both of these series, then, is motivated by, understood through, and accountable to her relationships with those around her.

### **2.2.2 In-School Coding: Hidden Labor, Tired Girls**

This connection to family and friends eludes some of the close ties between coding and economic futurity, instead positioning coding as a form of social good for particular individuals and groups. As stated above, the GWC series begins with *The Friendship Code* narrated by Lucy who joins the coding club with hopes of becoming a programmer like her mother (and desires to be the first black woman to win a Turing Award). However, her most immediate goal for joining the club is to create an app to help her Uncle Mickey remember to take his cancer medicine. In the scene reader's meet Uncle Mickey, Lucy's mom pops her head into the backyard to remind him to take his medicine, underscoring his reliance on outside forces to remember his treatment. Lucy, in some ways similar to

Kristy, seeks to ease the process of labor and dependence that exists within her own family structure, most specifically care work and domestic labor. Her interest in future programming does not appear as a pre-occupation or focus throughout the series.

At the same time, unlike the labor in the *BSC*, coding labor is not positioned as a current economic endeavor, marking one of the most noticeable differences between the two series. Money operates as a central interest in *BSC* always almost threatening to destabilize the gendered and self-sacrificing labor of the girls and their attachment to those around them. Despite the growing spending ability of children and tweens in the twenty-first century, the question of earning money independent of their parents does not arise for the girls in the *GWC* series. Instead, Lucy, Sophia, Maya, Erin, and Leila are shown working on coding projects for school and extra-curricular activities throughout the series, allowing their labor to be safely understood through education.

In the first book of the *GWC* series, *The Friendship Code*, the girls' coding is largely understood through the context of education. We, as readers, meet the girls in their non-gendered coding club. The impetus for the friendship is not couched in organic formation, but rather through the purposeful grouping of the girls by their computer teacher Mrs. Clark. Unlike the *BSC*, then, the existence of the novels depends on school as a mediating force, bringing it consistently into the narrative in varying degrees of clarity. The school simultaneously becomes a place where the girls can explore and a place that causes frustration and limitation. It is also the space through which their friendship is nourished, with the coding classroom and instructor playing a crucial role in bringing them together despite their differences (the girls are not only not friends, but Lucy and Sophia are ex-best friends).

In the first coding club meeting, Lucy's frustration with the club is evident. Following a failing attempt to write directions for making a peanut butter and jelly sandwich, Lucy pleads "But I *need* to make an app. How is this going to help?"<sup>101</sup> Thinking of her uncle and her need to help him, her intentions for joining the club are particular and pressing. Many of the other students in the room

share her frustration, listing the apps that they had also hoped to develop through the club.<sup>102</sup> The students' desire for immediate meaningful interaction with larger media structures stands in stark contrast to the design of school that views children as investments for future employment. This fictional account of school upholds cultural views of school in the United States as a place where human capital is developed rather than used.<sup>103</sup> Play and creation here are positioned as practice for something that will be “real” in the future. Though it is doubtful that many of the students could start creating an app on day one of coding club, at the end of book four Lucy has yet to begin creating the app for her uncle despite coding a game, robot, light show, and a voting portal. The other students seem equally app-less.

Though the clarity of the club falls out of the series in subsequent books—we no longer get long narratives about the club time itself—the school remains a central organizing factor of the labor that the girls perform. The girls go on a school trip to a hackathon, code lights for a school dance, and help organize the school talent show through an app. So, while the girls of *BSC* were imagined as creating their own space and performing labor that might benefit them financially, the members of *GWC* are safely kept within the school space and perform labor that can be poured back into or understood through that space. Even the labor that is traded between the girls themselves is for use within the school environment.

Structurally, this focus on the education and school falls in line with Malcolm Harris's conception of children as “capital projects” in which time, energy, and labor are invested with hopes of future returns. The *GWC* series holds tightly to school structures as a place for learning that is oriented to the future, creating labor that is “disregarded and unregulated” because of what he terms a pedagogical mask that disguises work and discourages measurement.<sup>104</sup> By continuing to narrate the friendship and the labor of the girls through the school and school sponsored functions, the hours that the girls spend coding over the series is never questioned as labor practice—after all, they will benefit in the end. This

becomes most apparent in subsequent books and through vague phrases from adults like “code is the foundation for *everything*”.<sup>105</sup>

### 2.2.3 The Future is Bright

*Lights, Music, Code!*, the third book in the series, is particularly interesting in terms of labor, learning, and service. Mrs. Clark introduces the concept of creative coding and stages a contest for the chance to code the light show for the school dance themed “future.” Of course, the girls win and are tasked with creating the light show through code since coding “basically [*is*] the future”.<sup>106</sup> The girls use homeroom, time before school, time after school, and evenings to code the feature, investing “the only thing [kids] have: their effort, their attention, their days and nights, their labor-time”.<sup>107</sup> Labor performed within the school setting by children points toward the promise of this imagined future. Of course, as Harris points out, school labor has historically not been understood as labor at all but is rather reclassified as learning. Writing about the queerness of the gay child and children more broadly, Katherine Bond Stockton argues that,

Legally, children cannot expend their energy in ways we call 'work' *and* be systematically paid for these expenditures, even though they can perform certain labors—run a cash register, stuff envelopes, mow a lawn, shoot hoops—that are the basis of some adult work. In fact, we let them 'play at' these labors in ways we don't let them play at sex, even if work-for-pay, like sex, is something delayed for them. This delay gives them not a shelter from money's effects—they are affected, at every turn, by their financial circumstances—but a shelter, though often incomplete, from knowledge of money—often including the detailed workings of family finance.<sup>108</sup>

Of course, babysitting—à la *BSC*—would be included in this list of “certain labors” that might be



performed for pay because of its close association to gendered normativity. This view is upheld by the members of the club being more interested in the gendered care of their charges than the business side of the operation—avoiding the discomfort that might surface around seeing their labor as mainly motivated by profit.

However, the labor present in *Lights, Music, Code!* moves beyond acceptable reproductivity and gendered labor and into a type of labor more related to a highly lucrative economic sector: tech. Theorists have struggled with how to understand the futurity of childhood: Lee Edelman perhaps most famously understands children through reproductive futurity, a line of thought that many scholars have taken up and built upon.<sup>109</sup> I follow in line with J. Gill-Peterson who argues that reproductive futurity “reads too narrowly” and that we must begin to understand “the relation of the child to the value of the future...through the lenses of labor and materiality”.<sup>110</sup> At the same time, the association with money, even in late capitalism, is still uncomfortable. The child queered by money (as Stockton writes) is still one that threatens. Despite performing work that could have been done by professionals—creating a light show, designing and producing a coded dress, and creating a voting app—the girls in *Lights, Music, Code!* steer clear of paid labor because of their position as students. The labor that is performed is positioned as a fun and unique learning opportunity for a select few.

The culmination of creativity, coding, and labor here is in line with twenty-first conceptualizations of creative and informational economies while the theme of “future” throughout the book points to the not-yet-there nature of child workers. Conceptually, the girls are in a state of arrest, developing skills for a future that they cannot yet enact. The future envisioned by Mrs. Clark is understood through technological innovation, so the coding club seems like a logical fit to help with the dance. While the girls are excited about helping, their outfits for the dance point to a broader conceptualization of “future”—Lucy dresses as a solar system pointing to the future of space exploration; Erin is a woman president; Leila is Miss Marvel, the first Pakistani superhero; Maya wears

a dress covered in mirrors to reflect people back to themselves; and Sophia wears a dress coded in lights. As the adults hold the future in terms of technological innovation, the girls seem to have a more broad and imaginative understanding of the future and the possibility of slippage between the real and the fantastic. If the collision of future and coding points them toward “growing up,” then their outfits that refuse legibility in the adult world of labor might point to the ways in which they “grow sideways” within the school space. These forms of sideways growth and the “queer affect”<sup>111</sup> that they engender are not quite legible to the school system or to the writer of the novel.

The multiple meanings of future get lost in the folds of Sophia’s dress, where the future coding girl coalesces. The old blue dress with the poofy skirt is reworked by Maya over the last third of the book, transforming from an old dress to a twinkling blue art piece that flashes to the beat of the music. Appropriately futuristic, the materiality of the dress brings together the themes of creative coding, girlhood, girlfriendship, and labor in a visible way. Sophia’s dress, in all its twinkling glory, visibilizes both the assumed labor of the future and the actual labor of the past. The dress itself draws these temporalities together in a present while hiding the very real labor performed by Maya throughout the book.

Sophia’s dress literally makes the invisible (the code that underlies her flashing dress) visible. As Wendy Chun argues, software itself “races simultaneously toward the future and the past,” two temporalities connected through “programmable visions” that attempt to predict a future action through the earlier programming.<sup>112</sup> In this way, software and coding have one foot in the past and another in the (predictable) future. Maya’s coding literalizes this future and past, manifesting in a highly visible dress at the middle school dance—all eyes are on Sophia as she walks in. Sophia transports this dress into the future, literally into the next book, where code might continue to not only predict what will happen but also prepare girl coders like Maya for labor. The code seems both predictable in terms of what the dress will do as well as how learning/doing code will positively affect the girls in the future.

Forward movement and coding are again paired on the cover of the book (Figure 1). Sophia is the only character on the cover of the book in motion, seeming to flit to the right side of the cover, threatening to run off the page. Maya and Sammy (Sophia's date to the dance) stand in with her in the foreground, their eyes trained on her. Erin, Lucy, and Leila stand in the background, cut off from the dress's creator and wearer. Maya's dress is covered in circular mirrors, allowing girls to literally see themselves as the future through reflection. The conceptualizations of both Maya and Sophia's dresses stress girls as important social and economic players moving forward whether through the labor that it took to make the dress or their own reflection staring back at them. Sophia, the dress wearer, and Maya, the dress maker, stand in an open plain with freedom of movement while the other girls remain trapped behind a booth.

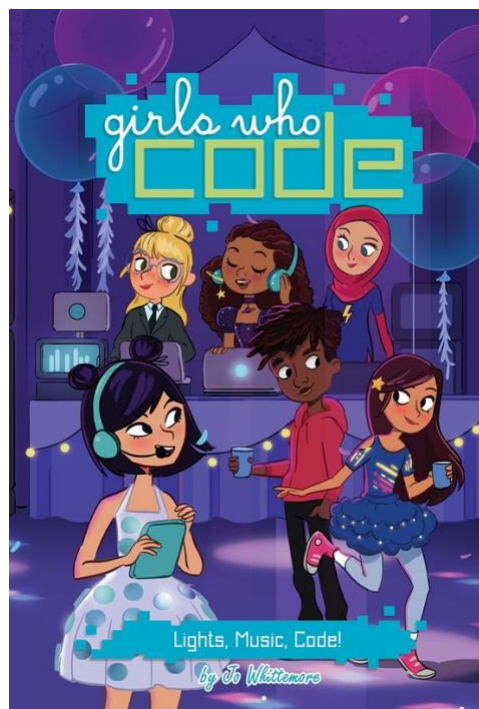


Figure 1 Lights, Music, Code! Cover

The materiality of the dress and its transformation point to the labor of Maya in terms of both the coding of the lights and the artistic act of cutting and sewing, creative coding as Mrs. Clark calls it.

While the coding of the dress draws from the coding the group did together, the assembly of the dress falls to Maya. Maya's sewing work, pushed to the last minute because of the light show, causes her to have blurry eyes, accidents in which she stabs herself with a sewing needle, and little time for breaks. The physicality of Maya's labor bares resemblance to industrial forms of child labor during the late 19<sup>th</sup> century that seemed unquestionably unethical (unlike other forms of labor such as farm work, acting, and shop work). Because of the amount of work Maya has to do, readers often encounter her locked in her room, anxiously scrambling to get everything done. Despite the very real consequences and anxieties around the work, Mrs. Clark insists that the girls "have fun with [coding club]...for crying out loud" to which Maya, through the first-person narration, relates, "I did feel like crying out loud".<sup>113</sup> Maya, while not outwardly expressing her concerns about the amount of labor involved in both the light show and dress, does express concerns to the readers about her ability to solve all of the issues she faces with project completion. We, as readers, see the immediate effects of this work in a way that is hidden from other characters.

However, while we are meant to sympathize with Maya in these moments, ultimately all of the projects are completed with astounding success. In this way, Whittemore avoids having readers question Maya's stress and labor, positioning them, instead, as the work that it takes to be what Anita Harris has coined, a "can-do girl." It is Maya's success within the boundaries of the school—and in areas that are legible to the institution—that point toward her future success in the labor market.<sup>114</sup> I would argue that is also her willingness to work at all hours and work through stress that make her ideal for the twenty-first century digital and creative economy. Though the creation of Sophie's dress was almost literally covered in Maya's blood, the beauty of the final material form hides the labor that went into its development.

The code promises not only a stunning dress, but also the maker's ability to accumulate human capital for future labor, particularly for young learners. The confidence with which Mrs. Clark is able

to posit coding as the future falls in line with what scholar Wendy Chun has referred to as “code as source, code as true representation of action” or code as logos.<sup>115</sup> In this formulation, code offers a “solution to neoliberal chaos” where code becomes an easily digestible map of power relations and a way for people to have a say in those power relations.<sup>116</sup> Understanding code as logos or as action creates code as metaphor that points to dialectics of visibility/invisibility and past/future that structure larger governmentality under a neoliberal regime. In this way, Chun intimately connects code with not only the past and future but also with larger political economic structures. The metaphorical expansion of coding to neoliberal politics as a whole point to the ways in which control and choice, particularly through markets, are meant to be new forms of liberty and freedom.

Postfeminism bought into this rhetoric full heartedly, positioning buying as a way to find liberty, freedom, and independence. While postfeminist ideas have been frequently critiqued through popular and neoliberal feminism in the twenty-first century, these alternate forms of feminism still rely on ideas of predictability through human capital accrual and visibility. Instead of buying choices, however, choice and control are reformulated through human capital accrual and labor. Cultural investment in childhood and children seems to guarantee a clear and navigable track to the future. Computer coding and computer science sit nicely within this framework where jobs growth always seem to outpace the number of workers. Neoliberal and popular feminisms involvement with computer science, on the surface, is much more difficult to critique.

This language is directly reflected in Whittemore’s text but altered to fit within the language of mandatory schooling. In asking the girls to create a light feature, Mrs. Clark pitches the project as a reward for an in-club activity—Maya’s group comes up with the longest list of possible ideas and therefore gets to “choose” and “control” the feature.<sup>117</sup> The connotations of power and choice fit within neoliberal ideas of individual control and agency, though, in reality, the girls’ feature and whether or not to take part at all were already constrained by the school system in which they were

operating. There seems to be no question that the girls will take up the offer as turning down the extra labor is not a clear option. It is also understood that coding the light feature gives the group an opportunity to practice coding and hone their skills over the other students in the (relatively small) coding club. What could have easily been a club project transforms into a competitive opportunity to gain another step up—even if it is positioned as a fun reward.

The payout of their labor, then, exists within the human capabilities that they produce in competition with the other children in their club. However, like code, the storing of human capital does not guarantee a predictable future and does not “necessarily offer a future return” though there may be other intrinsic values to the storing of human capital and capabilities.<sup>118</sup> Just like the narrative of code, control continually slips through Maya’s fingers, and so might the future that Mrs. Clark and the principal imagine. At the same time, other futures or queer affects might begin to present themselves in the girls hidden behind the sparkling dress.

### **2.3 Social Media and Building Affective Communities**

If coding is understood as school labor through the Girls Who Code book series, the organization uses social media to foster affective friendships oriented toward economic labor in their social media. Instagram in particular has become a site where Girls Who Code speaks directly to girls with whom they work. They have an exceptionally active Instagram account, run by Jerica Deck in 2021, that seeks to build these relationships while performing tech savvy girlhood. Like other nonprofits, the organization uses social media in hopes of building “stronger or deeper relationships” with various stakeholders, particularly the girls that they target.<sup>119</sup> These strategic uses of Instagram create a space for the organization to enact sisterhood through an intimate public—the “expectation that the

consumers of its particular stuff *already* share a worldview and emotional knowledge”. Key here is the “recognition and reflection” that occurs through an “emotional contract” between the organization and Instagram followers.<sup>120</sup>

Girls Who Code invites users’ affective bond with their mission through the use of GIFS, memes, quizzes, and interactive elements on their Instagram homepage. One of the most common material affordances of the GIF—quick looping animations— is the “performance of affect” that has the potential to transmit embodied actions typically prevented in written format.<sup>121</sup> GIFs also allow for the transmission of knowledge of particular cultural conversations through images paired with text.<sup>122</sup> Memes operate in much the same way, referencing popular cultural moments and layering them over other static images for newly generated meaning—what Miltner and Highfield refer to as polysemy for GIFs. Both GIFS and memes are used in the organizations’ homepage (permanent collection) and in their stories (24-hour post), tapping into viral cultural moments that they pair with their own assumedly shared concerns around computer programming.

For instance, as the Bernie Sanders mitten meme circulated widely on the internet in 2021 following President Biden’s inauguration (where the photo originated), Girls Who Code created their own meme using the image applied over an all-male tech boardroom with the caption: “Us when we see a tech boardroom full of coders, but none of them are women. ☹️ We feel you #BernieSanders” (Figure 2). During early 2021, Sanders also appeared in *Game of Thrones* stills, on the sidewalks of restaurants, and later on t-shirts and needlepoint patterns. As the image proliferated, organizations, businesses, and individuals used the still to tap into a cultural moment and a particular form of cultural knowledge. Following a rocky presidential election during a global pandemic, the Bernie Sanders memes connected users and followers through an affective resonance that spoke to what users potentially believed they all felt. In some ways and for various reasons, users were all Bernie Sanders, cross-legged, masked, cold, and (dare I say) over it. Girls Who Code draws on these shared sentiments,

positioning Sanders’s disdain toward tech boardrooms while implicating followers in the viewpoint through the framing of “us.” In this instance, followers are able to understand the affective labor they are called to perform because of the widely circulating image and its already established meanings.



Figure 2 Bernie Sanders Meme

Similarly, in October of 2020, Girls Who Code shared a meme of Hilary Duff as a young Lizzie McGuire (Figure 3). The meme was posted in the midst of an ongoing reboot battle of the original Disney show that would star Duff as a 30-something McGuire living in New York City. In the meme, a young Duff as McGuire sits, head in hand, staring into the distance in front of a blue sky (the image has been regularly used as the representative image of the show). Above the image is written: “Dreaming about when toxic bro culture is gone from tech.” While the Sanders meme draws on a hyper-current cultural moment, the use of the McGuire meme spans beyond current members and



reaches to create connections with an older Girls Who Code population. Running from 2001 to 2004, original viewers of the series would be noticeably older than the middle schoolers and high schoolers of after school and summer programs. The meme's legibility does not depend on this cultural capital, but it does allow for a different affective connection for women in their late twenties and early thirties—a group that Girls Who Code was seeking to build traction with through programs like their college loop or through mentorship. Again, the McGuire meme assumes a shared frustration about tech culture that is future oriented (particularly for younger girls).

These memes share much of the same sentiment, then, as the organization's website—girls and women should be computer programmers because of the overwhelming presence of men. However, unlike the quantitative arguments on the website, Instagram provides a space for affective resonance and overlaying of meaning. Importantly, these posts are directly targeted to the girl coders themselves in a way that the website might not be. They are easily digestible, quick, and wide-reaching, targeting a broad range in age that represents the increasingly diverse Girls Who Code population.



**Figure 3 Hilary Duff Meme**

This use of memes is akin to what Akane Kanai has termed “spectatorial girlfriendship” in relation to best friend blogs which “invites the reader to understand forms of girlhood as representative of both the blogger and reader as girlfriends who have certain experiences and knowledges in common”.<sup>123</sup> Here, of course, the organization stands in for the blogger. Like Kanai’s discussion of girlfriend blogs, Girls Who Code’s Instagram draws on a gendered social imaginary that is created through reading and relating to produce a specific way of doing femininity and to create girlfriendship between the organization and its followers. However, unlike girlfriend blogs, Girls Who Code does not focus their energy on the hidden moments that mark girls as “approachable, girly and normatively unsuccessful,”<sup>124</sup> instead they use social media to create a girlfriendship that shares frustration over the tech field. Interestingly, most of the intended audience on Instagram wouldn’t have the first-hand

experience of this frustration since they are too young to actually work in tech. The girlfriendship presupposes a future frustration. In this way, Girls Who Code taps into a girlhood that is characterized by the larger moment in neoliberal feminism where girls are asked to build confidence and see themselves as future laborers.<sup>125</sup>

Intimacy, in these posts, is integrally linked to labor. As such, the intimate public built and maintained through Girls Who Code's social media helps to uphold a gender normativity that flourishes "under the guise of feminine sociality".<sup>126</sup> Within neoliberal feminism, gender normativity—previously centered only on beauty and consumption—partially transitions to include concerns around economic viability and human capital. As Rottenberg outlines in relation to neoliberal governmentality for young women, while adulthood is figured with a focus on work-life balance, young adulthood is structured around the management of future fulfillment instead of risk management.<sup>127</sup> On Instagram the sisterhood of future tech leaders is built around a promise of success and future involvement in the field, already positioning their followers as affectively enacting shared beliefs about tech culture. This is underscored by Sujani's re-appearing phrase "be brave, not perfect," pushing girls to take risks instead of playing it safe. The phrase often appears on the Instagram page in the form of a popup window with a button that states "You got this!". In these moments risk is refigured as an inevitable good in the lives of the followers and is actively engaged through a sense of personal mentoring and friendship from the organization. Larger than leaving out risk management entirely, Girls Who Code refigures risk as the only way to future fulfillment that is managed through affective ties to the organization and an assumed sisterhood.

## 2.4 Pay Up

In April of 2021, Reshma Saujani stepped down as CEO of Girls Who Code, passing the proverbial baton to Dr. Tarika Barrett. A few months prior, in December of 2020, Saujani wrote an op-ed for *The Hill* detailing the needs of mothers who saw their careers decimated before their eyes as they worked from home with children during the Covid-19 pandemic.<sup>128</sup> She urged President-elect Joe Biden to create a task force dedicated to compensate the invisible labor of mothers. The call culminated in a full-page advertisement in the *New York Times* calling on the Biden administration to implement the Marshall Plan for Moms. The ad was accompanied by the signatures of fifty prominent women from the president and CEO of Planned Parenthood, Alexis McGill Johnson, to actresses Eva Longoria and Amy Schumer.<sup>129</sup> In February of 2021, fifty prominent men also joined the call.<sup>130</sup>

While Saujani had written op-eds and given multiple interviews and talks, the most sustained discussion of her plan for women's labor, *Pay Up: The Future of Women and Work (and Why It's Different Than You Think)*, was published in March of 2022. After a decade of pushing girls to be "brave, not perfect," Saujani writes that she "was wrong," leaning in and being brave wouldn't fix the issues of gender in workplaces, homes, policy, and culture.<sup>131</sup> The big lie, she writes, is that women can "have it all."<sup>132</sup> However, far from throwing her hands up, Saujani goes on to outline four forces of change that will make the workforce a better place for women, particularly mothers: empower, educate, revise, and advocate. Tellingly, the first force discussed, empower, requires women to empower themselves to make non-negotiables, set better boundaries, and stop trying to be perfect (for crying out loud). Despite briefly mentioning her experience with Girls Who Code and the failures that she saw, she never truly discusses the experience or how it shaped her views on women's labor.<sup>133</sup>

It's unclear how *Pay Up* and The Marshall Plan sit alongside the burgeoning messages of Girls Who Code, where the organization is no less interested in getting girls into the tech workforce and

where Saujani is still on the board of directors. Despite her seemingly grand revelation, the organization continues to advertise this exhausting future to girls—of course, motherhood isn't figured into the equation of Girls Who Code as it focuses purely on job success. If Girls Who Code articulates computer coding as future oriented and Saujani's recent activism targets working mothers, where might the work for girls in the present be and what would it look like to be a coding girl without tethers to this (clearly still problematic) future of high-tech and high-powered labor? The next chapter explores some alternative, and not so alternative, versions of the coding girl with particular attention to how underlying theories of play, learning, and adult labor intersect.

### 3.0 What is a Child Coder if She Does not Play?

While narratives connected to coding organizations focus on human capital accumulation, other narratives of the coding girl present girls actively coding for various purposes outside of future-oriented education. These versions of the coding girl are no less fraught with neoliberal economics and racial politics, but they do present computer coding as a playful endeavor with particular benefits in the here-and-now. On the surface, these narratives neither place the girl within traditional confines of mandatory education nor do they presuppose a future point of success that the girl coder is trying to reach. However, on a deeper level, these instances of the coding girl speak to larger shifts in the world of childhood, labor, and technology in the second half of the twentieth century and beyond.

Of central importance is play and its potential overlaps with labor. Underpinning this chapter are theories on educational learning and play that have existed for centuries. As Amy Ogata argues,

Like the concept of the toy, notions of play, creativity, and childhood have been knit together as a modern construction. Creativity is embedded in historical and philosophical discussions of play and is closely linked with a belief in the positive effects of the human imagination. Because play is central to the concept of modern Western childhood, it has accumulated associations of imagination and invention.<sup>134</sup>

Children's play and labor (as I've outlined as learning), have historically been connected through material playthings like building blocks, visual toys, and free-form play things that encourage creativity and free thinking for the "physical, intellectual, social, and emotional development of children."<sup>135</sup> Construction toys, in particular, have helped to imagine both what children might create as well as how constructing creates particular subjectivities.<sup>136</sup> As Nguyen argues, these subjectivities tied to construction play are often highly individualized and emphasize imagination and creativity.<sup>137</sup>

As STEM continues to occupy the forefront of the social imagination for children's play, both older forms of creative play and more media centered play incorporate goals of learning science, technology, engineering, and math. While past versions of play and learning relied heavily on ideas of childhood's closeness to the natural world, the influx of technology in childhood has slightly shifted what childhood play and learning look like in the late twentieth and twenty-first centuries. Children, in the recent past, have been theorized as having an intimate understanding of technology, earning them the nickname "digital natives."<sup>138</sup> The argument follows that children who have grown up with technology are fundamentally different than previous generations and require different methods of teaching and interacting. For instance, video games and the gamification of learning in general have heightened in popularity since media's widescale infiltration into children's culture. In the twenty-first century, then, learning and play are connected in new ways with technology acting as a mediating force that children seem to "naturally" understand. This has only heightened as tech labor continues to be a highly sought after and prized profession in adulthood.

This chapter also depends on alterations in labor that have taken place over the past century where creativity and play have been increasingly incorporated into the adult workplace. In 2001, John Howkins popularized the term "creative economy."<sup>139</sup> Taking up the term the next year, Richard Florida defines the creative economy in terms of individual occupations that create "meta-ideas" to support the "production and transmission of other ideas." In his view, the creative economy restructures the way that people live, making creativity a main unifying factor of bodies, work, consumption and leisure.<sup>140</sup> The "creative class," as Florida refers to these workers, "add economic value through their creativity."<sup>141</sup> As a part of this, large companies have shifted management style to incorporate play and leisure into the workspace. Leisure at work, what Duerden et al. define as the "nesting of the leisure domain within work," brings employees and identities into the workplace in order to promote organizational commitment, work engagement, and resilience.<sup>142</sup> Leisure in the

workplace, then, helps to create better creative employees who experience less burnout and more job satisfaction overall.

This chapter examines two variations of the girl coder that tug on the strings of creativity, digital learning/labor, and adult labor in various ways. These examples offer two different inflection points for the playful, laboring coder. First, the Nickelodeon series, *Game Shakers* offers an economic understanding of child labor and creativity, drawing on both naturalized ideas of creativity and media knowledge in childhood as well as the ways in which both have the potential to gain monetary capital. Like with *Girls Who Code* in chapter one, the imaginary space of *Game Shaker* performs tech girlhood through the lens of race. Second, I trace labor and leisure through the picture book *Rox's Secret Code* and its connected phone app for kids. Through both, labor and creativity surface for characters and real-life girls in oppositional ways, calling into question what these artifacts actually want from actual girl coders. Finally, the conclusion to this chapter reflects on all the versions of coding girlhood that have been offered here and in chapter one.

### **3.1 Game Shakers: Where are the Black Coders?**

In 2015, Nickelodeon premiered the sitcom *Game Shakers*. The show features Babe and Kenzie, two middle school girls at Sugar Hill Junior High in New York City. The girls code their first game app, *Sky Whale*, for their seventh-grade science class before uploading it for purchase online and funding an app startup company. They go on to create multiple games and partnerships, enjoying economic success through their company—also dubbed Game Shakers. Capitalizing on the enthusiasm for girl coders in the second decade of the twenty-first century as well as their own history of girl empowerment<sup>143</sup> and giving children a “network of their own”,<sup>144</sup> Nickelodeon creates a show



that positions young girls as uniquely able to be successful tech moguls here and now in childhood.

If the girls of coding camps and coding books represent future orientation and anxiety at some level, Babe and Kenzie of *Game Shakers* stand in for successfully individuated and white neoliberal subjects that are capable of earning *as* children. Play informs their labor; in fact, their labor is play as most games are created through dress up play that is digitized on Kenzie's computer screen. While the girls work for themselves, the literalization of play being work points to new forms of exploitation present in twenty-first century capitalism in which boundaries between work and labor are increasingly blurred. In a lot of ways, Babe and Kenzie become ideal neoliberal subjects that take the potential for creative labor to its logical end, no boundaries between their leisure and work. While the girls must still attend school—for them this seems to be the real labor of the show—their time spent at the Game Shakers headquarters takes up all of the spare time that we see, making it both their paying job and their singular form of leisure.

The girls' success is intimately tied to their childhood which provides naturalized links both creativity and technological know-how. Like most children's sitcoms focused on narratives of work, the work of the girls in *Game Shakers* is relatively invisible. This means that the show focuses on the outcomes of programming—games and fame—rather than on programming. We do not necessarily see the girls struggling like we encounter Maya in *Lights, Music, Code!*. Instead, Babe and Kenzie's skills are positioned as either inborn talents or, at the very least, fully developed skills nurtured before the start of the show. Kenzie is a skilled programmer and Babe has business savvy that matches and, at times, surpasses the adult business partners the Game Shakers continually acquire. Kenzie's coding abilities in particular draw on theories of the "digital native" put forth by Marc Prensky that situate children as deeply understanding of technology due to constant contact.<sup>145</sup> Because of this, there seems to be little need to see these workers developing their skills or struggling at their jobs. Positionally, these girls stand in stark contrast to the Black girls of coding organizations who must not only prove

their interest but also capture and store human capital.

Blackness, however, does enter the show in other ways. In order for these youthful tech superstars to gain success, they must be marked as white and middle class. This appropriate childish whiteness is positioned beside and against Double G, their rapper cum business partner, who often exhibits child-likeness in inappropriate ways that inhibit the businesses success. He is simultaneously an oblivious adult and an “urban” superstar, representing some of the key attributes that make an adult acceptable in what Banet-Wiser understands as Nickelodeon’s branded “us versus them” mentality that structures relationships between children and adults.<sup>146</sup> Double G is made safe—both generationally and racially—through his childishness at the same time that his creative labor and racial labor are emptied of legible meaning. This narrative character work bolsters the creative white coding girl as the ideal creative subject and erases the possibility of the Black coding girl and an appropriate childishness with Blackness. In this section I consider two Black characters in *Game Shakers*—Double G (childish Black adult) and Darlene (adult-like Black child)—to tease out the ways in which blackness props up Babe and Kenzie’s claim to childhood coding.

### **3.1.1 Double G: Race as Supporting Actor**

We meet Double G in the first episode of *Game Shakers*, “Sky Whale,” when Babe and Kenzie illegally use his hit single “Drop that” to promote their first phone app. Upon finding out the song was stolen, earning him no money while Babe and Kenzie have enough to buy a building in Brooklyn, he returns to New York and barges into the Game Shakers headquarters. When the girls don’t have the 1.2 million dollars that he requests, he starts to take all of their equipment until the girls propose that Double G become a partner. Initially resistant, he ultimately approves at the bequest of his

accountant and they sign the necessary paperwork. Throughout the remainder of the series, Double G is consistently positioned as a childish black adult to Babe and Kenzie's level-headedness.

He continues to eat at restaurants that make him sick; he falls for Babe and Kenzie's tricks; and his overall attitude toward life is one of fun and frivolity. Often, Babe and Kenzie must ask him to leave or stop talking so they can work. Through Double G, a childish Black male, "conditions of visibility" fall into place for Babe and Kenzie.<sup>147</sup> The blackness of Double G "shore[es] up whiteness," particularly that of the white girl stars at the center of the show.<sup>148</sup> It is the unique childishness of Double G that also creates what Projansky refers to as an "ironic binary" between adult and child.<sup>149</sup> The children exhibit adult-like characteristics (i.e. work ethic, thoughtful spending, and business savvy) while Double G and his black bodyguards are framed as childish (i.e. unaware of social cues, easily distracted by cute animals, and, at times, lazy). Importantly, while Babe and Kenzie's particular childishness and age are legible within the market and easily turned into capital, Double G's childishness stands in stark contrast, distracting from work and resulting in a potential loss of capital.

This dynamic is particularly salient in "Tiny Pickles" (season 1, episode 6). Babe, Kenzie, and Double G appear on the Helen Show (a Nickelodeon version of the Ellen Show) to introduce their follow up to "Sky Whale":

Helen: So now that *Sky Whale* is like a, a worldwide sensation, what's next for you guys?

Babe: Well, we're putting out a brand-new game in two weeks

Helen: Oh yeah, what's it called?

Babe: It's called...

Double G: The name of the new game, it's called *Tiny Pickles* [audience clapping]

Babe: Huh, no, no it's not called that

Double G: Oh yes, it is

In this televised conversation, Double G promises the world a game that does not exist, and a

game that Kenzie and Babe never intended to create. The girls are forced to alter their existing release to fit the promised product.

Rather than being a child-led creation, Double G takes on the role of creative director, promising the Game Shakers that they will get to see “the Double G creative process,” something they are visibly unexcited about. For Babe and Kenzie, the erasure of creative autonomy turns the creation of *Tiny Pickles* into the production of the game, an almost Fordist model of separation of design and production. Rather than “manag[ing] their own intellectual assets”<sup>150</sup>—a key feature of the creative individual for Howkins—Babe and Kenzie are forced to use their assets to produce Double G’s vision. They are visibly detached from the game’s production—sighing and unenthusiastically performing tasks as Double G directs from the sidelines. The montage of Double G’s game creation still relies on embodied coding methods in-line with the earlier creation of games. However, the focus here turns to the adult’s inability to conceptualize and design a playable game, underscoring a rhetoric of children as digital natives who inherently understand technology and processes. In a test run of the game, Double G excitedly plays while the children watch, unimpressed. The game, as Babe points out, is “terrible,” a game that “nobody would want to play...ever.”

Despite his interest in gaming and his support of the Game Shakers Company, Double G, who is merely a childish adult, is not able to break into the “truly natural” ability of children to work with technology and design productive and appealing game play. Play does not work in the same ways, but instead adheres to the adult body awkwardly, turning into a waste of capital and time. At the same time, the use of Double G as a performer of the ridiculous is not uncommon but draws on a long history of minstrelsy that is able to be hidden “under claims of holy obliviousness” through its association with childhood racial innocence.<sup>151</sup> Rather than the Black aggressor model that Tyler Bickford argues highlights whiteness, femininity, and childhood in relation to Taylor Swift, *Game Shakers* draws on a minstrel history of physical brutalization, ineptitude, and stupidity that highlights

play as the natural place of children, particularly white girl children.<sup>152</sup>

It is important to note, however, that Double G is the motivating factor in getting Babe and Kenzie on the Helen Show in the first place. When asked how, he responds, “How?! I’m a superstar!” In this formulation, Blackness simultaneously signifies a past and particular relation to whiteness while being emptied of anything other than the urban brand it signifies in the present. Viewers rarely see Double G making music, painting him as more of a symbol than a creative entrepreneur. While Banet-Wiser’s argument that “popular discourses of race and images of nonwhites become ‘street cred’ in the contemporary marketing world” applies to Nickelodeon’s broad branding, it is literalized through *Game Shakers* in which the childish capital of Babe and Kenzie often depends on Double G’s urban signification for legitimization (this is even true in their use of his song “Drop that What” for promoting *Sky Whale*). *Game Shakers*’s use of race and urbanization adhere to both Banet-Wiser’s articulation of Nickelodeon’s ambivalence about race and Tyler Bickford’s conceptualization of the whiteness of tween innocence through which black musical styles remind us that tween music is “deeply invested in whiteness as a foundational value”.<sup>153</sup> I see *Game Shakers* doing similar work in the portrayal of articulate and grounded white girls that are set against Double G’s extravagant spending and frivolity—their closeness highlights their difference. Babe and Kenzie, while positioned as successful coders in the marketplace, rely on Double G’s Blackness to further sediment their “rightful” place child entrepreneurs. Importantly, within this formulation and within *Game Shakers*, Black girlhood is erased completely. While national coding clubs trade current Black girlhood for future Black womanhood, *Game Shakers* articulates that there is no imaginative space in the childish economy for Black girlhood.

### 3.1.2 Darlene: Stuck Behind the Screen

The only Black girl coder we encounter in the first season comes in the final two-part episode, “Revenge @ Tech Fest” (episodes 20 and 21). This episode brings together the actual Girls Who Code organization and the Nickelodeon show. In the episode, the Game Shakers are attending a Brooklyn-based tech conference called Tech Fest where Girls Who Code also has a table setup. In their Tech Fest booths, Babe and Kenzie present *OctoPie*, their newest game, while Jenna and Darlene of Girls Who Code show off their Fit Buddy (an obvious play on Fitbit). The Game Shakers booth is colorful and fun offering visitors tablets to play their game, a giant slingshot, giant stuffed octopus, real neon jellyfish in small aquariums, and multiple television screens to display game play. Girls Who Code offers a pared-down station with tablets and television screens (though they seem to display the organization title alone) set against a colorful geometric backdrop. There are no extra physical attractions like the Game Shaker’s booth.

When we first meet the Girls Who Code, Jenna is running around trying to reach her 12,000 steps explaining “I don’t wanna end up looking like my mom,” and Darlene (the only Black coder we have seen to this point) is yelling at her mom through Bluetooth headset, confusing the Game Shakers crew: “Just get a bag of frozen vegetables and put it on your head...I don’t know mom, just go look in my underwear drawer...Be quiet mom!” In this brief introduction, it seems clear that The Girls Who Code envision a future that they are moving toward—namely unattractive and ill-equipped adulthood—whereas the Game Shakers rarely consider the future at all. Kenzie and Babe’s parents or their own futures is seldom mentioned. Two versions of the coding girl are sedimented and placed in sharp relief in this moment where viewers are meant to laugh at the ridiculously grown-up concerns of the Girls Who Code as well as concerns about grown-ups in general.

This reading is subtly enforced by Kenzie’s declaration that she coded her first game at a Girls

Who Code club. Kenzie offers an alternative present/future for girls that leave Girls Who Code clubs, but only one that was realized outside of the organization, underscoring the organization as a pedagogical tool for outside success. Kenzie used the Girls Who Code club to practice coding—the chicken and egg game that she developed is not one of the Game Shakers’ apps—while simultaneously providing a scenario in which the skills developed through the organization might provide economic substance to children in the present. Notably, she chooses not to follow the pipeline of Girls Who Code organization through their yearly afterschool programs and summer immersive programs. Girls Who Code is a thing of the past and economic viability is the present. Kenzie’s plot trajectory is one of school-focused learning (early in the series she is distraught at not getting an “A” in her science class) to one of fully embracing her economic capability. Importantly, Kenzie appears as an anomaly rather than the standard path of girls like Jenna and Darlene who are still held in place by their childhood and their connections to future adulthood. Kenzie has successfully grown sideways whereas Jenna and Darlene are carefully located within singularly forward-moving trajectories.

As the episode draws to a close, it is actually Jenna and Darlene that save Double G from the rogue robot, MeGo. As Darlene stands behind her computer, breaking into MeGo’s system and coding him to self-destruct, Kenzie ventriloquizes what she is doing for the rest of the Game Shakers crew, eventually telling Darlene the steps to take and sharing her keyboard. Unlike Kenzie and Babe’s physical and play oriented coding, Darlene’s remains stagnant behind her screen that displays the blue screen, black boxes, and lists of text that are more widely associated with computer coding. Even as Kenzie moves back to the open floor to celebrate Double G’s escape, Darlene and Jenna remain behind their computers, ending the episode in their act of coding. Their coding is clearly *not* play in the way that the Game Shakers crew’s is, and it does not earn them the money (or here even the recognition) that Babe and Kenzie have.

If Girls Who Code seeks to bridge access to technology and remedy gaps in the labor market, it

rhetorically closes down the potential of economic girlhood here and now. Girls might use Girls Who Code to garner skills, but from within the framework of the organization there is little chance of being economic actors. If *Game Shakers* presents us with the ultimate “can do” girl of the neoliberal digital economy, it does so at the detriment of adults and Blackness in general, offering one affluent white version of successful neoliberal girlhood. Race, labor, and technology become intertwined in an ambivalent cultural milieu that asks us to invest in Black girl coders while presenting white girls as the protagonists of the neoliberal economic game. Clearly, a lot of options are missing in these accounts of the coding girl.

### **3.2 Rox's Secret Code: Gender and Any Girl**

On the surface, Rox or *Rox's Secret Code* might give us something different. Rox is a young Black girl that rocks a tutu and leather jacket and codes robots in her spare time. She can make anything come to life, from a Brocc Bot that can hide the broccoli to a Mischief Bot that does the opposite of what it is told. Designed by Mara Lecocq and brought to fruition by writer Nathan Archambault and illustrator Jessika Von Innerebner, in *Rox's Secret Code* (2018), Rox uses her coding superpower to create Chorebot so that she can minimize work and maximize play. Rox's decision to install artificial intelligence allows Chorebot to teach himself and become more equipped to do chores as the plot progresses. He cleans Rox's room before moving on to the rest of the house, the neighbor's garden, and eventually the entire town, but his ability to learn organization without discerning what should be organized results in Chorebot tearing apart downtown and organizing the buildings by color. Much like Frankenstein's monster, Chorebot's creation has unexpected consequences and Rox is forced to override his code with the code of Mischief Bot. In the end, “Boss Rox” encourages Chorebot to



follow his passions, so he decides to become a Gardenbot.

*Rox's Secret Code* points to the ways in which coding might serve purposes outside of educational or economic goals. Unlike Danny's homework machine, Rox's Chorebot, in addition to helping her lessen her work, gains the respect and admiration of her parents and neighbors who take advantage of Chorebot's cleaning abilities. Whereas Mrs. Dunn and Miss Arnold didn't think it was fair for Danny and his friends to "expect a machine to do all [their] work for [them]",<sup>154</sup> Rox's parents "came around" once "chorebot cleaned up their messes".<sup>155</sup> It turns out parents also want to avoid the boring, dirty work of running a household. Undoubtedly, this difference in the text is related to the changing conceptualizations and uses of computers over more than half a century. If Danny's homework machine points to the drudgery of manually programming a mainframe in the early days of home computing, then Rox's robot underscores the dream (and limited reality) of home machines doing work for us. It is also easier to imagine fun computing in a media landscape where block programming (what is reflected in both *Rox's Secret Code* and the affiliated apps) is available to young audiences, allowing for a multiplicity of projects.

But, importantly for my work, it also reconceptualizes how children and their work relate to larger societal structures and people around them. In *Danny Dunn and the Homework Machine*, Danny, Irene, and Joe are not only firmly placed within a school narrative, they are also fixed as under control of adults entirely. The homework machine seems to offer liberation from the project of human capital accumulation. However, their inability to "get one over" on the adults in their lives actually leads to more intense exploitation and a move toward faster accumulation of human capital. Evidently, the adults in their lives would rather them work toward these goals—or perhaps just prove they are still in control—than give the kids time to play ball.

Unlike Danny's homework machine, Rox's robotic pursuits do not push up against adult learning desires (other than her parents' request that she clean her room which the robots ultimately solve) or

rupture their conceptualizations of time well spent. Building robots is an acceptable past time that might also reduce other forms of labor (like cleaning her room). Rox's robot building abilities embody creative economy ideologies of creativity, autonomy, and technological skill like many of the characters discussed in this chapter and chapter one. They do all of this within the framework of creative play and enjoyment that lead to the disruption of clear lines between labor and leisure in the twenty-first century. Whereas Danny, Irene, and Joe attempted to use their homework machine in order to create extra time for baseball practice, Rox's creation of Chorebot stems from her desire to have more time for making more robots. Kenzie and Babe, in some ways, are more similar to Rox in their pastime being easily translatable to labor (present and future) that playing baseball might not be. At the same time, Rox's interest in building robots and her practice at doing so help her to continually accrue intellectual and creative capital that she, as well as employers, will be able to exploit in the future. All of this without any clear labor or school-type learning.

### **3.2.1 Any Girl: The Politics of Personalization**

Interest in learning and future is crystalized in the paratextual materials of the book despite the book not making claims about future economies outright. On her personal website, Lecocq describes the Secret Code project as a chance to “address the problem of diversity in technology by treating the problem at the source, when children start developing aspirations.”<sup>156</sup> Like broader narratives of gendered coding, Lecocq simultaneously articulates coding as leading to tech careers in the future and as childhood being a particular place where this work begins through representation, effectively omitting the plethora uses of coding and other gendered and raced aspects of tech culture. The book then might not position Rox as a future professional coder, but it does imagine the girls reading it as

such. To borrow from Rose, this book (along with others discussed in this dissertation) acts as a kind of “seduction” of the child to “secure the child” in particular ways that meet adult desires.<sup>157</sup>

In service of developing coding aspirations, the book has the option for personalization if ordered from the Your Secret Code website, [yoursecretcode.com](http://yoursecretcode.com). Discontinued in 2020 so that the creators could focus on their families, the website now operates as a make-do archive of what the project once was. Through the website adults could customize Rox’s narrative, replacing Rox with the name of the girl in their life. Adults could then customize the main character’s hair, skin color, eye color, and parents (single parent homes as well as same sex and interracial couples are represented) and add an optional personalized message on the first page.

The Secret Code personalization falls within several personalized contexts of the twenty-first century. Bearing a resemblance to avatar creation, the ability to personalize Rox is constrained by pre-set options (less than a lot of avatar generators) that “remediate culture and present ideologies about culture and identity to players”.<sup>158</sup> Particularly clear is the investment in performatively gender-bending girls—Rox’s tutu and leather jacket do not get exchanged in any iteration. Gender markers of dress are still hyper legible within the gender binary yet favor a safe middle ground. Rox’s girls are not too girly but not too masculine either (perhaps programming robots its masculine enough). The simplicity of Rox’s personalization falls in line with what Bryant and Akerman have termed “concrete avatars” that, in their study, entice 6-9 year: a simplistic, concrete version of themselves.<sup>159</sup> In this age, avatars generally reflect things like correct hair color, skin color, and gender. The lack of particular characteristics points to potential identities/markets that have not yet been commoditized in the same way. For instance, the character never gets androgynous features, a headscarf, different eye shapes, and she is always able bodied.

The personalization of texts for children grew in the twenty-first century (as a larger personalization revolution) which Kucirkova and Mackey tie to increasing personalization of mapping

that moves “from A to B” to “from me to B” that place individuals at the center of mapping.<sup>160</sup> *Rox’s Secret Code* serves as an example of a hero storybook that places the child at the center of the narrative and focuses on their own relation to the fictional story. The customizable book’s tagline, “make her see what she can be,” is a forceful reminder of the adult desire to place their children in line for programming careers, seemingly taking the option (perhaps the word “let”) out of the equation. The tagline underscores the effort of pointing girls, particularly girls of color, toward “what they can be”—understood, based on the website, as a diverse person in tech. In the act of personalization, the book shuts down the work of children attempting to relate to other coding girls and instead refocuses on the self, a singular coding girl.

In this way, customizing Rox to “any girl” further individualizes the coding girl and imagines the subject as an independent actor outside of existing structures and relations. We see no girlfriends for Rox and the reader is not asked to cheer on another girl in the personalized version. Like broader aspects of neoliberal feminism and popular feminism, the book “restructures the politics of feminism to focus on the individual empowered woman”.<sup>161</sup> Unlike the Girls Who Code clubs and books, we see Rox succeeding on her own in a multitude of potential identities. These identities are chosen from a pre-existing list, making them free-floating racial and cultural signifiers rather than a deep engagement with what these identities mean in the larger social milieu of the twenty-first century. *Secret Code’s* interest in race and gender (though a particular heteronormative gender) point to discrete areas of the self that have been understood and segmented through the market for both adults and children.

In a way, then, the diversability of Rox is what Herman Gray considers an “incitement to visibility” in the “racial neoliberal regime of difference”.<sup>162</sup> Within this framework, “race is visible but emptied, made an exception, not to matter” in which representation becomes in end in itself that expresses the “logic of market choice, consumer sovereignty, self-reliance, and cultural diversity”.<sup>163</sup> The self-

crafting entrepreneurial subject becomes legible through celebrated difference and diversity that affirm the promise (and full realization) of a free market society at the same time that the proliferation of images acts as a “technique of power”.<sup>164</sup> Married with the newfound interest in neoliberal feminism, *Rox’s Secret Code* invests in turning the structural (both dealing with race and gender) into the individual for Rox and the girl readers that are made to see themselves in the pages. After all, it is no longer the structural elements of society that inhibit black and brown girls from being computer coders, but their own ability to imagine themselves in that role.

### **3.2.2 Secret Code App: Imagining the Coder**

But only to imagine so far. If Chore Bot and Rox take personal goals and claim them as invigorating and dangerous, constantly threatening to evolve out of control of the human that made it, then the last piece of the Your Secret Code project prevents this entirely. It also belies any assumption that children might “naturally” pick up computer coding. In *Rox’s Secret Code*, artificial intelligence is the key ingredient of Chore Bot’s cleaning power, described as “the power to learn on their own without humans telling them what to do” that could cause robots to “rebel against their bosses.” The phone app, titled Rox’s Secret Coding Game and discontinued with the project as a whole in 2020, allows users to design their own robot to program in an augmented reality interface. Once the user has designed their robot from a pre-existing inventory and named it, they can place their robot into their environment and start to drag and drop coded directions to work through pre-existing mazes and paths. People can enter into the augmented reality screen, sharing space with the robot creation. Rox gives advice and directions from the top left corner of the screen.

Like many online interfaces for kids that use simplistic approaches to teach coding, the Secret Code app sits firmly within teaching narrow skills associated with coding instead of viewing coding as

creative, collaborative, and playful.<sup>165</sup> The robot design screen offers a select set of body parts—four heads, four bodies, four arms, and four legs—and the drag-and-drop game design makes the app less of a creative game or exploration and more of a tech-influenced worksheet. Players move from a “learn” section (where they practice using the blocks with direction from Rox) to a play level (where they move through mazes somewhat more independently). Both sections of the app ask users to make their robot move toward the finish line, picking up objects along the way. To this end, users can select from blocks like move, pick up, and rotate.

Unlike other game designs, the various designs that players might choose for the robots do not equate to any difference in game play—for example, the arm with the grabber hand does not result in it being easier or harder to pick up materials from the puzzles. The robot creation, as evidenced from the promotional video in which a girl lovingly strokes her robot, serves as more of a beloved pet than a technological creation. This is, however, a beloved pet that does not demand the attention of other virtual pets such as Tamagotchi and Furby that die if not fed, played with, or taken to the bathroom. The robot also does not necessarily live between your time playing. Each time the game opens you can build a new robot. So, while, in some ways the robot creations are imagined as important affective figures crossing between the digital and the analogue, this scenario is not entirely supported by the game. Instead, players might consider each opening of the app a chance to design a completely new creation, a chance to try on different looks that results more in a move toward “dressing up” than designing or taking care of something.

If *Rox's Secret Code* presents a creative, individualized girl subject, the app pushes us away from that, severely limiting the options for what coding might do and the choices that girls might make. We might think of these games in opposition to creative coding platforms such as Scratch and ScratchJr that, though still using drag and drop blocks, create a playground where children can be creative. In this way, while other programs might create spaces for plethora of coding meanings and uses, the

Secret Code app narrowly aligns coding under what might be considered technical skills that are loosely tied to various types of coding: mainly the practice of giving clear directions, planning, and sequencing. Because of the set number of blocks available to players/coders, even a sense of problem solving is erased from the app in a lot of ways (for a given puzzle, players are given the exact amount of each block needed). Similarly limiting programs like Hour of Code do not limit the blocks that are available to users.

The desire to make girls see what they can become, then, is a promise that is not fulfilled through the app itself. The app's constraints around design and control leave the player to follow a narrowly defined path of coding and play that seems to be purely oriented to goals of the designer. Small hope might live in the moments where girls can imagine their robot creation in their own space through the augmented reality, but these moments are limited to the "build" screen (there is not, for example, an option to go to an open screen and see your robot outside of this). At the very least, what girls can do or become is limited in way that Rox seems not to be.

### **3.3 A Brief Note on Covid-19**

Childhood media scholars and academics in other fields have argued against the easy acceptance of the "digital native" argument for decades. In conversation with danah boyd and Henry Jenkins, Mimi Ito articulates wonder at the distinctiveness of youth behavior and whether it "has more to do with the unique social conditions that limit their autonomy than with some innate developmental imperative or generational identity."<sup>166</sup> They also articulate the problematic and freighted usage of terms like "native" and "immigrant". Boyd in particular considers "native" and how the term glosses over the agentic force behind youth digital participation and youth's willingness to develop skills.<sup>167</sup>

Both *Game Shakers* and *Rox's Secret Code* predate the Covid-19 pandemic when the reality of the “digital native” rhetoric was fully tested as students learning moved to largely digital methods. Perhaps unsurprisingly, the narrative of the digital native didn't hold up during Covid times. As Williamson, Enyon, and Potter found in their study of pandemic pedagogies “some young people [were] excluded from much of their education and their social networks” while attempting to learn from home.<sup>168</sup> As it turns out, children are not necessarily “digital natives” in the ways that popular culture might have us think. While the assumption of digital savviness often comes from seeing kids texting or using social media sites, they often have a more difficult time using technology for things like searching and interpreting results successfully.<sup>169</sup>

The next chapters will deal more heavily with Covid-19 and its impact on student learning. However, it is worth noting here that Covid-19 might give the opportunity to debunk longstanding myths of who understands technology, how, and for what purposes. Far from the easy naturalness with which Babe, Kenzie, and Rox approach technology, children in the real-world work hard at being digitally capable. As scholars like Mimi Ito, Mary Celeste Kearney, Anita Harris, and Julian Sefton-Green and David Buckingham have shown, it takes work for children to be digitally capable. Digital competency is also often approached for various reasons from boredom to political activism.

### **3.4 Coding Girl(s) Represent**

These narratives I have offered in this chapter and the previous are disperse, contradictory, yet mutually supportive. Weaving through organizations, books, television, apps, and websites is no stable definition of what a girl coder might be, but instead a proliferation of identities from which girls and adults alike might draw. On one hand there exists the Black and brown coder that works in summer



camps and after school to build her coding skills for a future job market or school labor that promises the accumulation of human capital; on the other hand, we have seemingly empowered girl subjects that harness their coding power for rewards in the here and now. Across all of these sites is an investment of what representations of girl coders might mean and do for real girl children in an increasingly tech-based economy.

Importantly, the imagined empowerment that surfaces in these texts stands to be questioned, particularly the ways in which that empowerment is primarily imagined through economic citizenship. For children, who are not yet legible as economic subjects in their own right, this delay is understood through preparation—preparation to be later economic subjects through training or learning. The coding girl is subsumed in popular and neoliberal feminism—simultaneously existing in a mode of feminism “taken into account” and an emblem of the “worthy capitalist-enhancing feminist subject”.<sup>170</sup> The image of the girl coder is, within these discourses, a pre-capitalist subject whose existence promises not only her own meteoric rise through the ranks of tech, but also the more just and equal future workforce.

Within this framework and her unique positioning as a child, the labor of the coding girl in these accounts is erased but constantly threatens to resurface. It hangs onto the threads of dresses, the soldered metal of robots, and playful games even as creators of these artifacts attempt to subsume it within the rhetoric of learning. Pedagogical masking and the ultimate success of all of the girls here underscore the importance of hard work, perseverance, and commitment particularly in the realm of education. Those that are not within an educational framework appear to labor for their own benefit, but benefit that is also easily translatable to economic terms either presently (in the case of *Game Shakers*) or in the future (in the case of *Rox's Secret Code*).

As is evidenced throughout the examples in these chapters, race also merges with conceptualizations of future economic subjecthood in an already gendered terrain. Whether racial

inequity is a central concern of organizations or wrapped within the politics of cool, in these narratives the coding girl emerges as a racialized subject. Future coders fluctuate between having particular racialized identities—Black and brown girls—to being a catch-all “any girl” that easily moves between ethnic and racial categories. These racialized boundaries and the connection between coders are maintained through drawing on a non-racial sisterhood and girlfriendship. The hope, it would seem, is to inspire a broad range of girls to seriously consider their own potential as computer programmers and future tech professionals.

The coding girl operates in what Banet-Wiser has termed an “economy of visibility,” in that she proves to be a part of feminism that is “easily commodified and branded”.<sup>171</sup> She has a “large enough consumer base”; she is not “alienating or offensive to customers”; therefore, she can become a successful piece of branded political culture.<sup>172</sup> The coding girl is a chameleon, serving multiply situated interests all at the same time. She is “widely popular yet somewhat vague” where empowerment attaches onto her mediating “competing definitions of reality”.<sup>173</sup>

She is, undoubtedly, a feminist figure though the feminist is a distinctly twenty-first century neoliberal and popular feminism. Broad, sweeping discourses around girls coding and the rhetoric of empowerment that adheres to them point to the every-individualizing nature of neoliberalism and the ways in which feminism has been absorbed into neoliberal ideology. Despite calls to sisterhood, girlfriendship, and support within many of these narratives, the impulse to accrue capital for future employment (even if it is with small group of friends) still refuses to engage with larger structures that exist to prevent women in these fields. And, as multiple scholars have pointed out,<sup>174</sup> referring to the lack of women in tech as a “pipeline problem” massively misrepresents both the preparedness and the reasons why more women (of color in particular) are not in tech. It is not only, as many of these narratives would have us believe, about girls simply seeing themselves as computer scientists.

At the same time, her existence supports continued investment in traditional educational

trajectories and solidifies the need for outside and individual investment in education, proving her to be an ambivalent figure in respect to publicly funded projects. The rhetorical resonance of the coding girl is situated alongside a larger call for coding to be taught more broadly in school though there are debates over what this might look like and where it might be housed. Girls, as well as other minoritized students, have been used to push through legislation like “CS for All” and are always a specific presence in studies about the state of coding education in the United States. Narratives that exist within this chapter show girls succeeding in these classrooms, yet they also show girls moving outside of these spaces to take up coding individually through personal, time, and monetary investment. In this way, the coding girl is also used to support neoliberal goals of de-investing from public education and re-investing in private education for particular job-oriented reasons. The successful coding girl is an entrepreneur of the self, crafting an economically viable self from the variety of options given to her and through her own go-getting attitude.

And, perhaps most insidiously, the focus on her image is important to companies that partner with nonprofits and create their own coding platforms for girls as a current consumer and as a future laborer. Calls to improve diversity in tech companies means that coding products serve not only as lucrative for companies in the short term (often, like in the case of Disney, programs can cost several hundred dollars), but these companies might also assume to get returns on their donated investments (particularly investments in nonprofit organizations like Girls Who Code) through a flooded pool of qualified applicants to later choose from. If girls are investing in their own training outside of publicly funded structures like school, then the amount of on-the-job training necessary by companies later might also be lessened. The contracting problem that Nancy Folbre points to as inherent in human capital takes a one-to-one correlation here in that early investment in girls human (creative and intellectual) capital can be repaid in the form of labor later—the same cannot be said of public investments through school and government-funded programs.<sup>175</sup> This is not to mention the “good

press” companies get from partnering with assumed social justice-oriented organizations like Girls Who Code. The coding girl, then, serves as an icon to which companies can attach themselves in order to fulfill moral requirements while refusing to give up the goal of capital enhancement (both monetary and human).

Unclear from these accounts is how real girl coders are wrapped up in these representations. As Meredith Bak argues the division between the actual child and the narrative child is “an unfortunate false division, for actual children’s lives are profoundly shaped by powerful (often contradictory) cultural narratives of childhood”.<sup>176</sup> The question now becomes, how do these cultural narratives of the coding girl shape the experience of real girl coders in the United States? The one-track interest in imaging girls as future computer scientists is severely limiting. The narratives discussed in this chapter detail girls who build apps and aspire to be computer programmers, girls who successfully code light shows in a week’s time, and girls who can skyrocket to game fame overnight. How then are girls legible within this space when their game doesn’t work as planned, when they run out of time to complete a project, or when they refuse to engage in the hype around computer coding? What might it look like for a girl to forgo the future that the coding girl narratives so clearly cling to in favor of something else? What if the coding girl said, “fuck coding”?

#### 4.0 Bedrooms and Classrooms, Classrooms in Bedrooms

If girls' computer coding occupies a small slice of popular culture in 2022, that slice never clearly made it into the computer coding classroom at Silverstream Academy. The girls hadn't read the *Girls Who Code* reading series, and none of the students I asked seemed aware of *Game Shakers*' existence. Students were remarkably uninterested in the popularization of computer coding. This is not to say they weren't interested in popular culture. Their conversations overflowed with references to actors, books, and television shows, and, occasionally, these interests would seep into their creations. School culture and home culture jostled for attention in focus groups where girls sat in peer groups and talked about their latest project or what they would like to make if given the time. This was even more present given the convergence of learning and home life during the Covid-19 pandemic. The overlaps of home and school created new chances for the two spaces to collapse into one another. I saw this in both the ways that girls discussed their school labor taking place at home and the way that popular culture entered into the classroom.

In this chapter, I argue that during the current Coronavirus crisis, it is important to consider the ways in which the bedroom not only acts as a liminal space between private and public but also how labor and human capital accrual have entered the bedroom space in new ways. Learning during the Covid-19 pandemic offers a new way for bedrooms—and other home spaces—to become key sites of labor since March of 2020 when a majority of the United States shut down schools. So, instead of being purely sites for consumption or sites of carefully chosen political and artistic outreach, rooms are currently configured as the workplace of childhood. For girls, the bedroom has historically acted as a central site of leisure, friendship, and, more recently, media influenced activism and production. Girls' placement in the domestic space, particularly their bedrooms, created what girlhood scholars

termed “bedroom culture.” New forms of work that intersect with home revive bedroom culture in new ways while also adding to a history of intersections between popular culture and literacy practices—both theoretical areas with long histories that have not yet been applied to computer coding.

This chapter explores three moments of convergence that bring the classroom and home together in different ways. I start by considering the centrality of girls’ bedroom culture and the shifting meaning of the term since its conception in the 1970s. I pair this with newer understandings of learning from home as well as self-directed learning through media technology. The majority of this chapter is dedicated to three separate student projects that bring this theme to the forefront through physical space, theme, and genre. First, I look at one student’s “llama doodle”—a coded illustration of a llama that she created using features on Scratch. I focus on the ways that she discussed the physical location and emotions surrounding her work. Next, I turn to two final projects from a sixth-grade class that attempted to incorporate popular culture through theme and genre to varying degrees of success. In the conclusion of this chapter, I think about the physical space and the camera during interviews and focus groups, including my own position within my home.

#### **4.1 Bedroom Culture**

Initially, I resisted engaging with ideas of bedroom culture throughout this project. After studying girls’ culture for years, it felt like everything about bedroom culture was already said and done. However, writing about school labor during a global pandemic and a move to hybrid learning made it almost impossible not to include. Not to mention, hybrid learning drastically changed the spaces that used to be reserved for girls themselves. As I met girls’ pets, saw their parents move in and out of

screen, and waited for them to grab Lego projects from other rooms, it became clear that not only would I need to talk about bedroom culture but also the ways in which it becomes reconfigured when the home becomes the classroom, the after-school club, and the center of the family. “Bedroom culture” has strong roots in girlhood studies. Bedroom culture was conceptualized along with girlhood studies as a field in Angela McRobbie and Jenny Garber’s 1975 work “Girls and Subculture” as a response to the focus on youth subcultures as always masculine by theorists in the Birmingham Schools Centre for Contemporary Cultural Studies.<sup>177</sup> Girl culture, they argue, is “an almost totally packaged cultural commodity,” made up of magazines, makeup, pop music, radio, and television.<sup>178</sup> While they do not necessarily articulate bedroom culture as a one-way interaction from media to girlhood (e.g. they outline five types of compromise at work: restrictions of place, absence of strict rules and requirements for entry, low personal/sexual risks for girls, adoption of girl daydreaming play, and power of consumer statements about self), they set up girlhood culture as unequivocally tied to consumerism and consumer culture.

Other scholars have worked to expand and rework theories of bedroom culture, particularly with the growing number of handheld devices that girls have access to in their own bedrooms. Media, particularly the internet, has been understood as a space where girls can begin to form feminist consciousness and use their voice<sup>179</sup> and push back against mainstream culture and create community.<sup>180</sup> Theorists have also detailed the ways in which media transforms bedroom culture in new ways, complicating the bedroom as a space only for consumption. I place myself in this long line of bedroom studies scholars that have drawn from and nuanced McRobbie and Garber’s early conceptualization of the girl subculture.

Anita Harris imagines bedrooms as a space of political resistance to proliferating images of girlhood and the call for and commodification of girl voices. Bedrooms, in this instance, offer a space between the private and public for girls to “go underground” and “re-invigorate the private” with

politics and subcultural connections through zines, music, and websites.<sup>181</sup> Mary Celeste Kearney has argued that girls' bedrooms are now reconfiguring the idea of the private space as girls increasingly produce and distribute material in and from their own bedrooms. She considers the cisgender-heterosexual and white construction of the girls in McRobbie and Garber's earlier study while arguing that race, class, and gender are still at play in who has access to new forms of technology like handheld video cameras, personal computers, and the Internet.<sup>182</sup> And, most recently, Melanie Kennedy posits that the popularity of Tik-Tok during the Coronavirus crisis allows for the "spectacle of girls' bedroom culture" to be on full display as a promise of normality through content creation that takes place within them.<sup>183</sup> Importantly, the ability to produce and promote work depends not only on the socioeconomic availability of media technology, but also the availability of a room of one's own and the correct visual signifiers for such work to matter in the wider platform context. As Kennedy writes, bedroom spaces for girls like Charlie D'Amelio operate differently within an economy of visibility, where some girlhoods are "hyper visible and others [are] hidden in their shadows".<sup>184</sup> TikTok, then, mirrors what Kyra Gaunt has articulated as the context collisions of Youtube where histories of Black dances are erased and white performers are remunerated for twerking while Black girls are villainized.<sup>185</sup> In this way, the bedroom in the twenty-first century is understood not only as a space of consumption but also of youth-driven production affected by race, class, and legibility.

The Covid-19 pandemic and the quick move to online learning for a variety of schools fundamentally shifted what the bedroom might look like as a productive space—mixing youth-driven production with adult learning imperatives and school work. Much like variances in girlhood culture, the movement of learning from the school to the home had upheld socioeconomic class levels for many students across the United States, often deepening gaps in educational access. For primary students in particular, studies have found that learning inequality gaps may have worsened during the pandemic.<sup>186</sup> Additionally, in low socioeconomic areas, areas with less technology access, and areas



with more rural schools, searches for at-home learning resources were lower overall.<sup>187</sup> Parents in lower-income homes are more concerned with their children falling behind because of the Covid-19 pandemic.<sup>188</sup> Schools with higher minority rates, higher poverty levels, and lower achievement levels were also less likely to offer rigorous or moderate remote instruction.<sup>189</sup>

While research has been done on the differing rates of education availability, little has been done at this point about the reality of spacial changes to households during the pandemic. In one instance, education scholars have illuminated how online learning brings the polysynchronous world of online learning into the rhythms of family life where physical spaces are “colonized and co-opted”.<sup>190</sup> Requirements for students to take part in face-to-face (virtual synchronous) as well as asynchronous education (work completed on their own time) bleeds into the students’ home life:

Domestic spaces could no longer be regarded as the backdrop against which the social action of the family took place, but instead made themselves foregrounded as work, study, leisure and schooling jostled for physical and temporal room within walls that – to some researchers – seemed to come in on them.<sup>191</sup>

Video conferencing ability opened up the home to teachers and researchers who could now “go and see” their students in new ways.<sup>192</sup>

For girls in particular, where so much of their cultural production and safety comes from their own bedroom spaces, it is difficult to imagine what these changes mean. Rooms that previously acted as a private space for only close friends and family now transitioned to places of varied public display. While TikTok acts as a public platform to display girl’s culture, not every girl on the platform creates and videos are generally edited and curated even when appearing unprofessional. But, while girls might have the choice not to display themselves on TikTok, the ability to hide in the semi-public space of school is a bit more complicated. Students can turn off their cameras or use pre-made backdrops, but these actions in themselves might send cues about one’s life and taste at home.<sup>193</sup> As evidenced from

my research, beds turned into studios in a complicated mixture of personal production and school-driven production, dining room tables became desks where the sounds of family life interrupted learning, and living rooms became the settings for focus groups. The personal and the scholarly (both my own research and the work of students) intersected through the physical and virtual environments that these girls were asked to live within.

This overlapping between home and work/school creates new forms of “context collapse” where a single moment of time can collapse multiple contexts together.<sup>194</sup> Most clearly in my research was the ability for Zoom technology to bring together a classroom space, a teacher or student home space, and the space of a researcher’s home. The Covid-19 pandemic created a collision between professional life (schooling) and private life for students where work was being completed from dining room tables and bedrooms. If girls’ personal creations like zines, Youtube videos, and TikToks are purposefully curated and edited by girls themselves, the computer camera during classroom time offered no such solace, instead peering into a less-curated slice of a girls’ home life. Students and teachers could literally see into each other’s personal space and the ability to “withdraw to a private place apart from adult surveillance and control” deteriorated as more people entered into that space virtually.<sup>195</sup> At the same time, working from home created a void in oversight which might not have normally occurred at the school, allowing students to be more flexible in how their private life entered the school day. For instance, no one was in the room to police whether or not students had cell phones out, something that was against the rules in the official school building. Even when students were not required to work from home, the already-accepted overlap between home and school affected how they considered each.

Silverstream Academy is a unique pandemic case since they returned to in-person learning earlier than other schools with increased measures in place for safety—no outside visitors, daily health checks, and lunch outside with minimal talking (since masks were off). Even though Silverstream operated

mostly in person, students were not exempt from the movement of learning into the home space whether through scheduled remote weeks or because they missed the morning health check. As with most school and work environments, this move was supported by the video conferencing platform Zoom. Because Silverstream is a school with one-to-one device adoption and a relatively affluent student body, online learning did not pose the same logistical problems as it did in the broader Pittsburgh area.

When the students were learning or interviewing from home, I often had visual access to students' bedrooms, kitchens, or other shared spaces. In an early focus group with the eighth grade iOS Apps by Design class, Deku had to continuously mute her mic because her mom was washing dishes in the room next to where she was working. At other times, pets made appearances and served as distractions—Ash left her screen to pick up her cat during a focus group where we were going over material she already felt comfortable with. For the most part, students seemed to have a dedicated space to school activities and parents and siblings rarely (if ever) interrupted. In this way, the issues around online learning were perhaps less apparent than with other learning communities. However, like students across the world, student labor was moved into the household in new ways.

## **4.2 Affinity Networks**

While school moving into the home reconfigured the home space, new configurations at school also imbued the school space with home, particularly popular culture. Scholars of education have long understood popular culture as a way to get students motivated to learn. In her work on Pokémon, Betsy Rymes urges teachers and students to move into “unknown territories of competence” and offers using Pokémon cards as a way to practice pronunciation and descriptive language with

students.<sup>196</sup> This type of activity, she argues, will help position students as experts and teachers as learners while still upholding values of phonetic learning. Anne Haas Dyson's work *Writing Superheroes* explores the readiness of students to incorporate popular culture into free writing time and media culture's involvement in mediating peer relationships.<sup>197</sup> Rebekah Willett's work similarly focuses on social learning that occurs through media referenced play.<sup>198</sup> These accounts mostly emphasize learning for younger students and seek to both mediate negative thoughts about connections between children and consumer culture as well as to make learning more interesting. Connections between literacy learning and popular media often fail to consider deeper structural elements that inform interest—Mimi Ito's study on edutainment software being one clear alternative to this.<sup>199</sup> It is not necessarily clear that children would buy into practicing phonics through Pokémon cards since it is not the type of activity originally invited (e.g. trading, battling, etc.). While popular culture has long been of interest to literacy scholars, it has not yet infiltrated conversations around computer coding in the classroom environment.<sup>200</sup>

In the classroom at Silverstream Academy, students were consistently asked to either practice basic coding skills from a pre-made template or to create a project that would be considered useful to a population. Popular culture was never clearly invited into the classroom. But, as lines between home and school began to blur during the 2020-2021 school year, keeping popular culture out of the computer science classroom became difficult to uphold.<sup>201</sup> Early in the year small glimpses of popular culture appeared in projects—maybe a free time activity that featured Marvel characters or a Beyoncé sprite—but by the end of the year popular culture was incorporated into entire projects.

Mimi Ito et al.'s work on online affinity networks gives one way to approach the infiltration of popular culture that I witnessed at Silverstream Academy. Though Ito's conceptualization foregrounds loose and informal connections that expand beyond the user's immediate location, the role of digital online technology, intentionality, and some of the structural choices made by the girls at Silverstream

point to the ways in which their creations might be understood as early signs of affinity networks forming within the school. This was particularly noticeable when the girls were part of a conversation that the teacher didn't have cultural footing, demarcating clear lines between who was "in" and who was "out". Their use of networked coding websites (mainly Scratch) also meant that these projects had the chance to expand beyond the walls of Silverstream.

Ito et al. understand online affinity networks as contributing to what scholars have considered connected learning. They argue that learning is "resilient and meaningful when it is tied to social relationships and cultural identities, and when it spans in-school and out-of-school settings".<sup>202</sup> This understanding of affinity networks dovetails with Seymour Papert's own understanding of what computer coding might have the ability to do for students where learning is "active and self-directed" and "knowledge is acquired for a recognizable personal purpose".<sup>203</sup> Scratch's form of personalization offers a space to create affinity communities based around computer coding as well as more specific subjects that resonate with communities of practice or fandoms. This does, however, mean moving beyond personalization and into "sustained engagement with peers with related expertise" by making "productive social and cultural contributions".<sup>204</sup> For instance, while most of the girls engaged with personalization throughout the year—inserting their own voices into programs or drawing sprites—few connected with pre-existing fandoms. These were moves most clearly made in the final projects of one sixth grade class where students drastically misunderstood (or willfully ignored) the assignment and made projects based on things they loved: Tom Holland, *Avatar the Last Airbender*, and personality quizzes.

While these projects engaged in different affinity networks, they all drew heavily on themes that McRobbie and Garber outlined in their original conceptualization of bedroom culture: cute boys and packaged commodities (here including television and film media). Productive affinity networks, though, give us a new way in to bedroom culture where the original "negotiations" are less about how

popular culture is consumed and more about how it can be played with to gain cultural, social, and knowledge capital within the classroom. The content of these projects served as spaces to negotiate these types of capital within the confines of the school walls in a (barely) acceptable way.

### **4.3 Paranalein and Her Llama Doodle**

Over the course of the pandemic school year, the bedroom entered into conversations in literal and direct ways. For one fifth grade student, Paranalein, this meant that computer coding sometimes took place on her bed. Paranalein flourished in the computer coding classroom even though it was her first year at Silverstream and her first time taking a computer science class. She enjoyed the work and her personality stood out as bubbly and ready to take on anything (even behind her roaring tiger mask). In our first weeks together, Paranalein's fifth grade class was working on a coordinate plane project where the instructor asked students to create a word, letter, or image using the coordinate plane on Scratch. Most students chose to make their name or the first letter of their name appear on the screen in live time using the pen up/pen down and glide features. This created the impression that the word was being written by the chosen sprite as the animation played. Because it was early in the semester and the first time that most of these students had a sustained computer science class, many projects got accidentally deleted and needed to be restarted between class sessions. Understandably, many girls also struggled with getting the correct coordinates and pen functions at the correct times—one girl gave up on this altogether and chose a completely different technique to create her animation.

During the second class period working on the project, Paranalein offered to share her creation during our focus group:

What I am making is a llama doodle. It's just a llama and then at the end...and then I drew the crayons, pencils, myself and at the end they're gonna do something different than just sitting there. And I was bored, and I couldn't...not bored, no I was confused. I wasn't sure what I was supposed to be doing. Cause I didn't know what to do honestly, then I saw a llama picture at the corner the classroom and I was like 'oh, I'll make a variation of that.'

After her introduction, she played her code and slowly a llama appeared on screen drawn by three different colored pencils in turn (made by Paranalein, as promised). The llama appeared to be stopping, its body leaning slightly backwards. She later confessed that the llama position occurred because of an accident in her code, but that she ultimately decided to keep the design. At the end of the animation, the colored pencils all reappear to receive roses that are thrown at them for their work (Figure 1).

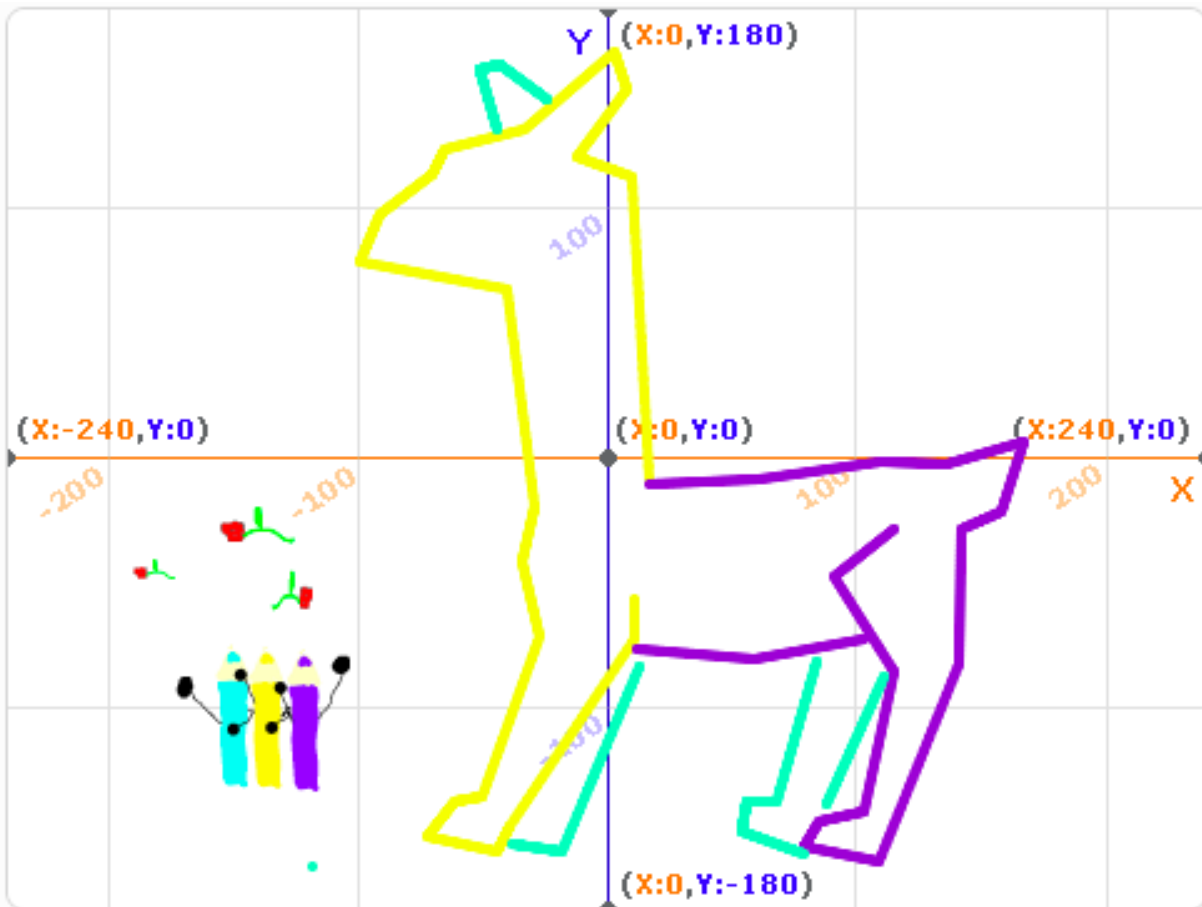


Figure 4 Paranalein's Llama Doodle

The project exhibited a level of intensity that the others didn't, partially because so many had lost material half way through and partially because of personal investment. The project, she explained, probably would have taken a week of a class to complete. Despite her many projects over the course of the year, the llama doodle remained Paranalein's favorite, and she offered to tell me more about it during our final interview:

One time I just sat in my bed and I was coding it for over three hours. It was very annoying...it was annoying because it took a while. It was very long, but it was very fun in the end...I'm exaggerating a little bit.

Paranalein's time investment was particularly interesting in a class that typically didn't require homework or even necessarily completed projects. Most unfinished projects could be finished during a daily study-hall period, and some projects never got completed at all. Paranalein's time investment, then, is not fully a requirement of the teacher, complicating the easy classification of her llama project as purely school driven. The bedroom, quite literally the bed, holds the tension between an online affinity space, personal space, and classroom space for Paranalein which she deftly navigated through careful articulations of feelings about the project.

As discussed above, Scratch offers a specific place for online affinity networks to flourish through shared artwork, commenting, and project remixing. In opposition to school learning, which is "driven primarily by instrumental or achievement-oriented goals," affinity networks allow for branching interests that might be "meandering and undetermined".<sup>205</sup> The way in which Paranalein approached this project—where she was not entirely sure what she wanted to do, then incorporated small mistakes into the design—showed an interest in the undetermined nature of personal projects. Her investment in the project toed the line between school learning and affinity-based learning, having the potential to lead her to be actively involved in the Scratch network, where children (and adults) might comment,



like, or ultimately remix her original work. However, the movement toward affinity networks was not actively supported in the classroom where students mainly used the platform to complete and turn in assignments, debug projects created by the teacher, and share with classmates. They were never asked to find a public project to remix or look at for inspiration, and I never heard these platform features discussed in the classroom. So, while Paranalein's personal investment had the opportunity to lead her to affinity networks, that was not fully explored in my time with her.

In this way, the classroom remained the central organizing space of the coordinate place project, where it ultimately began and ended, with the bedroom acting as an in-between space of creation. However, Paranalein's choice to work from her bed for an extended amount of time call into question the easy separation of school labor and leisure, or at least the requirement that they operate separately. For children, shows like *Game Shakers* (discussed in chapter two) and TikTok show aspirational labor as clearly tied to play and leisure spaces—ball pits, trampolines, and bedrooms. These spaces are remarkably frenetic. Unlike the spectacle of girls' bedroom culture that Kennedy sees on TikTok and the playful labor that I describe in *Game Shakers*, Paranalein's bedroom labor is neither glorified nor paid. It is also remarkably still, breaking from the full-bodied movement that these other forms of media creation rely on. Paranalein's labor, and its connections to a school project are still partially infused with concerns over long-term human capital accrual that neither the Nickelodeon show or TikTok are. She maintains close adherence to the project guidelines and, though originally planning to continue to project on her own time, abandoned it after the due date. The project also doesn't serve to connect her to any larger group (through Scratch) or to give immediate monetary returns in the present. Paranalein's claim that the actual labor time was "annoying" stands in stark contrast to the assumed fun of creating digital artifacts for TikTok or other digital platforms where the labor *is* play. Her feelings around the project point to the complicated feelings that might come with a difficult computer coding project that is highly rewarding in some ways.

That being said, Paranalein's project also avoided the complete future focus of educational labor, creating space for enjoyment in a completed project without mentioning what it does to her long-term educational goals. She shied away from talking about her educational labor in completely negative terms, adhering to the ways in which school was approached and discussed at Silverstream. Students were remarkably upbeat about their learning, even in classes where they weren't personally invested. Silverstream worked to create an atmosphere where there were high expectations of girls while also giving them the space to be creative and adventurous. A part of this came from the community aspect of the school, particularly the small class sizes, and teacher to student ratio.<sup>206</sup> I rarely, if ever, heard girls complain about school, their work load, or their teachers. In this way, it seemed that the conversations at Silverstream approached education in a particular way. Paranalein's description of her project work as stemming from boredom and being annoying might have pushed back against this, but it also might be the inability to articulate what exactly she was feeling in working on a difficult project. She was quick to rearticulate her feelings from boredom to confusion and from annoyance to exaggeration.

Paranalein's llama highlights the slipperiness of computer coding education and its ties to digital play. Despite the annoyance at her labor, Paranalein ultimately enjoyed the process of digital creation and turned to Scratch as a place to spend her free time. At the end of the year, she had completed over fifty Scratch projects, she claimed, though only two were publicly visible under her profile page. She hoped to continue using Scratch and creating, even outside of class time, perhaps in her own home, bedroom, or bed. Unlike the classroom in *Game Shakers* or the home of TikTok stars, Paranalein's coding gives a chance to imagine both spaces co-existing and feeding into one another in useful ways without needing to shun the classroom and negative feelings completely for productive labor to happen.

#### 4.4 Sixth Grade Culture

In the sixth-grade classes, the bedroom culture and classroom culture intersected in less physical ways for the girls. As the year came to a close, sixth grade students were completing final projects tied to machine learning that also incorporated Scratch basics they had been working with all year. After a few weeks of interactive lectures about machine learning and experimenting with the website Machine Learning for Kids, students set off to train the computer to identify images or text in a project of their own interest. They would then build a Scratch program incorporating machine intelligence so that people could interact with the machine's knowledge. Ideally, the finished program would be helpful in some way—the example used in class demonstrations was anti-bullying software on social media sites. Beyond basic directions, the students had free reign over what this might look like.

Many of the girls told me that this project was their favorite of the year because of their ability to personalize, which made the project more fun. The positive reviews of the final project were particularly prevalent in one class of sixth graders who incorporated popular culture for their final projects. As it turns out, students were not necessarily encouraged to incorporate popular culture—their projects were supposed to be helpful in some way—most of them were decidedly not helpful (by adult standards). In fact, the teacher let me know that the entire class had missed the point of the project but that at the end of the year she was too tired to correct them. After all, they were still practicing coding skills and showing understanding of machine intelligence. The result was a variety of projects that identified pop culture characters and worlds, song lyrics, and a quiz to match users with an *Avatar the Last Airbender* character. The other sixth grade class, which did not misunderstand the assignment, had projects that allowed users to distinguish between poisonous and non-poisonous plants and recognized what age category people fit into.

While I had gotten to know the girls over the course of the year, I had rarely seen their interests play out within their Scratch creations. Instead, they often lingered on the sidelines of conversations or made small appearances in assignments. I knew that many of the girls enjoyed reading, had celebrity crushes, or favorite television shows that we would often talk at length about in individual interviews. I also know that these conversations were part of the classroom dynamic that the teacher created where students were welcome to be themselves, joke, and share openly. It was surprising to me that these things did not surface in work earlier, especially given the project-based nature of the class that prized personalization. Part of this might have been due to time constraints and the prioritization of the coding itself in this particular class (more on time constraints in the next chapter).

This final project of the year gave students an unintentional chance to flex their own “communicative repertoire” and drew on information that they knew about one another.<sup>207</sup> However, unlike Rymes conceptualization of communicative repertoires where communicative knowledge serves pedagogical goals (even if teachers are not always positioned as the expert), these examples show the varying degrees to which girl-focused repertoires can be incorporated into the classroom at all. This section explores two sixth-grade final projects that attempted to incorporate consumer culture into the genre of a classroom assignment in different ways. The first project, “TomTom Test of Life,” relied on pre-existing classroom genres as well as the maker’s unique interest in Tom Holland. Overall, the “TomTom Test of Life” was easily understood in the classroom because of its reliance on pre-existing genres. The second project, “The Avatar Test,” adopted a consumer culture genre in addition to its surface level popular culture elements—particularly girls’ bedroom culture. In some ways, unlike the “TomTom Test of Life,” The Avatar Test’s deviance from known classroom structures made it difficult for the class to understand.

#### 4.4.1 The TomTom Test of Life

For her final project, Talia created a machine intelligence program called “TomTom Test of Life” in which the computer would recognize Toms (e.g. Tom Cruise, Tom Holland, and Tom Riddle aka Voldemort) versus non-Toms (e.g. Brie Larson, Anya Taylor-Joy, Will Ferrell, and the creators of the program). To train the program, Talia and her partner uploaded a variety of celebrity photographs to the groups “I’m a Tom” and “I’m not a Tom” to the online machine learning platform. Once the program was trained, they imported the project into Scratch where they could use the same or different photos to test the algorithm. The Scratch program, then, randomly filtered through photographs and attempted to correctly label them.

The game was inspired by Talia’s love of Tom Holland which had been a running joke in our focus groups throughout the semester and was one of the few interests that appeared in earlier projects. In our first focus group, during introductions, Talia listed watching Marvel movies as one of her hobbies. Barbara was quick to point out that Talia watches Marvel movies because she really likes Tom Holland. In fact, Tom Holland and other Marvel universe characters made appearances and informed themes in several of Talia’s projects throughout the semester under the “make it your own” option at the end of each project. This was a chance for girls to get creative if they had finished all other required steps. For Talia this often meant reworking the sprites to be Marvel characters while using the base level code from original games (like a jellyfish hunt game and a beach cleanup game) that were assigned to be debugged by students. The inclusion of pop-culture themed elements, in this way, did not inform the underwriting of the code but instead appeared as a kind of surface-level add on. Altering sprites and backgrounds is a relatively simple task in Scratch even when the images must be imported from elsewhere. In comparison to earlier projects, Talia’s final machine learning project

could intentionally feature Tom Holland from the beginning. She didn't have to sub in Marvel images as an add on.

Despite the subject focus on Tom Holland (and other Toms), Talia's project remained close to work that had been completed in the classroom previously—programs that could recognize pre-loaded images. In this way, the program was less interactive for the other girls in the class. It also displayed little resemblance to a real-word text for the users and could not be used over and over again bringing the same enjoyment. As a one-time group activity, however, it worked well. Talia's presentation elicited excitement from her classmates when it continued to correctly identify Toms and not Toms. As Tom Holland's image appeared on the shared screen, another classmate gasped as Talia agreed, "I know, right?" As the images continued moving between "I'm a Tom" and "I'm not a Tom," Talia tried to give names for all the not Tom's and the class broke into laughter. At the end of the celebrity naming, the instructor asked the Talia to explain how they had finally gotten their code to work—it had, evidently, been having trouble earlier in the day. The answer was to include more celebrity photographs of "not Toms"—a variation on something they had been told again and again to do if their program was not working correctly.

"TomTom Test of Life" easily allowed for pedagogically productive conversations to take center stage as the genre fit into what the girls had been working on while also drawing on pre-existing social contexts. Any side talk, including the naming of people, ultimately made sense in the broader coding context where the goal was to ascertain how successful the program was at classification. Tom Holland and all the other Toms/not Toms easily situated themselves within the pedagogical culture in the computer coding at Silverstream. In this way, the teacher shifted Tom Holland talk easily into her own "zone of comfortable competence" (if it ever even threatened leaving) where expectations are predictable and enacted an uninterrupted performance of doing school.<sup>208</sup> The project, though girl culture focused, was easily understood by everyone in the classroom: teacher, students, and researcher.

#### 4.4.2 Avatar the Last Airbender

While most final projects in this class, like Talia's, featured a program that would classify pictures that were randomly loaded into the program, Emily and her partner took a different route instead training their program with words. The girls created a personality quiz that would match four personality traits of the user with a corresponding Avatar character: Sokka, Aang, Katara, or Zuko. The program was highly interactive and allowed for a variety of inputs to create different experiences for each user. Emily's project adopted a text-based approach but was deeply inspired by her and her project partner's love of *Avatar the Last Airbender* as well as genres typically associated with girlhood subcultures—most specifically interactive self-based quizzes. Emily's project resembled the classroom examples less and seemed more like a quiz that one might find in *Seventeen* or *Teen Vogue*.

In their 1998 study of girls' magazines, Ostermann and Keller-Cohen found that quizzes were present in every issue of four popular girls' magazines in the U.S. and Brazil, making it an important aspect of girls' media consumption.<sup>209</sup> Beyond magazines, quizzes have moved into online venues like BuzzFeed where quiz results are often less moralizing. Quizzes in all of these forms “purportedly declare something about the quiz taker”—at times it's about the accuracy of the quiz results and other times it might be their involvement in a spirited community.<sup>210</sup> Unlike quizzes in these venues, Emily's quiz was open ended—asking the user to type four personality traits instead of supplying multiple choice answers—and it did not seek to give advice after the classification period.

The group was the last to present during the final class, their code still partially incomplete. During the presentation, after inputting “kind, stupid, silly, anger issues,” no character matched, so the teacher briefly allowed the group to complete their code while screen sharing. The teacher began to walk Emily and her partner through the required edits. Most of the required editing was connecting code

blocks and creating a text output. While Emily's partner edited, Emily fielded critiques from the other girls in the class about the chosen *Avatar* characters:

Voices from the class: You chose Zuko, really?! Out of all characters? You could have had Toph and you chose Zuko!

Instructor: (redirecting the conversation once the editing seemed complete) Ok, hit the flag again, let's give it some...

Class: Zuko!? Or Appa. Appa would have been better.

Instructor: (attempting to redirect again) Ok, give four traits. Emily give [your partner] four traits to say.

Emily: (rushing) Fun, exciting, happy, and loving. I don't know.

Instructor: Ok. Fun, exciting, happy, and loving

As the computer science teacher reiterated the chosen personality traits, Emily's partner typed them into the program. After a brief moment, the quiz matched Aang with the description. The instructor cold called Brooklyn who gave four new traits: kind, rude, sweet, and kind hearted. The program matched these traits with "Kuko".

Instructor: So is it accurate? I don't know my *Avatar* characters.

Student: It's Zuko (correcting the misspelling in the program output), and yea.

Instructor: That is accurate? Good.

Student: He's rude but he's also kind of sweet.



The class begins to argue briefly about Emily's characterization of Zuko as both rude and sweet before the instructor redirects them to a project survey that they will need to complete before the end of class.

Emily's project created an air of excitement and knowledge in the classroom that extended beyond the maker's themselves, inviting knowledge-based conversations from a large portion of students. I had not seen this sort of involvement in sharing previously. Students were generally quiet and they often refrained from asking questions during sharing even when prompted by their teacher. If there was feedback, it was generally quick and positive. This lack of conversation wasn't necessarily from a lack of interest. Since previous projects involved following specific directions, students generally had similar outcomes to share. Another reason might have been that most, if not all, of the girls were just beginning programming and felt that they had little insight on more straight-forward projects. This project, on the other hand, invited both excitement and disagreement about which characters should be included as well as their character traits.

All of the sixth graders were versed in *Avatar the Last Airbender* because they had chosen to watch it almost every day at lunch that year. Because of Covid-19, lunches were eaten in silence (this was the one time of the school day that students were not wearing masks). The girls in each grade got to choose what show they would prefer to watch, and the sixth graders continued to choose *Avatar* over and over again despite several teachers' efforts to suggest other things that might be of interest. So, while the girls in the class might have felt that they had very little coding expertise to share, everyone had a background in *Avatar* that they could lend to the project and use to critique creator choices. Emily and her partner were questioned about their inclusion of particular characters on the quiz as other classmates staked claim to characters that should have been included—particularly Toph and Appa. While the conversation showed an interest in the subject matter, it was left unclear as to whether

the class wanted these characters included because they enjoyed them or because they felt they most aligned with their personalities.

Later, while talking to Emily, I realized that the class might have misunderstood the goals and genre of the project itself. While other projects centered popular culture icons like Tom Holland or Taylor Swift (another project not discussed here), none engaged in formats and genres that girls might encounter in their own culture. When explaining the project to me, Emily shared:

Me and my friend both tried [the quiz] and it was pretty accurate...because me and my friend...since we're really big fans of the show we already know which characters we're most like then when who we thought we were appeared on the screen we were like 'wow this is pretty accurate'.

In this description, the accuracy of the program was measured on whether or not the girls viewed the resulting character as similar to themselves. The four traits that the girls used as input were not random but rather were parts of their own personalities. The matching character, then, was a character that they believed were most like themselves. Like other quizzes for girls in magazines and online the accuracy of the program was measured through the “perceived applicability of the results themselves to the taker’s interests or personality”.<sup>211</sup> The quiz was highly personal and revealed some truth about the quiz taker. The girls’ expertise in both Avatar and personality quizzes not only allowed them to build the program, but also to assess its accuracy. I found Emily’s Avatar quiz to be one of the most innovative and interesting final projects in the sixth-grade class. She and her partner successfully took an analogue method of quizzing and exploited the allowances of Scratch (and machine learning more generally) to make it more interactive even in comparison to online quizzes. They made a Scratch project that fully embraced bedroom culture while still meeting classroom expectations instead of overlaying a theme on top of pre-existing class material.

In the classroom environment, the Avatar quiz was stripped of the highly personal nature of magazine quizzes. Instead, it shifted to the comfortable classroom-centered focus on algorithm accuracy. While the creator's central imperative was to match users with an Avatar character, the teacher imperative was closer to testing if the computer could correctly identify an Avatar character based on random traits. All personal connections appeared to be wiped out of the classroom presentation of the quiz. This is clearest in the moment where Zuko is revealed as the Avatar for "fun, exciting, happy, and loving" (which were never clearly tied to a girl in the room). While Emily and her partner had assessed the accuracy of the program on whether they identified with the given character, the instructor instead asked if "fun, exciting, happy, and loving" described Zuko. This reorientation completely passes over the quiz taker themselves, altering the goals and meanings of the quiz. Though the teacher is verbal in admitting her lack of knowledge around *Avatar*,<sup>212</sup> she does not realize that she has also misunderstood the genre in which the girls were hoping to work. While Emily and her partner hold their own in both the subject matter and the coding,<sup>213</sup> they let their hold on genre fall away, never stepping in to correct the misunderstanding that has occurred and perhaps not necessarily registering it in this moment.

Emily's Avatar project complicates the possibility of deeper integration of bedroom culture into the classroom. Even with *Avatar the Last Airbender* being a new and crucial part of the sixth graders' day at Silverstream Academy, the goals of Emily's quiz seemed to be lost in classroom translation. This project marked the classroom as distinctly not the bedroom despite overlaps during the Covid pandemic. Where magazine and online quizzes might be taken by a small group of friends in an intimate setting, the projection of the quiz at the front of the room, the presence of an adult, and the only semi-private space of the classroom all work together to make the quiz less legible. Unlike the assumptions of easy integration of popular and consumer culture in classroom learning, Emily's project points to the ways in which bedroom culture genres might be impossible to fully embrace or

to find a “third position” where collaboration is possible across multiple repertoires.<sup>214</sup> Subject matter, whether it be Pokémon or *Avatar*, might be able to enter the classroom, but genre is a bit more difficult.

#### 4.5 Research Spaces

Paranalein’s llama doodle, Talia’s TomTom Test, and Emily’s Avatar Test all point to the complex ways in which dual movement between school culture and home culture existed at Silverstream Academy during the 2020-2021 pandemic school year. My own research, labor, and physicality was ultimately a part of this movement as well. My own home was not immune to vision during these interviews and classes, as my personal and professional life as a researcher intersected in new ways. My desk, carefully situated against the only logical window in my living room, offered an uninterrupted view of the entire room. Girls would often ask to meet my pets as they lounged on the couch behind me, clearly visible in the screen. If my dog happened to push open my bedroom door, my entire bedroom was on display as well. I often found myself turning my laptop so that the more “grown up” parts of my life—my carefully curated artwork and rows of coffee cups—were on display instead of my bedroom where clothes and shoes often littered the floor. In an interview with Ash, another sixth grader, we both lamented over our messy rooms but our impeccably organized bookshelves. We talked while she was perched on her bed with her newest pet cat on her shoulders. During the Covid-19 pandemic, I was astounded about just how much my labor (and workspace) began to mirror that of the girls I was interviewing—how we shared the same frustrations and joys about intrusions by pets, our separation from friends, our need to mute when family members were in nearby rooms, and how we liked being able to walk away from the screen at any time and get a snack.

When I interviewed Talia, we met virtually in her house. She lounged on a chair in front of a window overlooking snow-capped trees, a pile of craft materials was stacked to her left. My cat's head occupied the bottom right side of my screen for the first half of our talk. We moved between discussions of computer coding and popular culture, with Talia suggesting a variety of movies and books I should look into, including which actors were her favorite. I also suggested books I thought she might enjoy. Her home space offered a comfortable setting for talking about both computer coding and her own personal interests. While Emily chose not to sign up for an individual interview, her interests infused almost every project throughout the semester in some way: flaming hot Cheetos, Billie Eilish and Beyonce, and inside jokes ("don't be salty") appeared in most projects where she had creative control.

My research methods, before Covid, articulated a professional distance (read: safely "objective") from the girls in my study, carefully designed questions and plans to meet in the school library and classroom. While I was prepared for conversations to veer off track and I was more than open to this, I had not mentally prepared to have my own life on display. As much as I could "go and see" the girls in this project, they could "go and see" me as well (and my pets and sometimes my partner). Whatever flimsy boundary separated my own scholarship from the educational labor of Silverstream students fell apart instantly. I had no veneer of a nice office and no visible professional clothing to separate me. Blurring my background or using a fake background would have differentiated me possibly too much as everyone else allowed themselves to be on full display. It was just me, my pets, and my slightly slanting Pittsburgh apartment. In some respects, students realized this too and the professional overtones that might otherwise be equated with a visiting university scholar lessened. Students grumbled about my length of school and questioned whether what I was getting a degree in actually counted as being a doctor.

While I can't clearly connect my own disintegrating professional façade with the openness of the girls, I do know that I was privy to their bedroom culture in a way that the teacher wasn't—particularly their celebrity crushes and grumbles about computer coding. Covid-19 and online research shifted my ability to complete my research as planned both in structure and content. I never thought a project on computer coding would include a chapter on bedroom culture, but the availability everyone's bedrooms and the blurred lines between school, work, and home allowed the bedroom to hold a new prominence in the research just like it did in more mainstream media avenues. If girls' bedrooms gained new wide-scale attention during the pandemic through TikTok, they also became a central location of more mundane and every day labor for a majority of people. Computer coding projects at Silverstream were not the polished and professional games of *Game Shakers* nor were they the completely future-focused rhetoric of girls' coding clubs. The girls in this chapter offered a difficult to classify labor that doesn't seem pre-occupied with forward movement despite its classification as school work, but is also not deeply invested in monetary gains in the present. Instead, these instances offer an alternative that are based in a more ambivalent experience of computer coding and learning labor, one that is explicitly centered in the here and now. One that is deeply influenced by an ongoing global pandemic. This doesn't mean that all students at Silverstream were thinking this way. As the next chapter shows, some students were experts at understanding their work through a future focus.

## 5.0 The Experience of Groundwork: Labor Leading to the Future

During the second trimester of my study, the computer science elective at Silverstream was iOS Apps by Design—a class meant to help eighth graders design and code a phone application using the coding platform Thunkable. Over the course of the trimester, students were working on designing and developing phone apps that were of some social benefit. This meant that instead of a new project each week like the fifth and sixth grade classes, students would be working on one sustained project throughout the entire course. The pinnacle of the class was the final meeting where girls could share the project they had been working on. Students worked on the assignment in groups, two of which were involved in my study with a total of five girls (one group of three and one pair).

The 2020-2021 school year brought new challenges as teachers had to continue to navigate online learning during the Covid-19 pandemic. For Silverstream, the challenge was how to safely return to in-person learning. One part of this transition was buffer weeks after breaks where students would be fully remote as well as some students being remote during the regular in-person class sessions (most often because of the possibility of sickness or missing the daily health check). The iOS Apps by Design trimester was interrupted by winter break which meant that students completed at least two weeks of school online due to Covid-19, a required transition period after holiday travel. The girls had ten class periods, including the online classes and their final presentation class, to complete their apps. The mixture of in-person and hybrid learning as well as social distancing measures did not necessarily help already strained time issues within the school where the schedule shifted so classes were meeting less regularly. Computer science projects became difficult when working virtually despite abilities to screen share and meet in private breakout rooms.<sup>215</sup> Time, it seemed, was not on their side, and in the limited time of the class, it was coding itself that fell by the wayside.

During final presentations, I watched as PowerPoint slides and rough sketches of potential apps appeared on the screen and girls explained what their apps would look like if they were completed. These apps, of course, will most likely never exist since the class was over. For the girls, this was not necessarily a problem. Leading up to final presentations, we had discussed this issue of time frequently, particularly when it was clear that the girls wouldn't finish their apps. I often prodded the girls about their inability to finish the apps that they planned to create. Weren't they frustrated that they never made it to the development stage? What did it mean that these apps might remain unfinished? It became clear to me that completing the project was not necessarily the main goal of the class for the teacher or the students, but I couldn't help but wonder what it meant that a class based on computer science—largely understood as computer coding—a class called “iOS Apps by Design” did not involve creating functional apps. Even without coding, the girls easily understood the class as crucial for their growth in computer science, and they were not upset about the lack of a finished product. The ways in which students articulated their understanding of the class and its usefulness pointed to both the lack of time to complete projects (something they seemed incredibly used to and comfortable with) as well as an understanding of school views of human capital. Despite the lack of coding, students clearly felt that the iOS Apps class was leading to some future success.

This chapter explores ethnographic and theoretical accounts of time, childhood, and schooling. It is deeply invested in the lived experienced of middle school girls, yet also pulls away and thinks through ideas about human trajectories more broadly, particularly how girls are imagined moving into adulthood and neoliberal society. I argue, as have others, that this move toward adulthood is framed through economic trajectories, learning labor, and human capital and that girls are highly aware of and able to speak to through these frames. In my accounts, school is measured both in broad sweeps of time pointing toward the future as well as the minute day-to-day goals, and Covid-19 informs the way that the 2020-2021 school year was experienced by students and instructors. I stay focused on the iOS



Apps by Design class and the apps that they attempted to develop. The primary question in this chapter is what happens when time simply runs out. What is a coding classroom without coding? If effort, attention, days and nights are not enough to get the work done, then what do we make of the incompleteness of learning, what do girls make of unfinished projects, and how does that nestle itself within the rhetoric of American schooling.

## 5.1 App Development

The girls in iOS Apps by Design (iOS Apps)—Raina, Diana, Deku, Molly, and Leyla—were highly motivated in the coding classroom, several of them taking above the required computer science classes in middle school with plans to pursue computer science in the upper school. Molly had attended coding camps and was taking every elective offered through the middle school this year (mobile robotics, iOS Apps, and Girls Who Code). Diana also took iOS Apps as an extra elective and signed up for computer science the next year along with Raina, Leyla, and Molly. Leyla had waited specifically to take the iOS elective (since it was only offered to eighth graders) because she wanted to do coding work that was “popular” and more public facing. Deku was also excited about learning how to code apps though she did not necessarily plan on pursuing computer science classes in high school.

The girls were excited to work on what they saw as a “real” form of coding that they had been craving in their fifth and sixth grade computer classes where Scratch was the main focus. As Deku told me “Scratch is just not it” particularly when trying to create on the platform. The platform could be “low-key annoying” because of the characters and the sounds, and she found it “frustrating” overall. Most of the other girls on Zoom laughed and nodded along with Deku when she voiced this opinion. Raina pointed out that Hour of Code with Khan Academy, which they had done once, felt

like a step up from Scratch because of the freedom it granted and because it was text-based programming. For many of the girls, text-based programming seemed to have a serious aura around it that they hoped to move toward (Thunkable was still block-based). Even students who hadn't spent multiple years at Silverstream, like Molly, were excited to move beyond Scratch and its assumed childishness. They understood their move into iOS Apps as an advancement in their coding abilities and a move away from simple, easy, or beginner computer coding. It was clear to me, then, that the girls were looking forward to exploring what they presumed to be more intermediate coding than they had done in the past, and that they were all motivated to take this class beyond its elective requirement.

The main goal of the class was for each group to work on a phone app using the program Thunkable—a no-code (meaning not text-based) app development platform. The two groups hoped to create calendar and reminder phone apps that were inspired by PowerSchool, a student information platform that Silverstream uses. The app seemed to be unanimously hated among students for its slowness and lack of personalization. Views on the program's inaccessibility stemmed directly from their own required use of the app by their institution. It was how they received grades and kept track of their schedule. It was also used to connect care givers and teachers, offering real time information on grades, attendance, assignments, and email. While the app allows for some customization—the ability to move widgets to reorder the homes screen—some of the main complaints brought against the app was its lack of customization (the app was decidedly ugly), its difficulty to navigate from a mobile phone, and its slow upload speed. For these reasons, both groups chose to take elements of PowerSchool and rework them into better functioning apps. In this way, the girls were not starting from complete scratch as they could look to PowerSchool for inspiration or motivating frustrations.

While the girls' app ideas were similar, they moved in different directions to conceptualize and create their apps. Despite the class being focused on using Thunkable, Diana and Raina worked together to design their app “Alternate Agenda” using Wix website developer (after much back-and-

forth). Wix gave them an opportunity to quickly develop a website that mimicked the app they would like to build. They could see what the phone app would look like through a toggle to see a mobile version of the website. Importantly, both girls knew that Wix was useful because of its limited requirement of coding and the ease and efficiency of which websites could be developed. Deku, Molly, and Leyla designed their project, “Tracker Backpacker,” through rough pencil sketches that were uploaded onto their final PowerPoint presentation. While they planned to use Thunkable for their coding, they never got to the point of putting the app together. They completed several training modules on the platform, but Tracker Backpacker never started being coded.

Both groups’ ability to see a problem with the app and imagine a solution was tightly bound within their own experience of their social world, particularly structures that were naturalized parts of the school that they attended. In addition, the assignment asked them to think beyond themselves for a larger social good. Like many of the girls in coding books, the problem that needed to be solved directly applied to the makers but was also generalizable beyond their own immediate interests.<sup>216</sup> The resulting projects, then, were highly personalizable calendar and reminder apps that would facilitate communication between teachers and students and streamline the multiple lives that the students lived (in school and out of school could be organized all in one place). Unfortunately, the same reasons that the girls sought to make the app, particularly the difficulties of managing time, are what also made the apps difficult to develop over the course of the trimester.

## **5.2 Time, Temporality, Learning**

As this chapter explores, the girls in this portion of my study sought to validate their lack of tangible coding outcomes through narratives of temporality and human capital accrual that are

common in United States school systems. Because of this, I understand the girls as situated theorists in a long line of scholars focused on human capital, temporality, and education of which I briefly outline here. Childhood has long been connected to human capital through temporality and economics. In the nineteenth century, time was newly understood through economic and developmental terms. This caused childhood to gain “enormous significance as a period during which children had the greatest potential to establish a trajectory for later success”.<sup>217</sup> Time was to be spent on useful activities that would train the child for future success, and parents were to devote ample time to their children. In the post-World War II culture of the United States, this view on child training also incorporated creativity as a “solid middle-class belief [that] was invoked in the national conversation on identity, cultural progress, and future material and political gains”.<sup>218</sup> Cultural validations of children’s activities through future need are still a major component of learning and play labor in the twenty-first century, and creativity continues to be one avenue of learning that is simultaneously naturalized and nurtured. Computer coding piggybacks and draws from both this history of child training and its connections to future material successes.

If present training guarantees future success, it also maintains distance between the child and the adult, setting up a hierarchy between teacher and learner. As Katherine Bond-Stockton writes, temporality makes “the cherished category ‘childhood’—a state of one’s being while also delaying the temporal approach to a time it is not (namely, adulthood)”.<sup>219</sup> Education is largely premised off of this play between the child, the adult, and the usefulness of time/temporality. Learning is regularly imagined through the usefulness of skills in adulthood,<sup>220</sup> though they rarely conceptualize the skills as useful outside of that ultimate endpoint, perhaps for fear of a collapse in the temporal timeline. While not using this language explicitly, the girls often positioned themselves in a hierarchy of computer coding knowledge of which they were at the bottom or beginning, doubting that anything they could create here and now would be of much use. When asked outright, the girls characterized

themselves as beginning coders that would need to continue learning and training to become intermediate or advanced. This animated how they viewed their labor at school despite a few of the girls having extensive experience of creating websites or coding with Scratch outside of school.

Like learning and childhood overall, then, coding initiatives setup the temporal aspect of learning most commonly through citizenship and economics. This dual purpose of computer science education has been fleshed out through multiple government acts and agendas. For instance, while Obama's 2015 Every Student Succeeds Act focused on the rhetoric of well-rounded education, President Obama's 2016 "CS for All" initiative focused attention on computer science and its ties to the digital economy. Like many initiatives for coding education, the initiative focused initially on general empowerment and production before moving heavily into a concern for "economic opportunity and social mobility".<sup>221</sup>

Since children are not yet able to be concerned with economic opportunity, initiatives and reports are often marked by temporality. For instance, "CS for All" promised that "by 2018, 51 percent of all STEM jobs are projected to be in computer science-related fields".<sup>222</sup> Initiatives, reports, and other educational policy looks toward the future—which is always promised as known yet unknown—as a way to justify current educational focus.<sup>223</sup> In their 2010 report "Running on Empty" the Association for Computing Machinery and Computer Science Teacher Association argue that "if K-12 schools are seeking to make students college- and career-ready, computer science must be part of the core curriculum".<sup>224</sup> Computer science, then, is not just an addition to the school day but must be taken seriously as a core feature of twenty-first century education. This push to the future and career readiness is underscored through partnerships between the private-sector and public education. For instance, CS for All boasts support from companies like Apple, Facebook, and Microsoft making the connections to future labor much clearer than concerns over citizenship. Economic concerns increasingly structure computer science initiatives as corporations like Facebook continue to capture

headlines for unethical business practices while also “donating” money to educational programming in hopes of having a broader talent pool to pull from later.<sup>225</sup> Girls—particularly girls of color—occupy a central place in these narratives as they promise diversity and an outlet for change in an overly white-male profession.

For the coding girl, this time rupture allows her to be imagined as the future “child that saves (literally)”.<sup>226</sup> Through her education we are able to imagine her individual future as well as the future of women, tech, and our technological economy as a whole. This falls into broader conceptualizations of futurity that Gill-Peterson<sup>227</sup> and Sheldon<sup>228</sup> argue now exist through biopolitics, materiality, and production rather than sexuality as Edelman<sup>229</sup> famously argued. But it also draws on particular versions of girlhood and time in the twenty-first century that places girls on a “path of success” at school to gain economic independence and “participate in meeting the needs of the marketplace”.<sup>230</sup> Educational time for girls serves not only to give them useful skills for adulthood but also to help them to solve larger gendered and raced issues inherent in a capitalist system that have existed since (before) the beginning of computer programming. Again, while this is clear in the long-term deployment of economic narratives, it is also evident in the day-to-day experiences of girls in the computer classroom where they are asked to create projects that are beneficial to humanity in some way.

These large-scale educational endeavors point to temporality as a factor deeply embedded in the educational structure in the United States—less concerned with specific passing of time and more with vague “to-do” lists on the way to becoming upstanding citizens. While broad strokes of time characterize educational thinking and policy, it is often the day-by-day movement of time that is deeply experienced by educators and students. The road on the way to twenty-first century economic independence for today’s students is paved with measures of educational performance and cries for school funding. If computer science is to be taken seriously and predictably funded, then states would

need to have strong certificate programs for teachers, have clearly measurable assessments, and would need classes to count toward graduation requirements.<sup>231</sup> These are issues that have plagued the integration of non-core subjects for a long time. Time became particularly strained by the Covid-19 pandemic when ample time became devoted to technical issues, transitioning safely between classes, and navigating new student-teacher relationships (as was clear from my time in hybrid classes during Covid). By and large, the day-to-day structure of time has been ignored in educational literature and policy as more focus on STEM is asked for but the school day never gets longer (nor should it).

This chapter thinks through educational time—classroom settings where there is never enough of it—and human temporality—the ultimate goals of education. I work here to capture theories of time and learning explicated by the girls in the iOS Apps by Design class and to understand their views as part of these larger cultural narratives of citizenship, economic gain, and temporality. Like this work as a whole, it positions girls within the larger framework of neoliberal economics and education and what that looks like during a particular moment in time. To this end, I move through the girls' emotions around not finishing in order to explore what they felt they learned if not coding. I end the chapter with my own ruminations on the theorizations of the eighth graders here.

### **5.3 Pointless to Finish**

Two classes before the girls' final presentations, we met in our focus group to discuss their progress and overall feelings about the process of creating an app. While we started with the affordances of the platforms the girls were using—Thunkable (an app coding software) was what was assigned, but some groups instead opted to use Wix to create websites (more on this below)—it became apparent that the girls wouldn't finish these projects. Both groups were working on slide show

presentations of pitches and hadn't started coding yet. For me, it seemed frustrating that the girls would spend a semester planning an app that would never come to fruition. Since many of them were taking this class because they enjoyed computer science and they were invested in their projects, I thought they might continue working after the semester ended to complete the project. I was quickly set straight by Diana and Leyla who both believed their apps were pointless to finish.

Diana: I don't think it will ever get to the stage where I can ever actually use it, obviously. So that's kind of incentive not to.

Leyla: I would, but it would definitely be harder because I have a lot of homework and a lot of stuff outside of school. And I feel like what Diana said, I don't feel like it will ever get to a point where I'll be able to use it, so it's not gonna be really important to me because I'll probably never use it.

Time constraints were a reality in the school setting—there literally wasn't enough time in the trimester for the girls to code an app. But time constraints were also a reality outside of the computer science classroom, particularly with homework from other classes and sports. Even girls who thought they might be interested in continuing and who were pursuing computer science past the required elective classes thought other things might get in the way and they did not see this project shifting to other spaces.

Importantly, Diana and Leyla saw little point in seeing the project until the end even if they had the time to do so. Time, it seems, is not the determinate factor in a completed and polished product but rather some other metric. And while it seemed “obvious” to Diana that the app would never get to a usable stage, my year spent hearing miraculous stories of girl coders and Thinkable's shiny description—“a platform where anyone can build their own mobile apps”—had almost made me believe otherwise.<sup>232</sup> For all the hype and ability of the girl coders discussed in chapter one and those beyond the scope of this dissertation, Leyla and Diana firmly understood their striving toward creating



an app as almost an exercise in futility. Not to mention they were busy.

In reality, it is unlikely that apps coded either in school or in clubs would ever be usable beyond the classroom, Girls Who Code's Sophie Houser and Andrea Gonzalez being the one clear standout story.<sup>233</sup> Creating usable, functioning apps takes an entire professional team three to four months of full-time work just in the development phase (this does not include planning or design stages). So, while the idea of taking a class to develop a phone app might have seemed fun and interesting, the reality of the phone app ever being completed was unlikely from the start. On some level, the girls were aware of this and did not expect to get a usable app by the end of the trimester. Still, the assignment seemed perpetually disappointing in its construction—the promise of learning to create an app always just short of being met.

I did not get this same sense from younger students who were working on Scratch and often felt excitement from their projects being available to the larger world (whether or not they would ever be played beyond their close friends). Projects never felt incomplete even if they were, and fifth and sixth graders felt their projects were fun and rewarding. Scratch seems to help foster this mentality where creations are rewarding even if messy, incomplete, and imperfect. Even older students were interested in playing Scratch-created games that were a bit messy including child-created versions of existing phone apps like Rolling Sky. Rewards and completion, then, did not necessarily have to co-exist but could exist separately.

Thunkable and Wix were viewed differently, and students expected a more clearly usable app. While child-created Scratch games might still be fun and playable, there's nothing fun about a non-functioning app and website. Neither group even attempted to start the app on Thunkable, instead using other means to display their semester of work. Part of this might stem from the belief that phone apps and websites were a more public and advanced form of coding—ideas that were espoused during the girls early in the semester. While Scratch focused on play and creative communities of (often)

children, websites and phone apps have mixed and often adult audiences. The stakes were higher and the coding more difficult.

Diana and Leyla's attitudes were still positive, but their belief about the pointlessness of continuing stands in stark contrast to narratives of the girl coder who are upbeat, continually working to overcome obstacles, and successful in their coding endeavors. If fictional girl coders gave up nights and weekends to meet deadlines, Diana and Leyla clearly drew a line about when labor would stop. Their attitudes also stood in contrast to my expectations for what my ethnographic work would look like and what it would take into account. What happens to a dissertation on girls' coding culture if the girls never actually coded anything? I wasn't quite sure how to conceptualize PowerPoint presentations in my research related to computer coding education and narratives of girl coders. After all, making Powerpoints was what I was taught in my decidedly uncomputer sciencey "computers" class in elementary and middle school at the turn of the century.

The reality that Diana and Leyla would never actually complete or use their apps, in my mind, made some of the incentive disappear. I was frustrated. Frustrated that I would never see these apps complete and that students never truly got to code in their app design class. I thought surely the girls must share in my frustration at never reaching a finished product—after all, they spent a trimester planning beautiful and useful apps that would never exist in the world. While responses were mixed, my own assumptions about frustration at the end of the semester were incorrect. The girls made clear that they did not view their coding class as pointless without a finished product. Diana, Raina, Deku, Molly, and Leyla were dedicated to their impossible task all semester. They readily and easily re-conceptualized their learning in terms of storing human capital for a vague future time, a cornerstone of the United States' school system. Like coding education more broadly, the literal act of computer coding was not the only skill that might be learned through the computer science classroom. Instead, the girls paired their computer coding skills with more broad ideas of public speaking and problem

solving—both important twenty-first century skills—in order to give extra meaning to their experience. After all, if their labor was understood through coding only, the semester might have been a failure.

#### 5.4 Frustration or Lack Thereof

When I realized that the likelihood of having anything coded was low, I was curious about where the girls stood on their lack of progress and inevitably incomplete projects. They had entered the iOS apps class excited about getting to code apps, but had never gotten around to it. I was surprised, then, that many of them were fine or at least ambivalent about the way that the class progressed. Instead, they offered me interesting conceptualizations of what the class was and why it was important despite not having an app at the end. When I asked them if they felt frustrated that they had not coded an app Diana explained,

Diana: I don't think frustrating is the right word because you don't go into it expecting it to be the next Candy Crush. But I think it might be kind of interesting if it was less of...kind of sketches, I guess, is the right word?

Me: Like sketches of what you would want it to be? Or what do you mean sketches?  
Sketches of what?

Diana: You know like you do a sketch before your final painting or something. And you don't really care about the sketch.

Diana considered their Wix website a sketch of what they would want the app to be. Importantly, Diana points to the fact that she never believed her app would be “the next Candy Crush,” which I take to mean she never expected it to be wildly popular or known. Of course, her app would also meet

completely different needs than Candy Crush, competing against a saturated market of scheduling apps including big hitters like Google and Microsoft. Instead of being frustrated by the lack of completion, Diana reorients her learning and the trimester as a time for experimentation and preparation. At the same time, she seems ambivalent about the project and class as a whole, brushing a sketch off as something “you don’t really care about,” pointing to the ways in which work might be lost if it doesn’t build to something final. I was struck by the certainty with which she was able to conceptualize not finishing. Her partner also seemed unfazed by not finishing (or really even starting) to code:

Raina: I don’t think I’d be too upset if it never really launched. I think it would be a cool learning experience and just practice, you know. Because maybe eventually when I’m older and have more experience I’d have that under my belt and know what I’m doing a little bit more.

While Diana conceptualized her work as a sketch of something that might exist eventually, Raina articulated her experience in the iOS class as useful because of its potential to add to accumulating skills for future creation. This class was “practice.” Diana saw the class similarly, later referring to the class as “groundwork.” The incomplete project, then, is less about this singular instance of production and more about what this experience has to offer in a long line of ongoing training and learning labor *related* to production, most commonly production during adulthood. Sketches always have the potential to become something more even if sometimes they don’t.

The other group had more mixed reactions to their inability to finish the app over the course of the trimester as well as toward Thinkable as a platform. Leyla, Molly, and Deku shared complicated feelings of frustration, resignation, disappointment, and indifference. Leyla, in part, borrowed from similar educational themes as Raina:

Leyla: I definitely think [the class] was something I can learn from and I can use later on. But it is frustrating that I can't like have a final product because I may want to look back on it to see what I did and it won't be finished.

Leyla also imagines iOS Apps as an experience that she can build on in the future. Again, the future is vague here, not pointing to any direct moment of use or concrete idea. Unlike Diana and Raina, she is willing to consider her incomplete product as a disappointment or frustration in some ways, though its deeply connected to her own personal process instead of the class. The artifact from the class becomes inextricably bound to the personal process where a "final product" is imagined as the way to see time investment. Leyla shifts focus slightly from measuring the usefulness of the app to the end product as a reflection of a time of work. Leyla already imagines herself in this possible future role, looking back on her eighth-grade year and the work completed therein. Though she places emphasis on the app itself as the artifact that should be finished, she seems to neglect the ways in which her PowerPoint presentation with her groups might also be something to look back on as it involved time investment and labor over the course of the ten-week class. Instead, she situates this work as the unfinished steps to a final product, an incomplete ending to the app, an idea more than a coded product. In this way, the focus on coding might obscure other media learning occurring in the computer coding classroom which students were less willing to connect to computer science or computer coding (more below).

Molly, who had taken the mobile robotics class first trimester and was planning to take the Girls Who Code course the following trimester, was "a little bit frustrated" because she "did all the work but then...couldn't finish it." For Molly the final product was "definitely the most exciting part" though she also enjoyed the satisfaction of fixing errors and "building up to the final product." The final product, whether it be a robot navigating a trail or a functional app, made all the work worth it. Despite the fact that Molly planned to continue taking coding classes after eighth grade and she would

code an app using Thunkable in her next class, she did not articulate the work that she had done this semester as useful for those later experiences, something that Diana, Raina, and Leyla had considered. Instead, her responses were primarily focused on each single project and the satisfaction that came from sustained engagement toward a specific goal.

Unlike her classmates, Molly perhaps had the most immediate chance to use her Thunkable skills again as she was taking the Girls Who Code elective the following trimester where Thunkable would also be used. In her Girls Who Code class, Molly and Rose (not in the iOS apps class) worked on an app called Lifego that would help college students with life skills like finances, skincare, and time management. In the final class the girls were able to present a developed app on the Thunkable platform. While there were still bugs and the app was only partially complete, there were multiple screens and the final presentation showed clear understanding of the platform mechanics. It seemed like Rose and Molly were practicing coding in a way that the previous class had not quite gotten to. There's no doubt that Molly's own work with Thunkable tutorials in iOS Apps helped to move the group along, most other groups turned to a website development platform to design their projects.

Finally, Deku, who said she would potentially keep working on her app after class, did not necessarily feel frustrated from this particular instance of code, but drew attention to frustrations about coding more generally.

Deku: It's fun to like make the thing as it goes along, but I feel like it would definitely be better if you could snap your fingers and like 'BAM' it just appears and you could have your own website ready. But it's fun to design it too, but I feel like the coding can be frustrating if you can't get it to do what you want it to.

Deku continued to explain how the fun parts of the projects were actually the designs and final touches, the coding/middle part was what was frustrating. In other words, it was the coding itself that was of least interest to Deku. She avoided placing her learning experience in terms of progression or

acquired capital, instead opting to think through what is fun about the process and what she would rather avoid. In the process, she skirted around my question that connected frustration with this specific instance of computer coding applying frustration to the act of coding as a whole. Her desire to finish the project was less about seeing her labor (like it was for Leyla) or learning something (like it was for Raina). Instead, finishing would be about the final product in itself—Deku was willing to completely skip the middle part, snapping her fingers to get the app or website together.

It is interesting, then, that Deku didn't pressure her group more to think about using a website builder that would have avoided the aspects of the project that she was less interested in. At the end of the trimester, without a completed app in hand, Deku argued that she could still imagine herself using Thinkable in the future (along with Scratch) to create something. This was despite her previous complaints about Scratch and her lack of product with Thinkable. In the end, Deku also imagined her labor over the semester as a build toward future creation, even if it was platform-specific.

The above articulations of incompleteness covered distinct ideas about learning and the goals of learning from attaining skills for future use to a focus on project orientation. Some girls wanted their project to be in a final form so that their labor was concretized and visibilized in ways that were typically understood. These various understandings of their projects point to the ways that the girls were conceptualizing their work and its purposes in a classroom that did not meet their expectations. Time constraints worked to reveal what the purpose of computer science might be without computer coding for both the girls and myself. Time also helped to reveal the frustrations that can come with schooling when it does not meet the expectations and desires of students through no fault of the teachers. Overall, though, the girls' articulation of their labor and apps falls in line with overarching views of K-12 education. Even if the girls felt slight frustration in this single class, they were experts at rearticulating their work as contributing to longer term learning and professional goals, even if these goals and their connections to computer coding remained vague. In various ways, the five girls saw

the class as either an opportunity to begin storing coding knowledge for the future (groundwork, practice, learning experience) or as a minimally frustrating exercise. No one saw the class as a waste of time despite never truly completing the assignment.

### 5.5 Practicing What and Why

Though neither group coded, there was a clear understanding of what might count as coding and what did not. The two groups I worked with, as stated before, took two different routes to imagining their apps—one group focusing on Wix and the other on Thinkable. Platforms, then, were a big point of discussion throughout the semester in iOS Apps—which platform would be used to imagine a phone app and the allowances of each. Raina and Diana were adamant throughout the trimester that Thinkable, the coding app that the class was supposed to be using, was difficult to use and not a fit for their goals. Early on Raina contended that the platform was “not very useful,” “doesn’t work,” and was “overly complicated.” She admitted that it was possible that she just hadn’t figured it out yet, but that if she was to do this assignment outside of class she would “maybe use a website instead of a coding app.” At this point in the semester (with only three classes left to put the app together), Raina verbalized that she wanted to just use a Wix website but that “this is a coding class and that’s why it’s important for us to learn that.” I assume the “that” here stands in for multiple things: coding more generally, how to use Thinkable specifically, or how to make an app versus a website. Diana excitedly agrees with Raina telling me “I’ve used Google sites a lot, and I like it, but that’s not really coding so it sort of defeats the purpose.” The purpose, rather than a complete project or an actual useful website, seems to be the computer coding itself, specifically learning to use Thinkable as an app development platform.



By time we met the next week, Diana and Raina had decided to use Wix for their project. All focus on computer coding and the “purpose” of the class had been swept aside. While Wix gives the option to make websites without using templates, because of the time constraints of the class, the girls stuck to a pre-designed template. Using Wix complicated the group’s early stance that using a website design platform would “defeat the purpose” of the class or that coding was the important skill to learn. Instead of practicing coding, the girls practiced a sort of plug-and-chug website design that they hoped might eventually transition to Thinkable despite the fact that they did not like the look of the platform. For Raina, this is the type of website building was something that she had been doing outside of class through Square Space. Previous to the iOS apps class, she had designed three websites: one for her father’s hail dent repair business, one with her mother’s floral business, and one for her own potential business. While her website for class might not have been complete, two of the websites created outside of class had real-world use. She already saw the potential benefit in the project, particularly in the website development aspect despite the fact that the class was tailored for app development.

These three websites, like the one the girls designed in class, were built from templates. And while Raina knew that coding a website from scratch would potentially be better and let you make a website “exactly how you want it,” it also took longer. Time and product were always a balancing act. In this way, Raina was practicing building websites from templates both in school and out of school with very little coding involved. At the end of the trimester, the final class before presentations, Diana still conceptualized their website and the learning of the class as groundwork. Raina and Diana had developed a Wix web page that they still considered a sketch of what a real app or webpage might be despite the fact that their Wix website was a very real, functioning website. They had also almost finished their presentation which was polished and showed an understanding of how to create strong PowerPoint presentations.

I wondered what this groundwork was preparing them for and when they would reach the

endpoint of groundwork and move into whatever real and final thing they were imagining. If coding was the ultimate learning goal, and a Wix website defeated the purpose of the class, then the groundwork became a little shaky. Despite the seeming importance of coding and its popularity in the cultural zeitgeist, working on websites from templates seemed a very logical skill to be practicing, one that was useful in the real world and perhaps more feasible for many people. It definitely seemed the more feasible option for girls under a time crunch who still wanted to turn out some sort of project. Importantly, creating a Wix website gave the girls what they longed for in the moment, public-facing work that involved computing in some form (even if it was not coding). And, though the PowerPoint presentation may not have been the main point of the class, in the world of self-branding and venture capitalism, being able to pitch an idea and recruit investors seems perfectly useful albeit a different (though closely related) neoliberal economic skill. It is, perhaps, an even more useful skill than basic programming abilities for girls that are interested in a wide variety of future labor.

As I went back to look at their website after the end of the school year, I realized that the girls had deleted or unshared the page with the public. I emailed Diana and Raina to ask about this. In a brief email back, Raina explained that they had only published the page to try it out before taking it down, though she couldn't quite remember if it had ever been public at all. The webpage then was very much a prototype or "sketch," to borrow from Diana, in that it did not last past the class itself. Its purpose was served in the final presentation.

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While the girls' use of Wix sprung from their intense dislike of Thinkable, views on Thinkable were not unanimously shared between the two groups in the iOS class at the beginning of the project. Early on, Leyla, Deku, and Molly believed that Thinkable would work for their intended goals, and argued that it was not too difficult to use as long as you took time to work through the tutorials. The first few class meetings after the group came up with their app idea, they worked through tutorials on

the website in order to learn how their app might materialize using the platform. And while they seemed to be having luck with designing their app, they never got the chance to make it. Despite this, the group remained remarkably upbeat about Thunkable, maintaining that it was useful for app design.

Deku, Leyla, and Molly spent most of their time with Thunkable learning basic capabilities of the platform through online tutorials. The tutorials generally consisted of videos that instructed users on various aspects of the platform (e.g. how to use drag and drop blocks, how to toggle between screens, etc.) and how to recreate specific projects (how to create a translator app). Users could then practice the skills on their own project interface behind the video. Their group had invested a lot of time in going through the Thunkable tutorials, work that was not visible in the same way as Raina and Diana's website demonstration since they did not result in a usable final product. Instead, the recreation of these tutorials surfaced throughout the semester, particularly for Deku, as she often talked about or showed various small programs that she created through them (both her translator app and Zach Efron app). However, the rough sketches that the group presented at the end of the semester did not represent the time and energy they had invested in Tracker Backpacker, particularly because the sketches were literal pencil and paper sketches instead of incomplete app screens. While the group had no product to share at the final class meeting, instead sharing hand drawn sketches of their proposed app screens, one might argue that their time spent on the Thunkable tutorials gave them more coding expertise than Raina and Diana's time spend developing a website through Wix.

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Though both groups presented projects that were decidedly not coding, I was struck by Diana and Raina's conceptualization of what was "not really coding" and how that was positioned against what counted as computer coding in the school setting. While Raina and Diana were quick to point out that Wix might not be a real form of coding, no one questioned Thunkable's method of programming and whether it made sense in a coding classroom despite the platforms (over) insistence

that it is not coding. This might be partially because it is an accepted and teacher-approved platform for app creation. But, part of its easy acceptance might be due to its resemblance to Scratch and the understanding of block programming as a beginning coding literacy. Block programming has long been considered an acceptable predecessor to text-based programming in the coding classroom, and Scratch is the primary go-to for in-school programming instruction (along with Scratch Jr. and Alice). Block programming is a solid first step in teaching computational thinking and key ideas in later programming, facilitating easier learning, teaching efficiency, and positive affect toward coding.<sup>234</sup> Wix and website generators, on the other hand, are not understood as part of the same trajectory of website building within institutional settings. Not to mention that website construction never came up in any of my ethnographic work as a mode of computer coding being explored and was not a main activity in any of the fiction books I read.

The three platforms in question—Scratch, Thinkable, and Wix—all have slightly different allowances and uses. Scratch, developed by professional programmers for learning purposes, is understood as an introduction to coding and computational thinking through block-based programming. As discussed in previous chapters, it was the platform of choice for the younger grades at Silverstream (along with Scratch Jr. for the lower school students). Thinkable operates similarly to Scratch in many ways, offering a no-code option for beginners through its drag-and-drop interface and block programming. The website describes the platform as “powerful and playful” promising that they “make it fast and fun to realize your app without writing a single line of code.” Unlike Scratch, the platform is not advertised as a learning tool, but rather a way for adults that do not have coding experience to get apps out into the world. Its goals bare more resemblance to Wix, an online platform for website development, as both platforms offer alternative means to create digital content in a world increasingly lived online.

The connections and elisions between Scratch, Thinkable, and Wix align with beliefs about child-

oriented coding and adult-oriented coding. Scratch is designed as a first introduction to computer coding that focuses on creativity, collaboration, and fundamental computational concepts that undergird both future programming and literacy more widely.<sup>235</sup> The platform pages are colorful, users can draw and record within the program, and there is no avenue for monetization. The visual childishness of Scratch adheres its goals of allowing users to create free-flowing creative work that focuses on fun, long-term learning, and community building with little concern for clean and perfect creations. Community is built through commenting and remixing (copying and editing the code of someone else's project), and the ability to problem solve is fostered through creative play. In this way, Scratch balances beliefs about creativity being “innate and at the same time responsive to encouragement”.<sup>236</sup> Materially fostered through the platform's structure, creativity and block-based computational thinking are both accepted as “low floors” for entry as well as “high ceilings” where users can grow their skills exponentially. This design creates both a space where users can be excited about projects (no matter the level) and a space where users can learn, grow, and accumulate basic computer coding skills. This was clear in my own research where girls would share rough projects that they were both excited about and excited to learn from.

On the other hand, creativity and human capital are glossed over in Thinkable's design with attention instead turning toward app creation for customer reach. It is purposefully posed as simple yet powerful, a “fun” way to program any app that you might imagine. Thinkable's design and its promise to be both “powerful and playful” draws on larger aesthetic and branding techniques of modernist tech companies. Scholar Natalia Cecire argues that companies like Apple and Google draw on the “performance of childishness [as] a key form of modernist primitivism, a way of superseding modern civilization's (supposed) hypercontrol, not by admitting to being decadent or recessive but rather by appropriating a position of genuine newness in the form of youth.”<sup>237</sup> Thinkable's labor promise to be “playful” stands in contrast to understandings of adult labor (particularly computer

coding) as being laborious, difficult, and even perhaps boring. It also draws from Silicon Valley juxtapositions of serious work and play—ping pong tables and board rooms—which Cecire also argues characterizes modernisms flip sides of “shiny modern surface[s] and primitivism.”<sup>238</sup> There is a bit of childish play involved in app making—though definitely not a “draw your own sprite and make it sing” childish. Play here might be some form of labor, though not the very serious childhood labor of learning, and human capital accrual is instead transitioned to a form of financial capital.

Thunkable’s website touts that the company takes “pride in bridging the digital divide by making everyone active creators of technology,” rhetoric that simultaneously piggybacks on coding initiatives discussed previously while calling their techniques into question. Do you really need to learn to code to be an active creator of technology? An example on their homepage drives this point home, telling the story of a man “with no coding experience” that built an app to bring solar power to Yemen. Instead of focusing on community building or growth, the website focuses on clear outcomes and produced products. There is no hope or desire to build computational skills or use creativity. For children, programming falls under the guise of learning, play, and creation while adult-centered app creation steps away from learning and is understood through economic viability and connections to ease of creation, play being one element of this.

Thunkable both maintains block programming as tightly connected to coded products and denies it as a form of coding, simultaneously validating block coding as coding and denying it. The use of Thunkable in the classroom setting shows that it can, in fact, be understood as a method of learning fundamental coding concepts—particularly in its similarity to Scratch. But while Scratch has been consistently considered a form of programming since its public launch in 2007, Thunkable vehemently insists that it is a “no-code platform.” Even in its internal naming systems, Thunkable denies programming, referring to the “programming block” (the term used by Scratch) as “logic blocks” and avoiding any connections to programming proper. In a lot of ways, neither platform resembles text-

based programming that undergirds coded products. There is no block programming language transition into the “real world” of programming, even Scratch creators point this out, urging people interested in programming as a career to move on to other forms of programming after using Scratch as an introduction.

Thunkable’s existence calls the necessity of learning computer coding into question. Users of the platform are meant to have no coding experience yet can use block programming to create a usable app. Similarly, Wix is designed to allow non-programmers to create functioning websites for a variety of purposes. The crossover of programs like Wix and Thunkable, that are simultaneously used as teaching programs in middle schools as well as operational programs for adults (and perhaps children outside of education), casts doubt on the need for intense programming knowledge that must be stored and used later in life for non-professional programmers. The iOS apps class points to a dual-move happening where girls are being imagined as needing and benefiting from computer programming but adults are being imagined as unable to program and in need of simplistic alternatives to computer programming. Both of these platforms point to the simultaneous commodification and black boxing of computer coding. On one hand computer coding is being hyped as a necessary life skill, spawning funnels for money to move toward specific types of educational experiences. On the other hand, new platforms are being created to hide the process of computer programming and make digital creating easier. Along these lines, neither Wix nor Thunkable required much knowledge in the form of traditional text-based computer programming. In the future, there is little doubt that simple block and plug-in options will continue to exist and expand. At the same time, students still had the conception that programs like Wix didn’t count as coding or “defeated the purpose” of the class altogether.

Though Diana and Raina believed that Wix might have defeated the purpose of the class and didn’t count as coding, they still used the platform as a workaround to the actual skill that they were

supposed to be learning. This was, of course, partially tied to the time to complete the project, but even outside of the time allowances, the girls saw Wix as a useful platform to conceptualize their product. It also aligned more closely with the work that they saw the adults in their lives doing to develop websites for their businesses. In this way, the girls the automation of computer coding was doing the exact thing it was meant to do but for the wrong audience. The girls, instead of focusing on the learning labor of computer coding, moved past narratives of girl coders and into the world of adult website building by non-programmers.

## 5.6 What Did We Learn?

Despite the debate around what counted as coding and the lack of coded artifacts, the girls were still able to articulate particular learning outcomes. At the end of the semester, in a smaller focus group with only Raina, Diana, and Deku present, I asked the girls what they would want to learn related to coding in the future (as they were all planning to continue taking computer science courses):

Raina: I think...more in the iOS apps specifically and less in just coding in general. I like more about the app design thinking about how it would work and seeing more of it...I don't know if that makes sense.

Me: Yea, so a specialty class on designing apps rather than coding more broadly?

Diana: [Raina nods as Diana jumps in] Yea, I agree with Raina. I'd want to do it if were more a specific topic. Not an app but not computer science in general.

Me: Is there anything in particular that would be interesting to you?

Diana: Maybe like if you were to have a specific platform like Thinkable. Like just how to use Thinkable or something.



Deku: I agree with Diana and Raina too. It would have to be coding on a specific thing not just coding in general. But yea I agree with both of them because I would want to do both of those things.

The girls focused on particular computer science and computer programming knowledge, most interestingly specific platforms related to app development or other more specific forms of computer science. Their learning desires are concrete and tied to visible outcomes that they never quite got to. No one acknowledged that these were the exact concepts that the girls were supposed to be practicing all semester. Deku, while agreeing with Diana and Raina in this moment, later explained that Thinkable was one of her main takeaways.

The argument could be made that the girls in iOS Apps were not learning programming, particularly Raina and Diana who used Wix. Perhaps because of their focus on using Wix instead of Thinkable (where considerable time was spent on the act of coding), Raina and Diana had more generalizable knowledge acquisition beyond strict coding abilities, something they still yearned for. When asked what they would take away from the course, they responded:

Diana: I think all of it was helpful because it was more like groundwork information then you kind of learn from there. Also, with preparing our pitch, that's useful information, but it's not necessarily computer science.

Raina: Yea, I agree with Diana for the pitch part. And also kind of like the thinking behind the app—what is a problem with something you think you could do better or you could fix and make it more accessible to people.

Diana and Raina offered two main take-aways from the class—pitch preparation and problem solving—both of which relate to cultural understandings of gendered computer science in various ways.

Though pitch preparation might not be considered computer science proper—it certainly was not

considered computer science by Diana and Raina—it is not too far-fetched to see where it fits within rhetorics of computer science education for girls. At the end of the semester, the girls did develop a strong presentation that was clear and showed off their Wix website well, featuring scrolling images and screenshots of the site. At the end of the presentation, as if they remembered the name of the class, Raina promised that the website could be easily turned into an app by “making it a bookmark from the website.” Their classmates questioned their choice of a website, requesting clarification about whether the project was actually an app or not. Diana assured the class that “it might be turned into an app” to which Raina followed up with the bookmarking idea before acquiescing that “technically, no, it’s not an app.” The questions then moved into more specific questions about the website design and functionality. During the exchange Raina and Diana remained calm and collected, readily backing up their choice to present their final product through Wix. I was impressed at how the girls carried themselves during the presentation and the ease with which they answered their classmate’s questions. I was easily convinced that their choice made sense and that it would easily transition into an app later.

While Raina and Diana were quick to divorce this presentation from computer science, it actually seems to be a cornerstone of broad goals of computer science programs. For instance, Girls Who Code defines its program through “bravery” as one of its key goals, broadly understood as resilience, persistence, and ambition. In their organizations they use presentations regularly as a way for girls to practice sharing their ideas and their voices. This dovetails nicely with feminist engagements more broadly, particularly the goals of Silverstream Academy in their effort to help girls develop “confident voices” that will carry them into the real world. Computer science, then, becomes one important place for this confidence building to happen in order for girls to feel comfortable pursuing the field. The confidence that seems amorphous and vague within post-feminist feminism becomes solidified for specific purposes within the computer science classroom while still adhering to generalizable goals. If girls do not pursue a career in the field, they have at least developed a sense of self in the process, not

to mention a sense of self in an area where they are understood to be lacking.

This is particularly important as future economic subjects where human capital might not even be the determining factor of employment (or at least not the only one). Instead, self-branding and salesmanship are necessary complements to any acquired skills, especially in the postfeminist landscape of the twenty-first century. Drawing from Foucault's theory on "technologies of the self," Banet-Weiser points out that in a self-branding culture "operations" on the self "involve economic principles such as brand management strategies, self-promotion, and advertising techniques that help to explain the self within a set of social and cultural conditions".<sup>239</sup> For women and girls, self-promotion and advertising techniques are partial responses to earlier concerns around girls figurative voicelessness, particularly during adolescence, that allow girls to build themselves as individualized entrepreneurs (both of the self and beyond).

This newfound confidence, however, does not come without more grounded aspects of computer science to back it up. For Raina this was the ability to problem solve, particularly when it comes to app development and user experience. Even though the girls didn't finish their app, they took on a big job, bettering a widely used app with a 4.4 star rating on the Apple App Store with over 280 thousand reviews (PowerSchool). The rating is much lower on the Google Play store (2.8 rating from 28 thousand reviews). While the ability to problem-solve and fix large-scale problems fits within the rhetoric of girls' coding culture, it has been a staple of coding education since its introduction in the 1970s. Seymour Papert saw his turtle geometry and the experience of coding the turtle as a "method for solving not only [the problem of turtle movement] but a large class of others as well".<sup>240</sup> Today, STEAM and coding books for young children do not always get to coding specifically, but they do rely heavily on the main character's ability to problem solve through hands-on adventures. Coding platforms like Scratch maintain that block programming teaches problem solving skills that are applicable beyond the coding classroom. In short, sometimes it appears as if coding could do

anything—a fix-all for girls’ existence in the twenty-first century and the labor that comes with it. Whereas problem solving is generally broadly conceived in early coding literature and pedagogy, Raina considers the particular problem of end users and accessibility.

Within these take-aways there is a clear decision about what is and what is not computer science. What directly tied to coding made sense as a learning outcome (problem solving) whereas learning outcomes that were less easily applicable to computer science proper (presentation development) were quickly brushed aside as not computer science. At the same time, students were still easily able to conceptualize learning without a completed project and articulate where skills were gathered and mark them as useful. They were also able to think about what their next steps in learning might be and what they wanted to continue to push toward: the development of apps and more specific knowledge on platforms and languages.

This returns me to my earlier question: what happens in a coding class if nothing is ever coded? A new question might be, does it matter if girls code or is the idea of coding enough? By the time the girls enrolled in iOS Apps by Design, they had learned that coding was an important aspect of their educational experience through direct teaching, guest visitors, and time on Scratch. In this elective, then, it did not seem to matter that they did not code. Tangential activities related to computer coding like *thinking* about what to code seemed to count as coding knowledge in a broad, general sense and was still understood as useful for some vague future.

## 5.7 Sketches

As we wrapped up the trimester and I moved into the next elective class, Girls Who Code, I could never quite shake Diana’s comparison to the work that they had completed to an artist’s sketch. A

part of its staying power was her easy connection between art and computer coding, unlike cultural conceptions of computer coding that easily align it with rigid rules and computer science. Diana understood coding as less rule bound and rigid than one might think. Another reason, though, was that in some ways Diana understood that this project, and perhaps school more generally, is just a sketch. School is a test run for something that will come later in life.

I see Diana's version of sketching as different from Raina's "experience" or even Diana's own conceptualization of the class as groundwork. Both experience and groundwork seem to imply a moving forward, growing, or compounding of abilities that lead to something greater. Groundwork and experience as used in this context are free-floating signifiers that do not seem tied to any particular outcome or product. While this might be possible with a sketch—say if someone practiced sketching the same thing over and over again or specific small skills within a sketch—it still does not necessarily guarantee the effect of storing human capital for later use. The more I thought about it, sketch actually made perfect sense as a way to describe the work from this class—a rough delineation of something without detail. There was no guarantee that this group of girls would move on to build on the skills they had begun in this class, most specifically those skills related to Thinkable. Sketch was also seems more closely related to the specific product that the girls wished to create. It is harder to understand what exactly sketch means in terms of education more generally or to place it in the context of learning and human capital more broadly. After all, the details missing in the sketches had been the code, the core point of the class itself.

This is, undoubtedly, more pessimistic than Diana intended. Remarkably upbeat throughout our focus groups and interviews, she truly enjoyed her computer science classes. In fact, she didn't need to take iOS apps (neither did Molly) since her technology electives had already been completed. Most girls in this class also chose to sign up for the computer science elective that would be offered in ninth grade. None of the girls, however, really considered pursuing careers in tech in any way. And while

the girls vaguely understood that computer science might be useful in their future fields, there was never a definite answer on how or why.

There is a way in which coding education, while it is heavily focused on job preparation, also covers its bases with its focus on broad ideas of women's empowerment like bravery, problem solving, and sisterhood that have been widely touted by neoliberal feminism in the twenty-first century. While these are useful skills, sometimes it feels as if they have been completely coopted by the neoliberal marketplace as a form of "lean in" mentality. Computer coding is also continuing to be worked out as an essential twenty-first century skill with more states and school districts understanding it's important to K-12 schooling. As Annette Vee lays out, there are other arguments for computer education besides economic concerns: individual empowerment, learning new ways to think, citizenship and collective progress.<sup>241</sup> In this way, perhaps these girls are working less on sketches of future computer science and more on sketches of themselves as future productive citizens, particularly women, in whatever form that might take. They are building their voices, practicing branding, problem solving, and maybe coding.

The girls were experts at these broad reasons for learning to code, particularly how it related to citizenship—though they never quite used that term. Diana, for instance, knew that code formed "the base of everything" and that it was important to "be in touch." Leyla and Raina knew that code was important and "good for many things," though Leyla never fully explained what the "things" were. Occasionally the girls would hint that they could imagine coding being important for their work—Molly gave the example of coding architectural models for home building. However, a majority of their learning was understood through the importance of code underwriting their lives. As Raina argued, coding is "really important, especially with Covid...Zoom is really useful for online learning." Coding had been structurally supporting their learning for the past year even though it proved more difficult to learn in remote settings. But, again, none of the girls imagined themselves as future

professional programmers, they just understood that computer coding literally underwrote much of their life during the global pandemic. I am not sure they needed to know how to code to understand this.

Instead of focusing on employability in specific careers, the Silverstream Academy website imagines technology classes (including computer science) as a way for students to learn “to use technology ethically and responsibly while taking advantage of all the benefits of a 21<sup>st</sup> century education.” Unlike non-profit organizations and many educational reports, the goals of this class seemed to be less about moving onto computer science careers and more about understanding coding as a fundamental literacy. Of course, in practice this is most likely an aspect of coding organizations as well, but it is not the element of their course design that is most present on their website. At Silverstream, this very visible pronunciation of tech education goals helped to explain student beliefs that their iOS class might serve as groundwork or practice for the future even if it did not involve computer science as a destination. This view also adheres to coding as ubiquitous across future employment, something the girls argued was important but could not quite articulate in any tangible way.

Viewing computer coding as an overarching literacy, in some ways, takes the timed imperative out of learning. The setup of computer science at Silverstream also has the potential to aid in this since computer science is required curriculum for middle school and always available as electives beyond that. Students are highly aware that they have opportunities to build on coding skills throughout their education (barring a sudden change of schools). Skills could be stored and used in the future whether it be through a class the next trimester, a class the upcoming school year, or the future beyond K-12 education. So while iOS apps by design might have given the girls little time to fully design and create their apps, they could easily imagine continuing to use whatever skills they obtained in the near future with the same instructor.

However, I am also highly aware that sketches can turn up in dead artist's notebooks as ideas that were never completed. I seriously doubt that any of the projects started in this class will be finished based on the girls' reluctance to continue working on them after the trimester. I find myself ambivalent about the eighth graders not finishing their final projects. The girls were so good at reconceptualizing their unfinished work as still useful through attained and stored skills that might prove useful in some unclear future. Part of me wanted them to refuse that narrative. And while these girls were clearly leaders and were not afraid to disagree with adults in their lives, they clung to the narrative of growth that they had been given in school. I saw slight moments of hope in Leyla and Diana's declaration that the projects were not important to them and that they wouldn't finish on their own time, a slight acknowledgement of the reality that school is highly structured and setup for specific goals that might not match the reality of the girls' lives outside. And, if I'm being honest, a part of me wanted the girls to have feelings around their lack of coding whether good or bad.

I can't help but think that Alaska (a sixth grader who hates coding) might have had a different experience of a computer science class where she never got to code. In fact, it might be her favorite type of coding classroom—a place where she can design fun apps like Snapcat (her idea for an app that lets you take snapchats of your cat) without actually having to create them. After all, her favorite Scratch project was one where she spent most of her time drawing characters instead of completing the coding assignment itself.



## 6.0 Conclusion: The Selling of a Movement

It's November 27<sup>th</sup> and I'm in Portland, Oregon standing in front of a table of drawings featuring cartoon women and various sayings: "rough day need naps" with a pouty crop-top wearing brunette, "always punch Nazis" featuring a Black Rosie the Riveter, "think like a girl" joined by a hijab wearing chemist. Laying among art is a print featuring a white girl in a beanie (how decidedly Portland of her), carrying a laptop, surrounded by the words "code like a girl." The artist, a Black man named Valentine Barker, stands behind the table with a friend watching me debate over what to pick up. Unlike other art at this Geek Fair, these prints need no explanation. I spend a few moments debating if I should get the piece, and before I know it, I'm buying "code like a girl" along with the "game like a girl" print for a friend. I promise my partner excitedly that if I ever get an academic job it can hang in my office as a discussion piece. Against my better judgement, I love the piece and view it as a funny piece of pop culture rather than a demand to do anything with coding. After all, I didn't buy the "fight like a PhD" in the form of a booty-short wearing Harley Quinn (to be honest, I'm not sure what that would look like...there's a lot to unpack there).

Another way to think of this dissertation might be to ask, what does it really mean to "code like a girl." What is the image of the coding girl and how/what are girls actually coding? Undoubtedly, this art piece and the girls' coding movement as a whole draw on the versions of feminism that I described in the introduction that prize catch phrases of empowerment over structural changes to capitalist and patriarchal systems. At the same time, code like a girl seems to mean something specific in 2021, when everything is crumbling around us and society is becoming more and more aware of the effects that algorithms can have in everyone's day-to-day life. Girls, it seems, might offer something different to

coding. The initiatives, cultural connections, art pieces, and resources for girls to code keep coming. It's hard to keep up.

As a form of conclusion, then, I turn toward one specific coding artifact that was released after the ethnographic portion of this research was completed, an interactive music video by Girls Who Code called DojaCode. I end here to explore how “code like a girl” surfaces in both the Girls Who Code promotion as well as children’s Scratch creations related to Doja Cat. DojaCode, according to the promotional material, is the world’s first codable music video. Themes of empowerment, authenticity, sisterhood, and futurity are entangled in the code of DojaCode and the resulting promotion, illuminating coding as an important part of popular feminist culture. However, even before the creation of DojaCode, kids were using Doja Cat’s music on Scratch (as well as TikTok) to form connections and hone their computer coding skills. DojaCode and Doja Cat projects on Scratch point to some of the core tensions discussed throughout this project, particularly the ways in which girls are imagined as coders and how they actually do code.

The first part of this conclusion looks at DojaCode, both its actual coding and the paratextual reasons why Doja Cat makes sense as a partner for the Girls Who Code organization. The second half, then, considers how kids “dojascratch” without the structures in place through the organizational promotion, instead taking to Scratch to create their own individual Doja Cat inspired projects. Like the chapters within this project, I situate adult-created artifacts with child-coded creations, questioning how the two fit together and push against each other. In this way, DojaCode illuminates some of the central concerns of my broader work, distilling them into one centralized example of twenty-first century girls coding culture.

## 6.1 DojaCode

Less than a month after my purchase of Valentine Barker’s “Code like a Girl” print, in December of 2021, Girls Who Code partnered with Doja Cat (Amala Dlamini) to release the world’s first codable music video of her recent hit “Woman,” lovingly referred to as DojaCode. The project is a joint venture between Girls Who Code and Doja Cat mediated by Mojo, a creative company that specializes in helping people “develop a consistent brand story that cuts through the trash” in the disposable age.<sup>242</sup> The project was the latest in Girls Who Code’s “Make That Change” campaign which kicked off in October of 2021 by featuring a video of real women in STEM, giving them the “glamorous, hip-hop treatment they’ve earned”<sup>243</sup> —metallic clothing, makeup, and voice over about being “shot callers”. As the latest installment of the campaign, DojaCode falls in line with both the commodification of Blackness as a “general political and cultural style”<sup>244</sup> and hip-hop feminism,<sup>245</sup> structuring Girls Who Code’s consistent brand story along those lines.<sup>246</sup> It is also worth noting that Doja Cat was one of the most widely circulating artists at the end of 2021 both on social media platforms (particularly TikTok) and in the entertainment industry more broadly.

DojaCode must be accessed through a unique URL, meaning that the original music video (sans coding) and the codable music video exist in two separate spaces. Once on the DojaCode website, users are prompted to “code” Doja Cat’s original video at four moments and in three types of coding languages—changing the Queen of Planet Her’s nail color (CSS); altering particle color, speed, and height (Javascript); resetting time zone, cloud type, and sky tint (Javascript); and changing the type of “flower shower” in the video (Python). In each of these moments, the video slows to a halt and a pop-out window allows users to edit the internal code of the video. Users are given access to one part of the sentence in order to alter the color, number, or location. If this proves too difficult, users can choose attributes from a scroll-down menu (Figure 5). Once the user presses play, the pop-out window

dissolves and the video returns to the original (unedited) video, playing through until the next codable moment. The user quickly learns that they haven't actually altered the music video but rather briefly engaged with an animated image. At the end of the video, users are prompted to share their coded stills via Facebook, Twitter, Instagram, or link under the declaration "Share your creation with Planet Earth. I guess you're a coder now?!" They also have the option to "learn more" through a link on the top right of the video. The link prompts users to enter an email address for more information.

As a coding tool, DojaCode is deeply lacking. Instead of engaging with writing or understanding code, girls are asked to engage in a plug-and-play type of coding resembling activities for younger kids on Disney or Nickelodeon websites. The main difference between versions of coding games for younger kids and DojaCode is the movement to text-based programming. In my own work with the girls at Silverstream, text-based coding was something that a few students looked forward to learning since it emanated an aura of "professional" or "adult" programming that block programming on Scratch didn't. Despite using text-based programming, differences between the three coding languages get obscured in the video where it is barely discernible which coding language you're using and why.

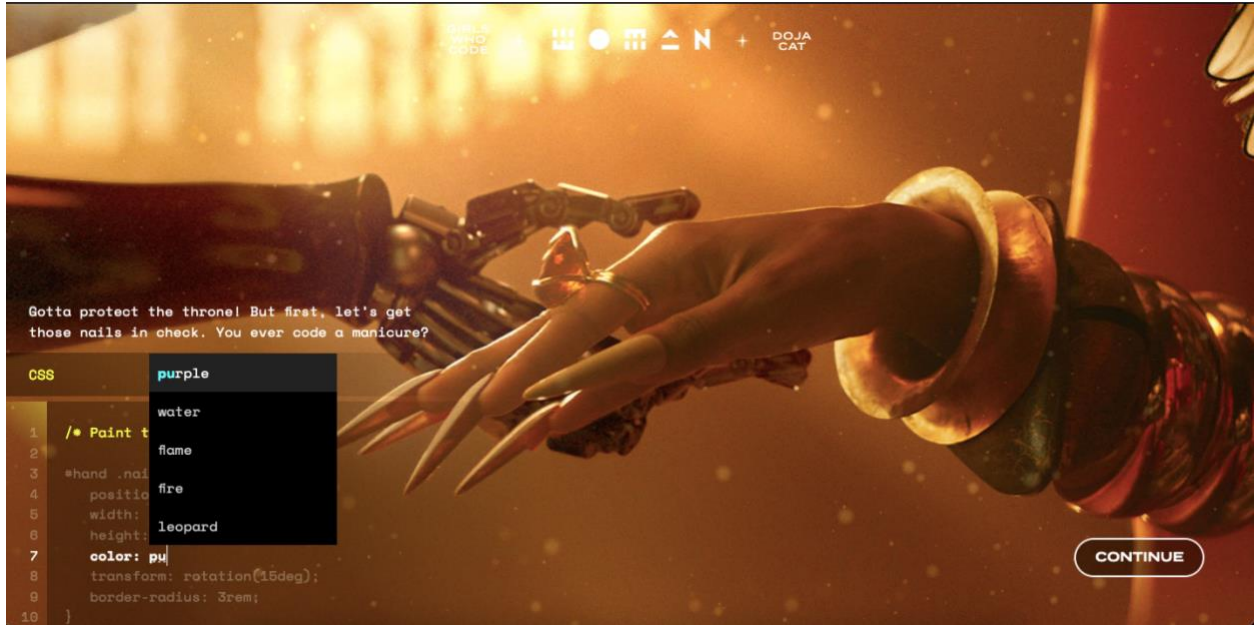


Figure 5 DojaCode Coding Window

I am not alone when I say I was drastically underwhelmed by the project that made so many promises it couldn't keep. The computer science teacher at Silverstream Academy argued that this video was impractical in a classroom setting because of the visible consumption of alcohol and seductive dancing. Some educators online were also confused, pointing to the song's lyrics as sending the wrong message of empowerment.<sup>247</sup> Much like Girls Who Code's other programs, DojaCode seems to position itself against, or at the very least outside of, school type learning, attracting girls to computer coding through popular culture.<sup>248</sup> And while the alcohol and dancing might mark it as unacceptable as an in-school activity, it clearly aligns with the multiple versions of feminism at play in the murky feminist world of the twenty-first century particularly as they relate to Girls Who Code's brand.

### 6.1.1 Authenticity, Empowerment, and Sisterhood

The coding is, maybe, less of the point with DojaCode. The music video draws from circulating ideas of neoliberal feminism and empowerment that adhere to both Doja Cat and Girls Who Code in order to entice girls to imagine coding as a career option. Doja Cat, from the beginning, has cemented herself as able to understand and capitalize on internet culture; she is, what writer EJ Dickinson has referred to as, “Extremely Online.”<sup>249</sup> One of her first claims to fame was her viral music video “Mooo!” in which Doja Cat sings about being a cow. The video was filmed DIY style in her bedroom with a homemade green screen, inspiring a plethora of “bitch I’m a cow” memes. In 2019 and 2020 Doja Cat finally broke through when her album *Hot Pink* made it on the Billboard Hot 100. In addition to her musical prowess, Doja Cat is known for her humorous online personality that helps to mark her as both relatable and irreverent. She’s an internet sensation, a singer, rapper, and dancer all which help to mark her as a relatable, hardworking popular feminist icon.

Now, Doja Cat is widely considered the queen of TikTok with a variety of her songs appearing on the app since “Say So” made its mark in 2020 when Haley Sharpe’s simple dance choreography went viral.<sup>250</sup> The circulating uses of Doja Cat’s songs range from simple choreography (“Candy”) to sultry silhouette challenges (“Streets”) and playful reveals (“Kiss Me More”).<sup>251</sup> Choreography videos in particular affix Doja Cat’s name to the girlish aesthetic that the app capitalizes on as a site of “goofiness and relatability”.<sup>252</sup> During the global Covid-19 pandemic in particular the site became a “celebration of girlhood” and bedroom culture as videos of young girls dancing in their childhood homes flooded the app.<sup>253</sup> As of March 2021, the top 3 creators were girls aged 25 and below with the most popular being Charli D’Amelio at 17 years old. Doja Cat circulates through girl-created dance videos and creates her own goofy TikToks that mark her as appropriately goofy and girly. Many of her own posts similarly take place in her bed or on her couch.

Crucial to Doja Cat's brand, then, is her authenticity as partially exemplified by these social networking sites. Exploring Doja Cat's wild success, Dickinson argues that at least part of the artist's appeal comes from her "willingness to be wacky and unpredictable in an age of polished, hyper-focused pop stardom".<sup>254</sup> Doja Cat fashions herself as a relatable self-brand at odds with the polished online personalities of other pop stars, positioning her as an acceptable and relatable part of the Girls Who Code sisterhood and giving a tangible form of the catchphrase "brave, not perfect" (discussed in chapter 1).<sup>255</sup> Additionally, Zhang argues that Doja Cat's music in itself includes "brash, confident lyrics [that] offer snippets of female empowerment," pointing to the artist as both a relatable friend and one who might understand more broad implications of women's empowerment.<sup>256</sup> While there's no doubt that Doja Cat's musical style (particularly its danceability) has a lot to do with her circulation, Zhang's argument might point to Doja Cat's proliferation beyond TikTok and her productive attachment to authenticity as a form of empowerment. There is little doubt that this is the version of Doja Cat that Girls Who Code partnered with to develop their "consistent brand." It doesn't hurt either that a large swath of their target audience would be aware of Doja Cat's circulation, perhaps even posting dance videos of their own.

"Woman," perhaps unlike some of Doja Cat's more sultry songs, can be read to focus on women's empowerment. While the beginning of the song focuses on heterosexual relationships—Doja Cat speaking to a man saying "let me be your woman"—the bridge of the song reorients focus to women empowerment and sisterhood:

"I could be the CEO, just look at Robyn Fenty

And I'ma be there for you cause you on my team, girl

Don't ever think you ain't hella these \*\*\*\*\* dream girl (edited in DojaCode version)

They wanna pit us against each other when we succeedin' for no reason

They wanna see us end up like we Regina on Mean Girls"

The video furthers this reading of the song, as Planet Her is threatening to be overthrown by men. After Planet Her's queen, played by Teyana Taylor, learns of the plot, she summons Doja Cat to get rid of the men through dancing and seduction. Doja Cat is joined by a small army of women/backup dancers though they never truly interact in the video. Ultimately, we are left with Doja Cat alone and dissolving into a tree, singular "woman" as in the title.

Understood as an ode to confidence, sisterhood, and success, the song's lyrics and army of women draw on central tenets of Girls Who Code as well as key components of popular feminism. In this way, this video is much less about computer coding abilities and more about the particular idea of feminism that computer coding has the ability to capitalize on and situate itself within. Girls' coding culture emerges from, lives within, and sits alongside other vague notions of female empowerment of which Doja Cat is one instance of. Admittedly, a song about computer coding probably wouldn't sell very well or be very interesting, but a music video that was actually editable might be. What DojaCode does is bring together several strands of popular and neoliberal feminism into one awkward package, highlighting the (in)consistencies of messages for young girls. Viewed through the lens of popular and neoliberal feminism, though, Doja Cat makes perfect sense as the pop culture voice of Girls Who Code. That is, about as much sense of any of this makes.

Like many things I've discussed throughout this project, this artifact is actually less about girls *doing* coding and more about *selling* coding to girls, a sort of twenty-first century gimmick relying on digestible and comfortable forms of "forward" progress. The press release from Girls Who Code states: "The aim of the experience is to show a new generation of fans who may be unaware of the career opportunities in the technology and computer science field, just how creative and fun it can be." Emily Berger, the creative lead at Mojo Supermarket, argues that there are "a thousand other things that girls care about more than coding" and that "Doja Cat is like 999 of them."<sup>257</sup> The hope is



that Doja Cat will make coding cool, making use of Doja Cat’s fame to propel Girls Who Code to its target audience, teens and tweens.

The problem is the music video *isn’t* creative or fun (at least not more fun than watching the original music video would be), and it actually gives girls very little (if any) access to the coding that underlies the video itself—there is very little move toward actually coding. Perhaps most concerning, like the Rox’s Secret Code app discussed in chapter one, girls have little to no control over the images that they code, something that should be possible. Instead, DojaCode seems to draw from vague ideas about coding, feminism, and how popular culture intersects with the two. As in the end of the video itself, where we see Doja Cat alone, girls are ultimately left to their own devices to find a coding camp or class near them to get down to the real work.

## 6.2 DojaScratch

Much like Meredith Bak’s assessment of Disney Infinity, DojaCode “shapes the coding environment” in specific ways limiting potential outcomes and subversive uses of the medium.<sup>258</sup> Even more so than programs like Disney Infinity’s coding platform or Nickelodeon’s Code-It, DojaCode locks users into a stereotypically girly version of computer coding—painting nails and choosing colors—through its drop-down menu style of coding. It also seriously limits the ways in which community might form through the website. Users are able to share their completed stills on social media outlets, but they remain branded by Girls Who Code and Doja Cat with “WOMAN” layering over the image. Users’ creations remain in the realm of DojaCode, acting as further marketing for the campaign itself. While potentially exposing girls to computer coding, it is also reinvigorating bedroom culture’s previously assumed one-way connections to consumerism, washing over the productive and

creative ways that girls have engaged with technology, popular culture, community, and even Doja Cat's music.

A quick search on Scratch for "Doja Cat" returns pages of projects inspired by and making use of Doja Cat's music. "Doja Cat - Woman (8D AUDIO) 360°" by yuzuapplebanana visually rests on the cover art for the "Woman" video but uses sound editing to move the song from the left earbud to the right, creating a listening experience unique from the original song.<sup>259</sup> RosieLovesArt created an animation to Doja Cat's song "Candy" featuring a dancing anime character with quite literal interpretations of the lyrics at times: "eat it until your teeth rot" accompanies the character bending over, face turning green, with an exclamation point over her head.<sup>260</sup> The animation, while not directly mimicking the TikTok dance for the song, does mimic the sort of simple movements that the platform is known for, meshing multiple popular culture points and using them for the artist's own creative work through computer coding. This was evident in other videos as well where users referred to the songs used as "TikTok songs."

Most of the early videos in the search turned up still images with sound clips uploaded to Scratch. Sound-focused projects sometimes played with the speed of the sound (slowing it down as in queen2010's version of "Say So")<sup>261</sup> or allowed viewers to choose which Doja Cat song plays by clicking the name of the song (as in ap178076's "Popular Doja Cat").<sup>262</sup> Sometimes, sounds were not edited in any way. At other times it was clear the music was recorded from another device because of the low quality. Comments often focus on the music itself where users ask for specific songs to be uploaded or more experienced users give tips on accessing quality audio downloads. The comment sections of projects acted as a space for users to write out lyrics, argue over the meaning of songs, show knowledge about its TikTok circulation, or ask for the chance to remix.

Creators and users seem aware of the "adult" nature of some of Doja Cat's music and their own inability to access it in other ways—the poorly recorded audio is one example of this. The proliferation

of TikTok references also points to an awareness of how Doja Cat's music circulates outside of Scratch while attempting to circulate the music on the more accessible platform. Scratch, then, provides both a platform for users to share original content and to access and exhibit knowledge about music that they might not be able to retrieve from other websites, particularly in the school environment. For example, a video for Doja Cat's song "Candy" directs users to "press the green flag and blast the song in class and then act suprised [sic] that it played".<sup>263</sup> This sort of underground area of Scratch, what some users refer to as simply "audio" projects, exhibits a use and exploitation of coding environment that creates an economy for children alone—after all, no adult is using Scratch to access or promote the latest Doja Cat song.

But kids aren't just using Scratch to code simple song-sharing projects. They are also creating intense animations that draw from themes and sounds in Doja Cat's music. One of the more involved animation projects features animals lip syncing to Doja Cat's song "Say So."<sup>264</sup> The two animals appear to have a conversation using Doja Cat's lyrics, move offscreen with just their hands barely missing contact, and then come back together at the end repeated over the first verse of the song. Acting as a sort of alternative music video in a way, the animation took roughly 39 hours to complete according to its creator, Nucleonn. Unlike other Scratch projects, each individual element of the animation is coded and timed instead of being a separate animation uploaded as a background to create the illusion of animation (Figure 6). User comments are overwhelmingly positive, and as of this writing the project has 1,241 views with one remix called "Say So !! GaYyY" featuring the same animation with rainbow shirts.

Another artist, lisabc, is known for her weekly animation posts that she has been posting since September 2020. In early 2021 she posted her first coded animation meme to Doja Cat's song "Say So."<sup>265</sup> Similar to Nucleonn's animation, lisabc's animation is her own drawing that is brought to life through intense coding in Scratch. Her evolving notes section points to her growing frustration with

the platform and her abilities—“Edit #1: I’m really starting to hate this >:( 2021/3/21”—and her growing success—“Edit #2: Wait...when did this get more than 40 remixes?! 2021/3/28”. A few months later, lisabc posted an update animation to her account that let her followers know she’s “taking too much time on scratch, especially Saturdays. I just want to say that I am not a worker, I don’t have a job here...my eyes are getting tired in front of the screen.” She goes on to update that she will now do animations only bi-weekly, reserving her off weeks for developing comic episodes on Pixilart.<sup>266</sup> While not deeply engaged in Doja Cat themed animations, lisabc’s emotions around her work point to the fine line between creative play and creative labor that girls have drawn to varying degrees. Particularly on a platform like Scratch, play might easily leak into labor though not monetized like adult-centered and commoditized platforms such as TikTok, Youtube, or Roblox. When Scratch proved to be too much, lisabc moved her labor elsewhere (at least partially).

Scratch, then, offers a way for users to both share music and create with music in unique and self-serving ways. Like my own research in Silverstream Academy, these Doja Cat creators also prove that popular culture, when not dominated by educational institutions, can prove ripe ground for computer coding, not necessarily limiting the creator to pre-existing texts as long as the environment as a whole allows for openness. Instead, makers draw pre-existing texts together in their own unique interpretation and usage in ways that are legible to specific communities of which they are a part, whether that be to share inappropriate music or help their friends decide which Avatar character they’re most like (chapter 3). We might think of this as what Allison Pugh has termed an “economy of dignity” where children operate their own economies based on symbolic life on the fringe of the adult world.<sup>267</sup> Doja Cat music offers a unique marker in the Scratch environment that positions the creators and users as able to interact in an economy of dignity that often incorporates artist references, TikTok references, and specific platform knowledge as well.

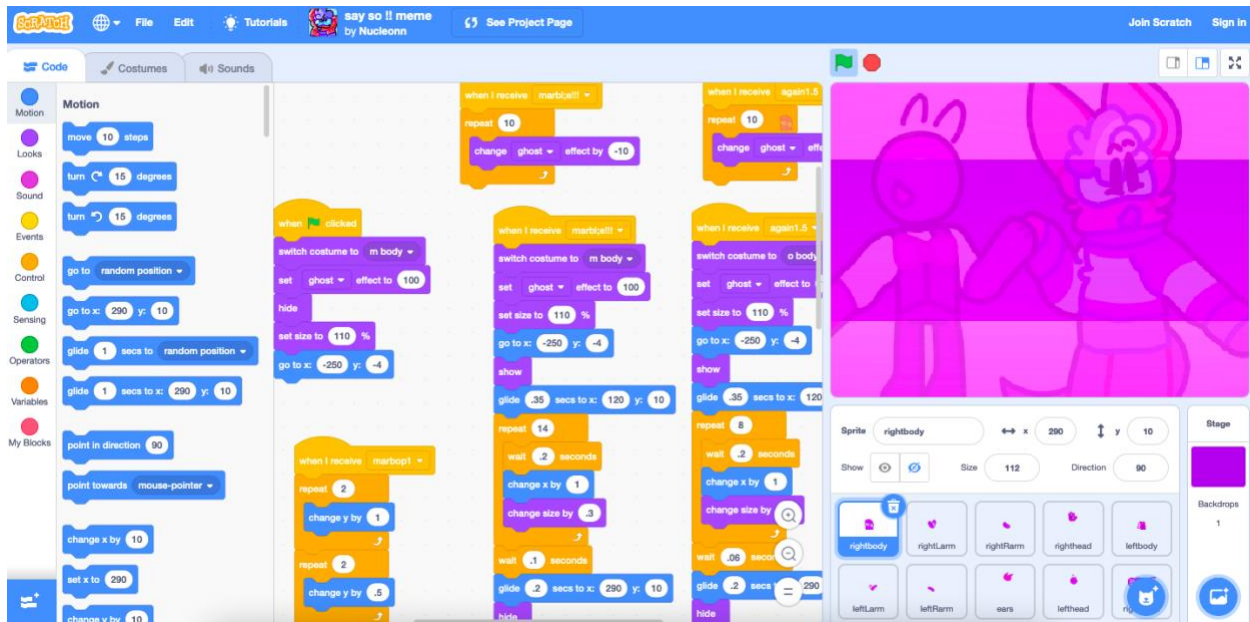


Figure 6 Say So !! Meme Coding

### 6.3 A Gentle Shrug to End

DojaCode brings into focus the connections and tensions between the rhetoric of girls coding and girls *actually* coding. It serves as the most recent instance of the girls coding narrative that has been evolving since 2011, including guest appearances on children’s shows, social media, partnerships with toy brands, and books. Work by organizations, particularly Girls Who Code, attempts to meet girls where they are, connecting itself to already popular youth culture and creating stepping stones of developmental options for girls in computer science. Too old for Nickelodeon? There’s always DojaCode and Instagram. This developmental approach to media narratives always positions girls on a forward moving path to the future (hopefully in computer science) while ignoring the actual importance of media culture in young people’s lives and how adults simply might not understand it at times.

Importantly, these media pitches rarely involve computer coding in any immediate way—for example linking to their own website page with code from home activities. Things like DojaCode seem to both drastically underestimate what girls are capable of as well as throw out the window some of the core arguments for computer programming like problem solving and creativity. This, again, might be some of the connecting narrative tissue of girls’ coding narratives espoused in the first chapter—while media representations of girl coders show them as powerful and competent, the artifacts created for real girls severely limits the moves they are algorithmically allowed to make outside of attending camps and clubs. It might be nice for girls coding culture to simply do the thing it seems to talk about most, let girls code. And code they do, despite what some of the narratives explored in this dissertation say. Sometimes it feels as if the hype of computer coding for girls almost doubts the interest that girls might actually have. Or rather, they ask for the interest to materialize in one specific way that girls are not quite ready to live out.

Doja Cat projects on Scratch and the girls coding that I saw in my ethnography are exactly *not* invested in the idea of coding in itself. In fact, the girls at Silverstream seemed remarkably uninterested in the things that circulated in my adult world about girls coding. They had never read the friendship code book series or watched *Game Shakers* when I asked in passing. Often, they reoriented the conversation entirely to talk about popular series like *Hunger Games* or *The Queen’s Gambit*. They were invested in other things and saw the potential of computer coding as a place to explore these further whether it led to a computer science degree or not (most often not). Coding seemed to serve as a means to engage in meaningful peer-to-peer relationships along with a swath of other media-focused tools like TikTok and Roblox (where the girls didn’t code but played games). The projects I got the chance to work see and work on with girls were more complicated than what DojaCode set out for them, and I can’t help but wonder a year after my research finished what they would think of the video.

Finally, my research has pointed to the ways in which labor is always lurking just beyond the surface of children's media, even in self-oriented Doja Cat projects and llama doodles. Computer coding, because of its framing in the United States currently, more clearly ties girls to future labor than other subjects. While subjects like math and reading are largely understood as general literacy requirements, coding has not yet made this jump and is instead incorporated into modern education with hopes of bridging current education with future economic output. However, even outside of the classroom—as with the Doja Cat project above, Paranalein's llama doodle (chapter 2), and the fictional girls in chapter one—labor is clearly attached to computer coding in often ambivalent ways through both human capital and monetary gain.

In the second decade of the twenty-first century, girls coding culture has turned into a profitable movement that takes part in economies of empowerment, figuring the girl child as the key to their own economic success. As chapter one exhibited, her existence depends heavily on new feminist formulations, namely popular and neoliberal feminism, as well as newer economic requirements of human capital that rearticulate the ideal girl as a forward-moving capitalist subject. Girls' coding culture evades interrogating larger economic and patriarchal structures that have historically pushed women and girls out of tech. And, perhaps most importantly for the girls who are coding, it imagines the usefulness of coding as largely future oriented. For every DojaCode type project, there are hundreds of kid-created coding projects that beg us to see them in a different way and for different purposes. Or, perhaps, they aren't for adults to see or understand at all. They can't be wrangled into the future-oriented hype that children have been so heavily asked to invest in. It might not be quite a “fuck coding” moment, but it is, at the very least, a gentle shrug at the narratives that the girls in my project let wash over them without trying to be the twenty-first century coding girl.

## Appendix A List of Coding Books

### 2008

Jinks, Catherine. *Evil Genius*. Boston: HMH Books for Young Readers, 2008

### 2011

Bueno, Carlos. *Lauren Ipsum: A Story About Computer Science and Other Improbable Things*. San Francisco: No Starch Press, 2011.

### 2014

Meyers, E.C. *The Silence of Six*. Adaptive Books, 2014.

Pfugfelder, Bob and Steve HockenSilverstream. *Nick and Tesla's Robot Army Rampage: A Mystery with Hoverbots, Bristle Bots, and Other Robots You Can Build*. Philadelphia: Quirk Books, 2014.

### 2015

Dickins, Rosie. *Lift-the-Flap Computers and Coding*. London: Usborne, 2015.

Liukas, Linda. *Hello Leyla: Adventures in Coding*. New York: Macmillan, 2015.

Yang, Gene Luen, and Mike Holmes. *Secret Coders*. New York: First Second Books, 2015.

### 2016

Pascal, Amy, and Heather O. Petrocelli. *The Wonderful World of Creatures and Code*. Portland: Mnemonic Productions, 2016.

Taylor, Justin. *The Computer Code Mystery (Celia Science and Anna Art)*. I\_AM Self-Publishing, 2016.



Yang, Gene Luen, and Mike Holmes. *Secret Coders: Paths and Portals (#2)*. New York: First Second Books, 2016.

## 2017

Alston, Sasha. *Sasha Savvy Loves to Code*. Gold Fern Press, 2017

Calandrelli, Emily and Tamson Weston. *Ada Lace, On the Case*. New York: Simon and Schuster, 2017.

---. (2017). *Ada Lace Sees Red*. New York: Simon and Schuster, 2017.

Deutsch, Stacia. *The Friendship Code*. New York: Penguin Random House, 2017.

Deutsch, Stacia. (2017). *Team BFF: Race to the finish*. New York: Penguin Random House, 2017.

Gonzales, Andrea, and Sophie Houser. *Girl Code: Gaming, going viral, and getting it done*. Harper Publishing, 2017.

Lerner, Jarrett. *Enginerds*. Aladdin, 2017.

Lu, M. *Warcross*. New York: Speak/Penguin Random House, 2017.

Menon, Sadiya. *When Dimple met Rishi*. Simon Pulse, 2017.

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## End Notes

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<sup>2</sup> Jay Williams and Raymond Abrashkin, *Danny Dunn and the Homework Machine* (New York: Pocket Books, 1958).

<sup>3</sup> Williams and Abrashkin, *Danny Dunn*, 132-133.

<sup>4</sup> This is the only book in the series dedicated to Danny Dunn's homework machine.

<sup>5</sup> Anita Harris, *Future Girl: Young Women in the Twenty-First Century* (London: Routledge, 2004).

<sup>6</sup> Stacey Deutsch, *The Friendship Code* (New York: Scholastic, 2018),

<sup>7</sup> J. Gill-Peterson, "The Value of the Future: The Child as Human Capital and the Neoliberal Labor of Race," *Women's Studies Quarterly* 43, no. 1 & 2 (2015): 186.

<sup>8</sup> Seymour Papert, *Mindstorms: Children, Computers, and Powerful Ideas* (New York: Basic Books, 1993), 21.

<sup>9</sup> Papert, *Mindstorms*, 100.

<sup>10</sup> Annette Vee, *Coding Literacy: How Computer Programming Is Changing Writing* (Cambridge: MIT Press, 2017), 51.

<sup>11</sup> See Vee for a comprehensive history of computer programming for children.

<sup>12</sup> Girls Who Code's "Missing Code" campaign serves as one literal call for this invoking both the resulting "broken" internet if girls don't code as well as promising a decent amount of money for those that do.

<sup>13</sup> Vee, *Coding Literacy*, 11-13.

<sup>14</sup> See Association for Computing Machinery and Computer Science Teachers Association, *Running on Empty: The Failure to Teach K-12 Computer Science in the Digital Age* (ACM, 2010), accessed March 13, 2022, <https://csteachers.org/documents/en-us/2b617f40-d441-4429-8149-46d0b3b4a673/1/>.

<sup>15</sup> Association for Computing Machinery and Computer Science Teachers Association, *Running on Empty: The Failure to Teach K-12 Computer Science in the Digital Age* (ACM, 2010), accessed March 13, 2022, <https://csteachers.org/documents/en-us/2b617f40-d441-4429-8149-46d0b3b4a673/1/>; Google Inc., *Women Who Choose Computer Science—What Really Matters*, (2014), accessed March 13, 2022, <https://static.googleusercontent.com/media/edu.google.com/en//pdfs/women-who-choose-what-really.pdf>.

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<sup>16</sup> Google Inc. and Gallup Inc., *Diversity Gaps in Computer Science: Exploring the Underrepresentation of Girls, Blacks and Hispanics* (2016), 4, accessed March 13, 2022, <http://goo.gl/PG34aH>.

<sup>17</sup> Sasha Costanza-Chock, *Design Justice: Community-Led Practices to Build the Worlds We Need* (Cambridge: MIT Press, 2020), 76.

<sup>18</sup> Code.org (in partnership with Computer Science Teachers Association and Expanding Computing Education Pathways) produced “2020 State of Computer Science Education: Illuminating Disparities,” one of the first reports to take an intersectional approach to computer science education. The report assessed computer science core standard integration across all fifty states and D.C. with particular attention to the demographics of students enrolled at the axis of race and gender (only understood as girls and boys, no non-binary data available).

<sup>19</sup> Papert, *Mindstorms*, 186.

<sup>20</sup> For further discussion, see Driscoll, *Girls*; McRobbie, “Post-Feminism and Popular Culture”; Genz, “Third Way/ve”; Gill, “Postfeminist Media Culture”; and Tasker and Negra, *Interrogating Postfeminism*.

<sup>21</sup> Sarah Banet-Weiser, *Empowered: Popular Feminism and Popular Misogyny* (Durham: Duke University Press, 2018).

<sup>22</sup> Catherine Rottenberg, *The Rise of Neoliberal Feminism* (New York: Oxford University Press, 2018).

<sup>23</sup> Banet-Weiser, *Empowered*; Rottenberg, *The Rise of Neoliberal Feminism*.

<sup>24</sup> Diane Negra and Yvonne Tasker, *Interrogating Postfeminism: Gender and Politics of Popular Culture* (Durham: Duke University Press, 2007), 5.

<sup>25</sup> Angela McRobbie, “Post-Feminism and Popular Culture,” *Feminist Media Studies* 4, no.3 (2004): 255-264.

<sup>26</sup> McRobbie, “Post-Feminism and Popular Culture”.

<sup>27</sup> Banet-Weiser, *Empowered*, 19 and 27.

<sup>28</sup> Banet-Weiser, *Empowered*, 21.

<sup>29</sup> Banet-Weiser, *Empowered*, 20.

<sup>30</sup> Banet-Weiser, *Empowered*, 27.

<sup>31</sup> Negra and Tasker, *Interrogating Postfeminism*, 10.

<sup>32</sup> Rottenberg, *The Rise of Neoliberal Feminism*, 12-13.

<sup>33</sup> Rottenberg, *The Rise of Neoliberal Feminism*, 83.

<sup>34</sup> Rottenberg, *The Rise of Neoliberal Feminism*, 20.

<sup>35</sup> Anita Harris, *Future Girl: Young Women in the Twenty-First Century* (London: Routledge, 2004).

<sup>36</sup> Harris, *Future Girl*, 14.

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<sup>37</sup> Harris, *Future Girl*, 33.

<sup>38</sup> Amalia Sa'ar, *Economic Citizenship: Neoliberal Paradoxes of Empowerment* (New York: Berghahn Books, 2016), 111-112.

<sup>39</sup> J. Gill-Peterson, "The Value of the Future: The Child as Human Capital and the Neoliberal Labor of Race," *Women's Studies Quarterly* 43, no. 1 & 2 (2015): 181-196.

<sup>40</sup> Lee Edelman, *No Future: Queer Theory and the Death Drive* (Durham: Duke University Press, 2004).

<sup>41</sup> Kathryn Bond-Stockton, *The Queer Child, Or Growing Sideways in the Twentieth Century* (Durham, Duke University Press, 2009).

<sup>42</sup> Things like listening to Mozart and reading to your baby bump have been shown to help babies develop. There are whole Youtube stations (with ads included) that capitalize on this finding.

<sup>43</sup> Michel Feher, "Self-Appreciation; or, The Aspirations of Human Capital," *Public Culture* 21, no.1 (2009): 30.

<sup>44</sup> Erica Burman, "Deconstructing Neoliberal Childhood: Towards a Feminist Antipsychological Approach," *Childhood* 19, no.4 (2012): 423-438.

<sup>45</sup> "History -- Fair Labor Standards Act of 1938," United States Department of Labor, accessed November 6, 2018, <https://www.dol.gov/oasam/programs/history/flsa1938.htm>.

The Fair Labor Standards Act of 1938 prohibited children under the age of 16 from working unless there were special circumstances (family businesses, farms, etc.). It also legally set a minimum wage. While the minimum wage was \$0.25 in 1938, most amendments to FLSA have had to do with shifting the minimum wage ("Fair Labor Standards Act"). This was the first successful attempt at creating child labor laws after a long battle between proponents of child labor and proponents of the sentimental child.

<sup>46</sup> In her work *Pricing the Priceless Child*, Viviana Zelizer uses the term "useless" to refer to the child that has been pushed out of economic activity and into the production of smiles and good feelings.

<sup>47</sup> Viviana Zelizer, *Pricing the Priceless Child: The Changing Social Value of Children* (Princeton: Princeton University Press, 1985), 97.

<sup>48</sup> Malcolm Harris, *Kids These Days: Human Capital and the Making of Millennials*, (New York: Little, Brown and Company, 2017), 15.

<sup>49</sup> Zelizer, *Pricing the Priceless Child*, 98.

<sup>50</sup> M. Harris, *Kids These Days*, 25.

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<sup>51</sup> Ruth Lister, “Investing in the Citizen-Workers of the Future: Transformations in Citizenship and the State under New Labour,” *Social Policy and Administration* 37, no.5 (2003), 437. Crucial to Lister’s understanding of the citizen worker of the future is the premise that children no longer get what they need in the present and the experience of education deteriorates.

<sup>52</sup> Nancy Folbre, *The Invisible Heart: Economics and Family Values*, (New York: The New Press, 2001).

<sup>53</sup> Guy Standing, “Global Feminization through Flexible Labor: A Theme Revisited,” *World Development* 27, no.3 (1999).

<sup>54</sup> Burman, “Deconstructing Neoliberal Childhood,” 424.

<sup>55</sup> M. Harris, *Kids These Days*, 16.

<sup>56</sup> For further discussion, see Ensmenger, *Computer Boys Take Over*; Abbate, *Recoding Gender*; and Hicks, *Programmed Inequality*.

<sup>57</sup> Nathan Ensmenger, *Computer Boys Take Over: Computers, Programmers, and the Politics of Technical Expertise* (Cambridge: MIT Press, 2012), 38.

<sup>58</sup> Ensmenger, *Computer Boys Take Over*; Abbate, *Recoding Gender*; Hicks, *Programmed Inequality*.

<sup>59</sup> Google Inc., *Women Who Choose*.

<sup>60</sup> Maureen Mauk, Rebekah Willett, and Natalie Coulter, “The Can-Do Girl Goes to Coding Camp: A Discourse Analysis of News Reports on Coding Initiatives Designed for Girls,” *Media, Learning, and Technology* (2020), 4-5.

<sup>61</sup> Safiya Noble, *Algorithms of Oppression: How Search Engines Reinforce Racism* (New York: New York University Press, 2018); Thomas Misa, *Gender Codes: Why Women are Leaving Computing* (Piscataway: IEEE Computer Society Press, 2010); Jacob Clark Blickenstaff, “Women and Computer Science Careers: Leaky Pipeline or Gender Filter?,” *Gender and Education* 17, no.4 (2005), 369-386.

<sup>62</sup> Nicole Zarrett and Oksana Malanchuk, “Who’s Computing? Gender and Race Differences in Young Adults’ Decisions to Pursue an Information Technology Career,” *New Directions for Child and Adolescent Development* no.110 (2005), 65-84.

<sup>63</sup> Elizabeth Garbee, “The Problem with the Pipeline,” *Slate*, last modified October 24, 2017, <https://slate.com/technology/2017/10/the-problem-with-the-pipeline-metaphor-in-stem-education.html>.

<sup>64</sup> Noble, *Algorithms of Oppression*, 65-66.

<sup>65</sup> Banet-Weiser, *Empowered*.

<sup>66</sup> Costanza-Chock, *Design Justice*, 75.

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<sup>67</sup> Mary Guy and Meredith Newman, “Women’s Jobs, Men’s Jobs: Sex Segregation and Emotional Labor,” *Public Administration Review* 64, no.3 (2004).

<sup>68</sup> All school, student, and teacher names are pseudonyms.

<sup>69</sup> Kathryn Bond-Stockton, *The Queer Child, Or Growing Sideways in the Twentieth Century* (Durham, Duke University Press, 2009), 5.

<sup>70</sup> Kathryn Bond-Stockton, *The Queer Child, Or Growing Sideways in the Twentieth Century* (Durham, Duke University Press, 2009), 5.

<sup>71</sup> Nickelodeon UK also launched a coding application called Code-It in 2015 which developers described as expanding coding learned in schools by making it fun. The Code-It app allows users to create “action trees” and “action stacks” to animate Nickelodeon characters and the worlds they inhabit. Nickelodeon US, Asia, and Australia have a less complicated application entitled Code A Character which allows players to code Sponge Bob or Sky Whale from a set of pre-selected choices.

<sup>72</sup> In August of 2019, Black Girls Code received a \$1 million grant from Nike as part of its four-year investment in organizations that help fight systemic racism. At the end of 2020, the organization partnered with Netflix’s 2020 Christmas film *Jingle Jangle: A Christmas Journey* in “The Possible Pledge” that asserts the “power and magic young Black women possess.” The partnership began with a brief discussion between the makers of *Jingle Jangle* and girls of Black Girls CODE about the power of imagination, perseverance, and STEM on December 12, 2020. After this discussion, the partnership largely consists of individuals “taking the pledge” as a reminder of their magic and power and downloading social media and phone backgrounds. Most recently, in October of 2021, Mariah Carey announced she was partnering with Black Girls Code and Gemini cryptocurrency to learn more about Bitcoin. A portion of each Bitcoin trade would go to the nonprofit with the code “mariah.”

<sup>73</sup> Anna Meyer, “Black Girls Code’s Founder on the Power of Trusting your Intuition,” *Inc.*, August 31, 2021. <https://www.inc.com/anna-meyer/black-girls-code-kimberly-bryant-your-next-move.html>.

<sup>74</sup> Abbianca Makoni, “Update: Black Girls Code CEO Speaks Up In A Tell-All Interview Days After Board Suspends Her,” *People of Color in Tech*, January 10, 2022, <https://peopleofcolorintech.com/break-into-tech/update-black-girls-code-ceo-releases-statement-and-denies-allegations-of-work-place-impropriety/>.

<sup>75</sup> Maureen Mauk and Rebekah Willett, *Marketing the Tween Girl Coder: Coding Initiatives, Parenting, and Preadolescent Girls* (Paper Presentation, International Girls Studies Association Conference, Notre Dame, February 28-March 3 2019).

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<sup>76</sup> Margolis et al.'s (2008) book length study on Los Angeles shows that segregation and inequality infiltrate the ways in which computer science is conceived and taught in schools with varying populations. They also articulate that certain students are encouraged to take computer science classes while others are not (particularly Black students).

<sup>77</sup> "Measuring Our Impact," Black Girls Code, Accessed December 12, 2018.

<sup>78</sup> Reshma Saujani, "Girls Who Code Annual Report 2017," Girls Who Code, Accessed March 23, 2022.  
<https://girlswhocode.com/2017report/>

<sup>79</sup> Nathan Ensmenger, *Computer Boys Take Over: Computers, Programmers, and the Politics of Technical Expertise* (Cambridge: MIT Press, 2012), 2.

<sup>80</sup> Ellen Seiter, *Sold Separately* (New Brunswick: Rutgers University Press, 1993).

<sup>81</sup> Annette Vee, *Coding Literacy: How Computer Programming Is Changing Writing* (Cambridge: MIT Press, 2017), 16.

<sup>82</sup> Maureen Mauk, Rebekah Willett, and Natalie Coulter, "The Can-Do Girl Goes to Coding Camp: A Discourse Analysis of News Reports on Coding Initiatives Designed for Girls," *Media, Learning, and Technology* (2020), 4.

<sup>83</sup> Elizabeth Garbee, "The Problem with the Pipeline," *Slate*, last modified October 24, 2017,  
<https://slate.com/technology/2017/10/the-problem-with-the-pipeline-metaphor-in-stem-education.html>.

<sup>84</sup> Matthew Cannady, Eric Greenwald, and Kimberly Harris, "Problematizing the STEM Pipeline Metaphor: Is the STEM Pipeline Metaphor Serving our Students and the STEM Workforce," *Science Education* 98, no.3 (2014): 443–460.

<sup>85</sup> Garbee, "The Problem with the Pipeline"; Cannady et al., "Problematizing the STEM Pipeline Metaphor".

<sup>86</sup> Reshma Saujani, "Girls Who Code Annual Report 2019," Girls Who Code, Accessed March 23, 2022.  
<https://girlswhocode.com/2019report/>, 12 and 2.

<sup>87</sup> On the organization's website, there is a tab devoted to research and page devoted to public policy. Research reports include topics such as how to get women into tech, research about applying for jobs in tech, and strategies for keeping women in tech once they are there. This research directly correlates with their public policy work in which they aim to work with state governments to expand K-12 coding education. Most recently the organization has been the face of the Marshall Plan to pay moms during the Covid-19 pandemic.

<sup>88</sup> Amalia Sa'ar, *Economic Citizenship: Neoliberal Paradoxes of Empowerment* (New York: Berghahn Books, 2016), 111-112.

<sup>89</sup> Vee, "Coding Literacy".

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- <sup>90</sup> Stacey Deutsch, *The Friendship Code*. (New York: Scholastic, 2018).
- <sup>91</sup> Katie Harper, *Out of Reach: The Ideal Girl in American Girls' Serial Literature* (New York: Routledge, 2019).
- <sup>92</sup> Harper, *Out of Reach*, 5.
- <sup>93</sup> Harper, *Out of Reach*, 2.
- <sup>94</sup> Harper, *Out of Reach*.
- <sup>95</sup> Alison Winch, *Girlfriends and Postfeminist Sisterhood* (New York: Palgrave, 2013): 127.
- <sup>96</sup> One might question here how organizations, books, and other materials “teach” friendship and what effect that has on girls who would rather not engage in emotional connections at an afterschool coding club.
- <sup>97</sup> Stacey Deutsch, *Team BFF: Race to the Finish* (New York: Penguin Random House, 2017): 72.
- <sup>98</sup> Deutsch, *Race to the Finish*, 78.
- <sup>99</sup> Sarah Banet-Weiser, *Kids Rule! Nickelodeon and Consumer Citizenship* (Durham: Duke University Press, 2007).
- <sup>100</sup> Maureen Mauk, Rebekah Willett, and Natalie Coulter, “The Can-Do Girl Goes to Coding Camp: A Discourse Analysis of News Reports on Coding Initiatives Designed for Girls,” *Media, Learning, and Technology* (2020).
- <sup>101</sup> Deutsch, *Team BFF*, 19.
- <sup>102</sup> One of these apps will do the students’ homework for them. Evidently this student hasn’t read Danny Dunn.
- <sup>103</sup> M. Harris, *Kids These Days*, 40.
- <sup>104</sup> M. Harris, *Kids These Days*.
- <sup>105</sup> Deutsch, *Team BFF*, 38.
- <sup>106</sup> Jo Whittlemore, *Lights, Music, Code!* (New York: Penguin Random House, 2018): 31.
- <sup>107</sup> M. Harris, *Kids These Days*, 40.
- <sup>108</sup> Bond-Stockton, *The Queer Child*, 222.
- <sup>109</sup> Lee Edelman, *No Future: Queer Theory and the Death Drive* (Durham: Duke University Press, 2004).
- <sup>110</sup> Gill-Peterson, “The Value of the Future,” 183.
- <sup>111</sup> Hannah Dyer, *The Queer Aesthetics of Childhood: Asymmetries of Innocence and the Cultural Politics of Child Development* (New Brunswick: Rutgers University Press, 2019).
- <sup>112</sup> Wendy Chun, *Programmed Visions: Software and Memory* (Cambridge: MIT Press, 2011): 9-11.
- <sup>113</sup> Whittlemore, *Lights, Music, Code!*, 84.
- <sup>114</sup> A. Harris, *Future Girl*, 18.
- <sup>115</sup> Chun, *Programmed Visions*, 19.



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- <sup>116</sup> Chun, *Programmed Visions*, 28-29.
- <sup>117</sup> Whittemore, *Lights, Music, Code!*, 31.
- <sup>118</sup> Nancy Folbre, "The Political Economy of Human Capital" *Review of Radical Political Economics* 44, no.3 (2012): 282.
- <sup>119</sup> Weiai Xu and Gregory Saxton, "Does Stakeholder Engagement Pay Off on Social Media? A Social Capital Perspective," *Nonprofit and Voluntary Sector Quarterly* 48, no. 1 (2019): 32.
- <sup>120</sup> Lauren Berlant, *The Female Complaint: The Unfinished Business of Sentimentality in American Culture* (Durham: Duke University Press, 2008): viii.
- <sup>121</sup> Kate Milter and Tim Highfield, "Never Gonna GIF You Up: Analyzing the Cultural Significance of the Animated GIF," *Social Media + Society* 3, no.3 (2016): 4.
- <sup>122</sup> Miltner and Highfield, "Never Gonna GIF," 7.
- <sup>123</sup> Akane Kanai, "The Girl in the GIF: Reading the Self into Girlfriendship," *Girlhood Studies* 10, no. 3 (2017a): 190.
- <sup>124</sup> Akane Kanai, "Girlfriendship and Sameness: Affective Belonging in a Digital Intimate Public," *Journal of Gender Studies* 26, no.3 (2017b): 298.
- <sup>125</sup> Catherine Rottenberg, *The Rise of Neoliberal Feminism* (New York: Oxford University Press, 2018).
- <sup>126</sup> Kanai, "Girlfriendship and Sameness", 294 drawing on Winch.
- <sup>127</sup> Rottenberg, *The Rise of Neoliberal Feminism*, 83.
- <sup>128</sup> Reshma Saujani, "COVID has Decimated Women's Careers — We need a Marshall Plan for Moms, Now," *The Hill*, December 7, 2020, <https://thehill.com/blogs/congress-blog/politics/529090-covid-has-decimated-womens-careers-we-need-a-marshall-plan-for/>.
- <sup>129</sup> Reshma Saujani (@reshmasaujani), "Today, @GirlsWhoCode took out a full-page ad in the @nytimes calling on the Biden administration to support moms by implementing a #MarshallPlanForMoms in the first 100 days. 50 prominent women signed on to our letter. Take action and add your name: <http://marshallplanformoms.com>," Twitter, January 26, 2021, <https://twitter.com/reshmasaujani/status/1354053269606301696>.
- <sup>130</sup> [Veronica Stracqualursi](#), "50 Prominent Men join Push for 'Marshall Plan for Moms' Proposal," *CNN Politics*, February 26, 2021, <https://www.cnn.com/2021/02/26/politics/marshall-plan-for-moms-male-allies/index.html>.
- <sup>131</sup> Reshma Saujani, *Pay Up: The Future of Women and Work (and Why It's Different Than You Think)* (New York: Simon and Schuster, 2022): 10.

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- <sup>132</sup> Saujani, *Pay Up*, 7.
- <sup>133</sup> The book, overall is uninspired, ignoring many second wave feminist ideals and repositing them as if new. It also ignores they ways in which union organization has played an important part in pay and women's rights in the past.
- <sup>134</sup> Amy Ogata, *Designing the Creative Child: Playthings and Places in Midcentury America* (Minneapolis: University of Minnesota Press, 2013): 36.
- <sup>135</sup> Ogata, *Designing the Creative Child*, 37. As Ogata outlines, physical spaces also helped to sustain the American version of the creative child. Schools, homes, museums, and other public spaces imagined the child as inherently creative yet in need of continued development.
- <sup>136</sup> Josef Nguyen, "Minecraft and the Building Blocks of Creative Individuality," *Configurations* 24 (2016): 478.
- <sup>137</sup> Nguyen, "Minecraft and the Building Blocks," 478.
- <sup>138</sup> Marc Prensky, "Digital Natives, Digital Immigrants Part I," *On the Horizon* 9, no.5 (2001): 1–6.
- <sup>139</sup> John Howkins, *The Creative Economy* (New York: Penguin, 2002).
- <sup>140</sup> Richard Florida, *The Rise of the Creative Class* (New York: Basic Books, 2002): 48.
- <sup>141</sup> Florida, *The Rise of the Creative Class*, 68.
- <sup>142</sup> Mat D Duerden, Stephen H. Courtright, and Mark A. Windmer, "Why People Play at Work: A Theoretical Examination of Leisure-at-Work," *Leisure Sciences* 40, no.6 (2018): 636.
- <sup>143</sup> Banet-Weiser, *Kids Rule!*
- <sup>144</sup> Heather Hendershot, *Nickelodeon Nation: The History, Politics, and Economics of America's Only TV Channel for Kids* (New York: New York University Press, 2004): 15.
- <sup>145</sup> Prensky, "Digital Natives, Digital Immigrants."
- <sup>146</sup> Banet-Weiser, *Kids Rule!*
- <sup>147</sup> Sarah Projansky, *Spectacular Girls: Media Fascination and Celebrity Culture*, (New York: New York University Press, 2014): 35.
- <sup>148</sup> Projansky, *Spectacular Girls*, 43.
- <sup>149</sup> Projansky, *Spectacular Girls*, 44.
- <sup>150</sup> John Howkins, *The Creative Economy* (London: Penguin, 2002): 125.
- <sup>151</sup> Robin Bernstein, *Racial Innocence: Performing American Childhood from Slavery to Civil Rights* (New York: New York University Press, 2011): 8.

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- <sup>152</sup> Tyler Bickford, *Tween Pop: Children's Music and Public Culture* (Durham: Duke University Press, 2020).
- <sup>153</sup> Bickford, *Tween Pop*, 106
- <sup>154</sup> Williams and Abrashkin, *Danny Dunn*, 129.
- <sup>155</sup> Mara Lecocq, Nathan Archambault, Jessika von Innerebner, and Rodolfo Dengo, *Rox's Secret Code* (New York: POW Books, 2018).
- <sup>156</sup> Mara Lecocq, "Work," *Mara Lecocq*, Accessed March 24, 2022. <https://www.maralecocq.com/work>
- <sup>157</sup> Jacqueline Rose, *The Case of Peter Pan, Or the Impossibility of Children's Fiction* (Philadelphia: University of Pennsylvania Press, 1984): 2.
- <sup>158</sup> Victoria McArthur, "Making Mii: Studying the Effects of Methodological Approaches and Gaming Contexts on Avatar Customization," *Behaviour & Information Technology* 38, no.3 (2019): 231.
- <sup>159</sup> J. Alison Bryant and Anna Akerman, "Finding Mii: Virtual Social Identity and the Young Consumer," in Natalie Wood & Michael Solomon (Eds.), *Virtual Social Identity and Consumer Behavior* (New York: Taylor and Francis Group, 2009): 127-140.
- <sup>160</sup> Natalie Kucirkova and Margaret Mackey, "Digital Literacies and Children's Personalized Books: Locating the "Self," *London Review of Education* 18, no.2 (2020): 151–162.
- <sup>161</sup> Sarah Banet-Weiser, *Empowered: Popular Feminism and Popular Misogyny* (Durham: Duke University Press, 2018): 17.
- <sup>162</sup> Herman Gray, "Subject(ed) to Recognition," *American Quarterly* 65, no.4 (2013): 780-1.
- <sup>163</sup> Gray, "Subject(ed) to Recognition," 780 and 785.
- <sup>164</sup> Gray, "Subject(ed) to Recognition," 785.
- <sup>165</sup> Mauk, Willett, and Coulter, "The Can-Do Girl goes to Coding Camp."
- <sup>166</sup> Mimi Ito, Henry Jenkins, and dana boyd, *Participatory Culture in a Networked Era* (Cambridge: Polity, 2016): 48.
- <sup>167</sup> Boyd, Ito, and Jenkins, *Participatory Culture*, 49.
- <sup>168</sup> Ben Williamson, Rebecca Eynon and John Potter, "Pandemic Politics, Pedagogies and Practices: Digital Technologies and Distance Education During the Coronavirus Emergency," *Learning, Media and Technology* 45, no.2 (2020): 110.
- <sup>169</sup> Boyd, Ito, and Jenkins, *Participatory Culture*, 50.

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- <sup>170</sup> Angela McRobbie, *The Aftermath of Feminism: Gender, Culture, and Social Change* (Thousand Oaks: Sage Publications, 2009); Catherine Rottenberg, *The Rise of Neoliberal Feminism* (Oxford: Oxford University Press, 2018).
- <sup>171</sup> Banet-Weiser, *Empowered*, 13.
- <sup>172</sup> Sarah Banet-Weiser, *Authentic TM: The Politics of Ambivalence in a Brand Culture* (New York: New York University Press, 2012).
- <sup>173</sup> Sa'ar, *Economic Citizenship*, 111-12.
- <sup>174</sup> Safiya Noble, *Algorithms of Oppression: How Search Engines Reinforce Racism* (New York: New York University Press, 2018); Thomas Misa, *Gender Codes: Why Women are Leaving Computing* (Piscataway: IEEE Computer Society Press, 2010); Jacob Clark Blickenstaff, "Women and Computer Science Careers: Leaky Pipeline or Gender Filter?," *Gender and Education* 17, no.4 (2005), 369-386.
- <sup>175</sup> Folbre, "The Political Economy of Human Capital".
- <sup>176</sup> Meredith Bak, *Playful Visions: Optical Toys and the Emergence of Children's Media Culture* (Cambridge: MIT Press, 2020): 3.
- <sup>177</sup> Angela McRobbie and Jenny Garber, "Girls and Subcultures," in *Culture, Ideology and Social Process*, eds. Tony Bennett, Graham Martin, Colin Mercer, and Janet Woollacott (Berkshire: The Open University Press, 1981), 209-222.
- <sup>178</sup> McRobbie and Garber, "Girls and Subcultures," 220.
- <sup>179</sup> Pamela Takayoshi, Emily Huot, and Meghan Huot, "No Boys Allowed: The World Wide Web as a Clubhouse for Girls," *Computers and Composition* 16 (1999): 89-106; Catherine Driscoll, "Girl Culture, Revenge and Global Capitalism: Cybergirls, Riot Grrls, Spice Girls," *Australian Feminist Studies* 14, no. 29 (1999): 173-193.
- <sup>180</sup> Mary Celeste Kearney, *Girls Make Media* (New York: Routledge, 2006); Sharon Mazzarella, *Girl Wide Web: Girls, the Internet, and the Negotiation of Identity* (New York: Peter Lang, 2005); Maryann Erigha and Ashley Crooks-Allen, "Digital Communities of Black Girlhood: New Media Technologies and Online Discourses of Empowerment," *The Black Scholar* 50, no.4 (2020): 66-76.
- <sup>181</sup> Anita Harris, "Revisiting Bedroom Culture: New Spaces for Young Women's Politics," *Hectate* 27, no.1 (2001): 128-138; Anita Harris, "gURL Scenes and Grrrl Zines: The Regulation and Resistance of Girls in Late Modernity," *Feminist Review* 75, no.75 (2003): 38-56.
- <sup>182</sup> Kearney, *Girls Make Media*.

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<sup>183</sup> Melanie Kennedy, “If the Rise of the TikTok Dance and e-girl Aesthetic has Taught us Anything, It’s that Teenage Girls Rule the Internet Right Now’: TikTok Celebrity, Girls and the Coronavirus Crisis,” *European Journal of Cultural Studies* 23, no.6 (2020): 1069-1076.

<sup>184</sup> Kennedy, “If the Rise of the TikTok Dance,” 1073.

<sup>185</sup> Kyra Gaunt, “Youtube, Twerking, and You: Context Collapse and the Handheld Copresence of Black Girls and Miley Cyrus,” in *Voicing Girlhood in Popular Music: Performance, Authority, Authenticity*, eds. Jacqueline Warwick and Allison Adrian (New York: Taylor and Francis, 2016), 208-232.

<sup>186</sup> Juliana Menasce Horowitz, “Lower-Income Parents Most Concerned About Their Children Falling Behind Amid Covid-19 School Closures,” *Pew Research Center*, last modified April, 15, 2020, <https://www.pewresearch.org/fact-tank/2020/04/15/lower-income-parents-most-concerned-about-their-children-falling-behind-amid-covid-19-school-closures/>.

<sup>187</sup> Andrew Bacher-Hicks, Joshua Goodman, and Christine Mulhern, “Inequality in Household Adaptation to Schooling Shocks: Covid-Induced Online Learning Engagement in Real Time,” *Journal of Public Economics* 193 (2021): 1-17.

<sup>188</sup> Horowitz, “Lower-Income Parents”.

<sup>189</sup> Nat Malkus, “School Districts’ Remote-Learning Plans May Widen Student Achievement Gap,” *Education Next*, last modified June 16, 2020, <https://www.educationnext.org/school-districts-remote-learning-plans-may-widen-student-achievement-gap-only-20-percent-meet-standards/>.

<sup>190</sup> Ben Williamson, Rebecca Eynon, and John Potter, “Pandemic Politics, Pedagogies and Practices: Digital Technologies and Distance Education During the Coronavirus Emergency,” *Learning, Media and Technology* 45, no.2 (2020): 111.

<sup>191</sup> Adam Roth, Niroshnee Ranjan, Grace King, Shamim Homayun, Rebecca Hendershott, and Simone Dennis, “Zooming in on Covid: The Intimacies of Screens, Homes, and Learning Hierarchies,” *Anthropology in Action* 28, no.1 (2021): 69.

<sup>192</sup> Roth et al., “Zooming in on Covid”.

<sup>193</sup> Roth et al., “Zooming in on Covid”.

<sup>194</sup> Michael Wesch, “Youtube and You: Experiences of Self-Awareness in the Context Collapse of the Recording Webcam,” *Explorations in Media Ecology* (2009): 19-34.

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<sup>195</sup> Joan Abbot-Chapman and Margaret Robertson, "Adolescents' Favourite Places: Redefining the Boundaries Between Public and Private Space," *Space and Culture* 12, no.4: 426.

<sup>196</sup> Betsy Rymes, "Contrasting Zones of Comfortable Competence: Popular Culture in a Phonics Lesson," *Linguistics & Education*, 14 (2004): 321–335.

<sup>197</sup> Anne Haas Dyson, *Writing Superheroes: Contemporary Childhood, Popular Culture, and Classroom Literacy*, (New York: Teachers College Press, 1997).

<sup>198</sup> Rebekah Willett, "Children's Media-referenced Games: The Lived Culture of Consumer Texts on a School Playground." *Children & Society* 29, no. 5 (2014): 410–20.

<sup>199</sup> Mizuko Ito, *Engineering Play: A Cultural History of Children's Software* (Cambridge: MIT Press, 2009).

<sup>200</sup> This is not to say that popular culture and coding don't exist together, as the previous chapter outlines. Coding projects related to media culture are most often company-sponsored coding platforms like Nickelodeon's "Code a Character" or Disney's various coding games featuring sprites like Moana and Anna. Overwhelmingly, these platforms and programs do not ask users to code in the same way as Scratch instead focusing on following directions over creative play.

<sup>201</sup> Instead of media and consumer culture, interest in computer programming has been broadly understood as connecting to a desire to help people, particularly for girls. This is reflected not only in literature about gender gaps in education, but also in the assignments at Silverstream where students are often asked to create projects that are helpful or useful. The results are things like a website of disability resources, scheduling apps, and public service announcements related to recycling. Projects like websites detailing the best ski locations and games related to Marvel films, while not graded poorly, were met with less excitement from the instructor.

<sup>202</sup> Mizuko Ito, Crystle Martin, Rachel Cody Pfister, Matthew H. Rafalow, Katie Salen, and Amanda Wortman, *Affinity Online: How Connection and Shared Interest Fuel Learning* (New York: New York University Press, 2013): 3.

<sup>203</sup> Seymour Papert, *Mindstorms: Children, Computers, and Powerful Ideas* (New York: Basic Books, 1993): 21.

<sup>204</sup> Ito et al., *Affinity Online*, 20.

<sup>205</sup> Ito et al., *Affinity Online*, 167.

<sup>206</sup> The school website boasts that there is an average class size of twelve students, a 6:1 student to teacher ratio, and a 100% college attendance rate.

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<sup>207</sup> Betsy Rymes, "Classroom Discourse Analysis: A Focus on Communicative Repertoires," in *Sociolinguistics and Language Education*, eds. N. Hornberger and S. McKay (London: Multilingual Matters, 2010).

<sup>208</sup> Rymes, "Contrasting Zones," 327.

<sup>209</sup> Ana Cristina Ostermann and Deborah Keller-Cohen, "Good Girls Go to Heaven; Bad Girls...? Learn to be Good: Quizzes in American and Brazilian Teenage Girls' Magazines," *Discourse and Society* 9, no.4 (1998): 531-558.

<sup>210</sup> Stephanie N. Berberick and Matthew P. McAllister, "Online Quizzes as Viral, Consumption-Based Identities," *International Journal of Communication* 10 (2016): 3424.

<sup>211</sup> Berberick and McAllister, "Online Quizzes," 3424.

<sup>212</sup> This is not due to a lack of exposure. The teacher had spent lunches with the students throughout the semester where Avatar was on the television, but she had not dedicated the characters to memory in the same way.

<sup>213</sup> While the teacher briefly directs their code fixes at the beginning of the session, her voice is quickly drowned out by the other conversation in the room Emily's partner proceeds to fix their program alone. This is not to mention that the program was almost complete upon sharing.

<sup>214</sup> Rymes, "Classroom Discourse Analysis," 538.

<sup>215</sup> In other schools around the area, computer science dropped altogether when the switch was made to virtual learning in the spring of 2020 because of access to technology and computer instructors needing to facilitate an overall move to online learning.

<sup>216</sup> In this class, as with girls' coding education more broadly, projects are understood as being appealing to girls if they are tied to social good.

<sup>217</sup> Meredith Bak, *Playful Visions: Optical Toys and the Emergence of Children's Media Culture* (Cambridge: MIT Press, 2020), 48.

<sup>218</sup> Amy Ogata, *Designing the Creative Child: Playthings and Places in Midcentury America* (Minneapolis: University of Minnesota Press, 2013), 2.

<sup>219</sup> Katherine Bond-Stockton, *The Queer Child or Growing Sideways in the Twentieth Century* (Durham: Duke University Press, 2009), 16.

<sup>220</sup> Meredith Bak gives the example of a child training their eyes with optical toys in order to understand how perception works. Even here, learning is positioned against an un-learned adult (someone who does not understand optical tricks and illusions). While the child being tricked might be delightful, the goal of training vision ensures that the child will not grow up to be an easily duped adult.

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<sup>221</sup> Megan Silverstream, “Computer Science for All,” January 30, 2016. <https://obamawhitehouse.archives.gov/blog/2016/01/30/computer-science-all>

<sup>222</sup> Silverstream, “Computer Science for All.”

<sup>223</sup> We can see similar work happening with organizations like Girls Who Code in their promise to fix the gender gap in entry-level tech jobs by 2030 (originally 2020) or Black Girls Code by 2040.

<sup>224</sup> Association of Computing Machinery and Computer Science Teachers Association. (2010). *Running on Empty: The Failure to Teach K-12 Computer Science in the Digital Age*, 26.

<sup>225</sup> While writing this dissertation chapter (fall 2021), Facebook continues to be in the news for unethical practices around hate speech, spreading false news, and inciting violence after the release of the Facebook papers.

<sup>226</sup> Rebekah Sheldon, *The Child to Come: Life After the Human Catastrophe* (Minneapolis: University of Minnesota Press, 2016), 2.

<sup>227</sup> J. Gill-Peterson, “The Value of the Future: The Child as Human Capital and the Neoliberal Labor of Race,” *WSQ: Women’s Studies Quarterly* 43, no. 1 and 2 (2015).

<sup>228</sup> Sheldon, *The Child to Come*.

<sup>229</sup> Lee Edelman, *No Future: Queer Theory and the Death Drive* (Durham: Duke University Press, 2004).

<sup>230</sup> Anita Harris, *Future Girl* (London: Routledge, 2004), 18.

<sup>231</sup> Ibid.

<sup>232</sup> Thinkable. <https://thinkable.com/#/>

<sup>233</sup> Andrea Gonzalez and Sophie Houser developed the game “Tampon Run” during their summer at a Girls Who Code Camp. The game went viral and the girls were invited to retool their game for a wider audience. The story is featured in their book *Girl Code: Gaming, Going Viral, and Getting it Done*.

<sup>234</sup> Michal Armoni, Orni Meerbaum-Salant, and Mordechai Ben-Ari, “From Scratch to ‘Real’ Programming,” *ACM Transactions on Computing Education* 14, no. 4 (2015), 12.

<sup>235</sup> Mitchell Resnick et al. “Scratch: Programming for All,” *Communications of the ACM* 52, no. 1 (2009), 62.

<sup>236</sup> Ogata, *Designing the Creative Child*, xv.



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<sup>237</sup> Natalia Cecire, “Apple’s Modernism, Google’s Modernism: Some Reflections on Alphabet, Inc. and a Suggestions that Modernist Architect Adolf Loos Would be Totally into Soylent,” August 11, 2015. <https://natalia.cecire.org/research/apples-modernism-googles-modernism-some-reflections-on-alphabet-inc-and-a-suggestion-that-modernist-architect-adolf-loos-would-be-totally-into-soylent/>

<sup>238</sup>Ibid.

<sup>239</sup> Sarah Banet-Weiser, *Authentic™ The Politics of Ambivalence in a Brand Culture* (New York: New York University Press, 2012), 55.

<sup>240</sup> Seymour Papert, *Mindstorms: Children, Computers, and Powerful Ideas* (New York: Basic Books, 1993), 58.

<sup>241</sup> Annette Vee, *Coding Literacy: How Computer Programming is Changing Writing* (Cambridge: MIT Press, 2017).

<sup>242</sup> About, Mojo Supermarket, accessed April 5, 2022, <https://mojosuper.market/about/>.

<sup>243</sup> Girls Who Code, “Girls Who Code Campaign Empowers Young Women to ‘Make That Change’ by Pursuing Careers in Tech,” news release, October 11, 2021, <https://girlswhocode.com/news/girls-who-code-campaign-empowers-young-women-to-make-that-change-by-pursuing-careers-in-tech>.

<sup>244</sup> Sarah Banet-Weiser, *Kids Rule! Nickelodeon and Consumer Citizenship* (Durham: Duke University Press, 2007), 145.

<sup>245</sup> Coined in the late 1990s, hip-hop feminism as outlined by Joan Morgan inhabits the gray areas of being a Black woman. It imagines a feminism that overlaps and finds truth in meeting of contradictory voices like hip-hop more broadly to help one confront the things they’d rather not. It makes space for feminist ideology that includes the joy of being a Black woman, even when it pushes against historic (white) forms of feminist ideology.

<sup>246</sup> Girls Who Code has consistently relied on hip hop artists in their campaigns. Prior to Doja Cat, Lizzo helped to produce the visual album “Sisterh>>d” which featured girls and artists.

<sup>247</sup> Anita Lavakumar (@CSatBPS), “Great idea, but how in the world are the sexual images and the lyrics "let me be your woman" supposed to empower women?? What age group is this level of coding and video aimed towards? Please rethink the message, @GirlsWhoCode. Love your stuff, usually - but you missed the mark,” Twitter, December 2, 2021, <https://twitter.com/CSatBPS/status/1466813656948166665>.

<sup>248</sup> This seems to be a go to move for Girls Who Code, one of the other moments being their partnership with American Girl Doll to create an arcade-going and game creating student named Courtney in 2020.

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<sup>249</sup> EJ Dickinson, “Doja Cat DGAF If You Read This: Or, at Least, That’s What She Want you to Think,” *Rolling Stone* (December 16, 2021), <https://www.rollingstone.com/music/music-features/doja-cat-planet-her-tour-mooo-dr-luke-say-so-1269896/>.

<sup>250</sup> Doja Cat actually borrowed the TikTok choreography for her official music video and included Sharpe in the video itself. It is unclear if Sharpe was paid for the work or if the cameo was payment.

<sup>251</sup> The Silhouette Challenge features a quick transition from the creator being fully clothed to undressed in front of a red lit door. The gay reveal features a slight wrist flick on the note of the chorus of “Kiss me More”. According to various statistics, users between the age of 10-19 made up from about 25-32.5% of TikTok users in the United States in 2021, making them the most highly present age on the platform. (According to Influencer Marketing Hub, Statista, and Walla Room Media.) This is the same age demographic that is the target of many of Girls Who Code’s programs (particularly summer camps, after school programs, and beginning university clubs).

<sup>252</sup> Melanie Kennedy, “If the Rise of the TikTok Dance and e-girl Aesthetic has Taught us Anything, It’s that Teenage Girls Rule the Internet Right Now’: TikTok Celebrity, Girls and the Coronavirus Crisis,” *European Journal of Cultural Studies* 23, no.6 (2020), 1070.

<sup>253</sup> Kennedy, “If the Rise of the TikTok Dance.”

<sup>254</sup> Dickinson, “Doja Cat DGAF.”

<sup>255</sup> Doja Cat’s authenticity has garnered her media partnerships that make use of and uphold this version of the star. For instance, during the 2022 Super Bowl, Doja Cat and Taco Bell joined forces to reveal an “epic story of liberation” as a clown Doja Cat escapes from clown school to “live más.” Doja Cat was chosen because she is “the personification of a generation that praises authenticity.” The “Woman” music video also seems to be an unabashed commercial for both Skyy Vodka and Beats by Dre.

<sup>256</sup> Cat Zhang, “The Mystery of Doja Cat’s Unimpeachable TikTok Reign,” *Pitchfork* (May 18, 2020), <https://pitchfork.com/thepitch/the-mystery-of-doja-cats-unimpeachable-tiktok-reign/>.

<sup>257</sup> Girls Who Code, “Doja Cat and Girls Who Code Create ‘DojaCode’ Interactive Music Video Experience for ‘Woman,’” accessed April 5, 2022, <https://girlswhocode.com/news/doja-cat-and-girls-who-code-create-doja-code-interactive-music-video-experience-for-woman>.

<sup>258</sup> Meredith Bak, “Building Blocks of the Imagination: Children, Creativity, and the Limits of Disney Infinity,” *The Velvet Light Trap* 78, no.78 (2016), 61.

<sup>259</sup> Yuzuapplebanana, “Doja Cat – Woman (8D Audio) 360°,” *Scratch* (game), October 19, 2021, <https://scratch.mit.edu/projects/586560219/>.

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<sup>260</sup> RosieLovesArt, “Candy by Doja Cat -meme?-,” *Scratch* (game), January 17, 2020, <https://scratch.mit.edu/projects/360496263/>.

<sup>261</sup> Queen2010, “Say So Slowed Down to Perfection | Doja Cat | Clean,” *Scratch* (game), May 26, 2020, <https://scratch.mit.edu/projects/399259041/>.

<sup>262</sup> ap178076, “Popular Doja Cat,” *Scratch* (game), October 21, 2020, <https://scratch.mit.edu/projects/400758087/>.

<sup>263</sup> Sav\_y, “doja cat candy,” *Scratch* (game), March 20, 2020, <https://scratch.mit.edu/projects/378180213/>.

<sup>264</sup> Nucleonn, “say so !! meme,” *Scratch* (game), October 5, 2021, <https://scratch.mit.edu/projects/565507353/>.

<sup>265</sup> Lisabc, “Say So – original code animation meme,” *Scratch* (game), March 6, 2021, <https://scratch.mit.edu/projects/494192087/>.

<sup>266</sup> Pixilart is a website based on community (like Scratch) where users create, share, and network through art.

<sup>267</sup> Allison Pugh, *Longing and Belonging: Parents, Children, and Consumer Culture* (Oakland: University of California Press, 2009).