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Everything Old Is New Again: A Comparison of Mid-Century American EDP Schools and Contemporary Coding Bootcamps

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Running Header: Everything Old Is New Again

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Abstract: Over the course of the past decade, coding has been positioned as a silver-bullet solution for several key issues in the U.S. tech industry. The coding bootcamps that have sprung up in response to the contemporary coding obsession may appear innovative, but they bear a remarkable resemblance to the Electronic Programming Data Schools (EDP schools) that proliferated during the "software crisis" of the 1960s and 70s. By comparing the current coding craze and coding bootcamps to the software crisis and EDP schools, this paper looks to not only draw attention to the remarkable similarities between the two periods and institutional forms, but to also identify specific qualities and problematic practices of EDP schools that threaten to repeat themselves with coding bootcamps. It then concludes with some reflections about why certain "forgotten" histories of computing are more relevant now than ever.

Keywords: coding bootcamps, computing education, learning to code

Over the course of the past decade, coding, or computer programming, has been positioned as a silver-bullet solution to three interrelated issues in the tech industry:[1] a pervasive "skills gap" between workers' proficiencies and the needs of tech companies, social mobility for marginalized groups, and the lack of women and "underrepresented minorities" in the computing workforce.[2] With the rallying cry "everyone can code", coding enthusiasts insist that learning programming skills is the gateway to a bright future for anyone with the desire to learn. In response to this discourse, an entire industry that is comprised of organizations offering intensive "accelerated learning programs" focused on computational skills has developed and grown exponentially since 2012;[3] in 2020, US and Canadian coding schools took in $349 million in gross revenue and graduated almost 25,000 students.[4]

The bootcamps and schools that have sprung up in response to the contemporary coding obsession may appear innovative, and many coding schools promote themselves with the claim that they offer a new approach to a broken system of higher education. However, despite coding schools' apparent novelty, it is not the first time that there has been a computing education boom that relied heavily on for-profit organizations offering short-term programming training to marginalized groups especially. From the mid-1960s to the mid-1970s, during a period that Ensmenger has characterized as the "software crisis",[5] skyrocketing demand for computer programming personnel resulted in an explosion of computer programming training programs, the majority of which were offered by for-profit vocational schools called Electronic Data Programming Schools, or EDP schools.

This paper draws a comparison between the current coding craze and the software crisis with the goal of illustrating some key similarities between those periods. Examining the rise and fall of EDP schools offers an important historical corollary to the current debate about coding and coding schools that is instructive in a variety of ways. Much like today's coding schools, a main factor driving the explosion of American EDP schools in the 1960s and 1970s was the perception of a programming labor crisis combined with a discourse that positioned computer programming as accessible to anyone who was interested in a well-paid job or had certain basic aptitudes. Furthermore, in a manner that closely presages the contemporary discourse about coding, programming was often positioned as a "fix" for labor exclusion and a gateway to social mobility for a variety of minoritized groups, including women, Black people, the disabled, the incarcerated, and the economically marginalized. As a 1967 New York Times article noted,

"people of all ages, creeds, colors and both sexes have seen computer programing [*sic*] as a doorway to opportunity or an exit from drudgery".[6] Just like coding bootcamps, EDP schools drew heavily on this narrative to recruit students, focusing particularly on women, people of color, and the working class. Unfortunately for many EDP school graduates, the bright futures promised by the acquisition of technical skill often failed to materialize, whether the culprit was poor-quality instruction, bias and inequality, or blatant fraud.

By comparing the current coding craze and coding bootcamps to the software crisis and EDP schools, this paper looks to not only draw attention to the remarkable similarities between the two periods and institutional forms, but to also identify specific qualities and problematic practices of EDP schools that threaten to repeat themselves with coding bootcamps. After reviewing the methodologies used in this analysis, this paper will then compare three specific areas that illustrate the consistencies between the software crisis and the current moment: the computing discourses in circulation, the promises and overtures made by EDP schools and coding bootcamps, and the failure of both EDP schools and (some) coding bootcamps to come good on those promises and fulfil their obligations to their students. It will conclude with some reflections about the lessons that the past has to offer the present, and why certain "forgotten" histories of computing are more relevant now than ever.

Method[7]

The comparative analysis that follows combines an evaluation of historical sources dating from the mid 1960s to the late 1970s with a multiplatform discourse analysis of materials concerning coding and coding bootcamps from 2011- 2021.

Constructing a history of coding schools was something of a challenge because unlike dominant 20th century computing companies that have extensive archives (e.g., IBM), most of the dominant EDP schools ceased to function in the late 1970s; furthermore, many of them were fly-by-night operations whose materials would not have been saved for posterity. Given that traditional archival material was not a feasible option, I followed the lead of Ensmenger and Abbate who touched on EDP schools in their work by referencing historical trade press;[8] furthermore, Ensmenger's inclusion of cartoons from mainstream American newspapers and magazines indicated that there was a mainstream press discourse about EDP schools taking place

in the late 1960s and early 1970s. Thanks to the "digital turn" in newspaper archives and the "digitized turn" in archives more generally,[9] I was able to gather materials from two digital databases—the ProQuest Historical Newspapers Database and the Internet Archive—in order to construct a history of EDP schools. I found these materials through a combination of "bottom up" keyword searches using terms related to computer programming, electronic data processing, and EDP schools; [10] I also used a "snowball" approach of finding sources mentioned or cited in other materials. My search began in the late 1950s and extended through the mid-1980s, with a focus on the software crisis time period (early 1960s to late 1970s). The historical corpus contained 257 articles from a range of mainstream newspapers and periodicals, historically Black newspapers, and computing trade press. It also contained several government reports as well as promotional materials from an EDP school.

For the contemporary discourse analysis on coding and coding bootcamps, I used Lawson's method of multiplatform discourse analysis, which traces discourse across platforms and actors and focuses on the most salient features of a particular discourse or controversy instead of attempting to conduct "an exhaustive account of all media objects".[11] Because of the networked nature of digital information environments, citations and evidence often took form through hyperlinked articles and sources, offering a wealth of additional material. Following Braithwaite, I took a "snowball" approach to this data,[12] following links to a wide variety of sources that included articles in *Bloomberg, Business Insider, Forbes, Inc., Life Hacker, Newsweek, Recode, Slate, Tech Republic, TIME, USA Today, Valleywag, Venture Beat* and *The Wall Street Journal* among others*;* legislative documentation and government reports; public-facing materials released by tech companies and coding organizations, including websites, research reports, blog posts, press releases, tweets, YouTube videos, and more. My final data set included over 200 media objects dating from 2011-2021.

In both the historical analysis and the contemporary discourse analysis, I triangulated the corpus materials in order to understand how computing was constructed and interpreted, who the target audience of the discourses were, how training organizations were discussed, who benefitted from them, who was promoting them, and to a limited extent, how they operated. In doing so, I looked to examine the similarities within these areas across time, with a particular view to understanding what lessons the past has to offer the present.

Mid-Century and Contemporary Computing Discourses

One of the primary points of comparison between the software crisis era and the current moment concerns the remarkable similarity between the mainstream computing discourses that were/are in circulation at both junctures. Historically and contemporarily, these discourses respond to a perceived "crisis" of programming/coding talent by positioning computing skills and careers as "golden opportunities" that are exciting cutting edge but also accessible, with low barriers to entry. The demand for programming/coding talent combined with the purported accessibility of computing also results in a social change narrative in both discourses, with computing framed as a facilitator of socioeconomic mobility amongst marginalized groups that also addresses racial and gender inequalities in the labor market.

The Software Crisis Discourse

Starting in the mid-1950s, the nascent computer industry collectively came to the realization that the availability of quality, functioning software was essential to the expansion of commercial computing and that there was a perceived dearth of qualified computer programmers available to create this software, a state of affairs that Ensmenger has termed the "software crisis".[13] As computing moved from primarily scientific and military uses to a more commercial focus throughout the 1950s and into the 1960s, the demand for computer programmers skyrocketed, and the difficulty of finding appropriately trained employees to fill these roles caused corporate managers, academic computer scientists, and government officials to "release ominous warnings about the desperate state of the software industry with almost ritualistic regularity".[14] Despite the proliferation of academic and corporate training programs that aimed to alleviate the programming labor crisis, demand continued to outpace training efforts.[15]

By the late 1960s, computer industry, business, and popular press outlets were breathlessly reporting on the labor crisis in the programming industry.[16] The exact number of programmers needed varied across press and industry reports— ranging from 300,000 by 1970 to 1 million by 1975;[17] despite these discrepancies, the overall message was that "if you select such a career, there won't be any shortage of employment for you".[18] Furthermore, reports of the demand for computing labor were often accompanied by descriptions of higher-than-average

salaries starting at $5,500 (approximately $49,000 in 2021 dollars) for entry-level positions and exceeding $20,000 (approximately $179,000 in 2021 dollars) for managerial positions.[19] A 1968 Newsweek cover feature on the computing industry exemplified this kind of coverage, stating that

> As industry marches toward the 1970s, there appears to be but one nut that will resist cracking: programming. Programmers are in short supply…60,000 more are needed… this despite salaries that range from an average $175 weekly for a junior systems analyst to a high of $600 weekly for data processing managers.[20]

Another common theme within this coverage was that computing was broadly accessible as a career path. A 1965 front-page *Wall Street Journal* article claimed that "Most anybody can become a programmer",[21] and this portrayal of the computing industry's openness (if not inclusivity) was further reinforced by frequent reportage about the success that people from marginalized groups found within the computing industry. From the early 1960s through to the mid 1970s, both mainstream and niche outlets enthusiastically described how women and members of minoritized racial groups found success in computing.[22] A 1967 article in Cosmopolitan described women as "naturals" at programming, while a 1964 *New York Times* article on women IBM employees proclaimed that "beauty and brains mix well in this work".[23] Within these articles, the sheer demand for programming talent was seen to override entrenched biases—such as sexism and racism—that would otherwise act as gatekeeping forces to a lucrative industry. A 1964 front-page article in the *New York Times* titled "Computer Seen As Boon to Negro" made this argument explicitly, stating, "computer people are in short supply, and if a company needs a good programer [*sic*] they don't care what his race, creed or color are as long as he can do the job."[24] A 1970 article in *Essence* similarly argued that computing offered "golden opportunities for Black women", arguing that "since the industry is comparatively new…and is suffering from a manpower shortage, it has grown up minus many of the racial and chauvinistic biases rampant in other businesses."[25] As will be discussed later in this article, the veracity of these claims is certainly questionable, but the portrayal of computing within the mainstream press at the time was often along these lines.

Much of the coverage about the software crisis also reported on the training programs available to would-be programmers. A consistent thread throughout articles focused on computing's accessibility was that computing careers were available to those with a high school degree, and while programs offering instruction in "the computer sciences" at elite universities got the occasional mention,[26] most coverage was devoted to training programs geared toward career-changers with a high school degree or marginalized groups facing exclusion from the labor market. Both mainstream and niche press outlets positioned computing careers as pathways to social inclusion and/or mobility, and training programs as "a passport to a better job and a guarantee of a sure future."[27] While some of these articles mentioned the variable quality of computer training programs,[28] much of this coverage is laudatory, with dozens of articles from the late 1960s onward celebrating programs for "ghetto" residents,[29] welfare recipients,[30] the disabled,[31] the incarcerated,[32] and the "hard core" or long-term unemployed.[33] The purported accessibility of computing to traditionally excluded populations suggested to both these and non-excluded groups that computing careers were there for the taking. As will be discussed shortly, this discourse largely laid the groundwork for the success of EDP schools, many of whom drew upon key points of the discourse to entice students to enroll.

The Coding Fetish Discourse

The discourse surrounding the programming labor shortage of the 1960s centered around three key beliefs about programming jobs: how available they were, how lucrative they were, and how accessible they were, even for minoritized populations. In the current moment, there is another, remarkably comparable discourse that is motivated by similar tenets. This wide-ranging discourse, which I have previously termed the *coding fetish discourse*, suggests that "anyone can code", and offers three interrelated rationales as to why "everyone" should do so.[34] The first rationale centers on economic arguments, focused on jobs and salaries that will facilitate social mobility and address a purported "skills gap" in the tech industry; the second rationale positions coding as a solution for inequalities within the tech industry, particularly concerning women and "underrepresented minorities"; and the third rationale (which is primarily, but not exclusively, concerned with children) focuses on autonomy and control in the face of an increasingly digital world and the perceived threats associated with automation/AI. While the coding fetish discourse

frames coding as a novel solution for of-the-moment problems, a comparison with the software crisis discourse of the 1960s and 1970s illustrates that current rhetoric "[recapitulates] earlier framings of computing skill" in remarkably similar ways.[35]

Like the software crisis discourse, the coding fetish discourse hinges on an argument that American workers lack the appropriate skills to fill the large number of tech industry jobs available; this purported crisis has been referred to as the "skills gap".[36] The primary claim in relation to the skills gap is that there are (or will be) a large number of unfilled jobs in the tech sector. However, the exact number of these jobs and the date they will come into existence is a matter of some confusion, with various sources claiming that there will be 500,000, 1 million, or 1.7 million unfilled computing jobs in the United States by 2020-2022.[37] Much like the discourse in the 1960s and 70s, the assumption undergirding the contemporary "skills gap" is that filling job vacancies in the tech sector is simply a straightforward matter of skills training and matching workers with the necessary skills to open positions—for which, as a 2015 *New York Times* article about coding bootcamps asserted, "companies cannot hire fast enough".[38] As such, unfilled tech jobs are framed within the coding fetish discourse as a matter of "opportunity" that is predominantly economic in nature. In his launch speech for government employment initiative TechHire in 2015, President Obama said, "When these tech jobs go unfilled, it's a missed opportunity for the workers, but it's also a missed opportunity for your city, your community, your county, your state, and our nation."[39]

Similar to the software crisis discourse in the 1960s and 70s, the coding fetish discourse presents learning to code as a golden opportunity to enter into an exciting, in-demand, and well-remunerated field. Discussions of tech careers within the coding fetish discourse regularly tout enviably high salaries that can reach as high as $134,000 in major cities, with the insinuation that such jobs are readily available for those with the right skills.[40] In a 2012 *TIME* op-ed, Codecademy co-founder Zach Sims exclaimed that "learning programming is not just an easy way to build your own creations and companies—it's also one of the best routes to securing a high-paying job";[41] a 2014 *TIME* article about coding organization #YesWeCode similarly described computer science as "one of the fastest-growing, highest-paying career paths in America".[42] It is largely because of these high salaries that learning to code is framed within the coding fetish discourse as "economic empowerment" and a pathway to social mobility for

economically disadvantaged groups— or in President Obama's words, a "ticket into the middle class".[43]

While this "ticket into the middle class" is ostensibly available to anyone with the "right" skills, much like the software crisis discourse, coding is represented in the coding fetish discourse as a particularly ripe opportunity for groups that are traditionally excluded from technical professions and spaces, including women,[44] girls,[45] people of color,[46] the underemployed,[47] the incarcerated,[48] and blue collar workers.[49] The overall lack of diversity within the tech industry is a complex problem that has been broadly acknowledged for decades;[50] however, despite the fact that there are a series of factors that contribute to the lack of women and minoritized racial groups in American tech companies, the coding fetish discourse primarily frames the issue as a problem of supply and demand, with not enough women and people of color with the necessary skills to get hired into technical roles. As such, the coding fetish discourse positions learning to code as the way for traditionally excluded groups such as women, people of color, and immigrants to benefit handsomely from the coding gold rush. A 2017 *Glamour* op-ed titled "I'm A Woman Who Learned To Code and, Honestly, It Changed My Life" exemplifies this type of coverage, with self-described "poor kid" and programmer Meg Adams writing, "if you want a new path or new opportunity, consider coding. Thanks to coding, at 28, now I do have the life I always wanted."[51]

Much like the software crisis discourse, the benefits and accessibility of computing careers are often discussed within the coding fetish discourse alongside various options for coding training for adults. Both historically and contemporarily, there were and are a range of non-profit and for-profit training options, including university, community college, and community-based courses. However, both now and during the software crisis, for-profit computing courses typically receive(d) the most attention in the press. And, perhaps unsurprisingly given the similarities in how computing careers are discussed within both discourses, how for-profit computing courses past and present sell their offerings are remarkably similar.

"It's a Life-Changing Experience": The Enticements of EDP Schools and Coding Bootcamps

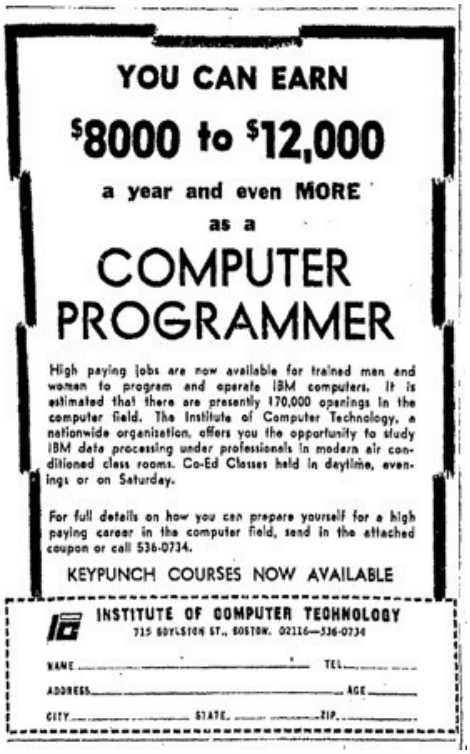
Both the software crisis discourse and the coding fetish discourse promote the view that an insatiable demand for computing talent results in the reduction and/or elimination of traditional barriers to entry for highly paid careers, with advanced educational requirements and structural biases such as racism and sexism supposedly being rendered irrelevant. The sales pitches for EDP schools and coding bootcamps draw heavily on these narratives, suggesting that well-paid and prestigious corporate jobs are available for the taking after just a few months of in-demand (but simultaneously accessible) training. Although this compelling image is certainly alluring to a broad audience, both EDP school and coding bootcamp sales pitches specifically address members of marginalized groups, selling dreams of social mobility and gender and racial inclusion. Promoted within media coverage and by the organizations themselves, EDP schools and coding bootcamps make many of the same promises to the same groups of people across the span of 50 years.

"Computer School Come-Ons"

The rise of EDP schools in the mid-to-late 1960s is deeply imbricated with the discourse about the software crisis that was circulating in both industry and popular press at the time. Indeed, the programming labor crisis was a key selling point for many EDP schools; in an undercover news report from 1970, a journalist posing as a prospective student was shown articles from Reader's Digest and Time Magazine about the software crisis as evidence that he would receive a job after finishing the course.[52] These bombastic advertisements and sales pitches— known colloquially as "computer school come-ons"—were ubiquitous in Classified sections of local newspapers and in the pages of national magazines.[53] Parroting the key talking points of the software crisis discourse, these ads promised well-paid, upwardly mobile careers that were accessible to anyone with a high school degree and a desire to learn. "YOU CAN EARN $8,000 to $12,000 a year and even MORE as a COMPUTER PROGRAMMER" barked a typical ad for the Institute of Computer Technology (see Figure 1). "It is estimated that there are presently 170,000 openings in the computer field". EDP school ads typically interpellated a non-technical subject with uninspiring or unfulfilling career prospects, demystifying computer programming while simultaneously and presenting it as an exciting and challenging—but accessible—career path. A 1968 ad for the Electronic Computer Programming Institute (ECPI)

exemplifies this; explaining that computing doesn't require anything but "a high school education and some training", the ad suggests that for those who are prepared to take a leap of faith (and finances), the rewards could be great:

> It's not easy, mind you. And it's not cheap. But when you've earned your ECPI diploma, you'll be in a position to command a highly respectable salary with even a higher potential. And you'll be in a field where the job comes looking for you. (see Figure 2)



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a year and even MORE

as a

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For full details on how you can prepare yourself for a high paying career in the computer field, send in the attached coupon or call 536-0734.

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INSTITUTE OF COMPUTER TECHNOLOGY
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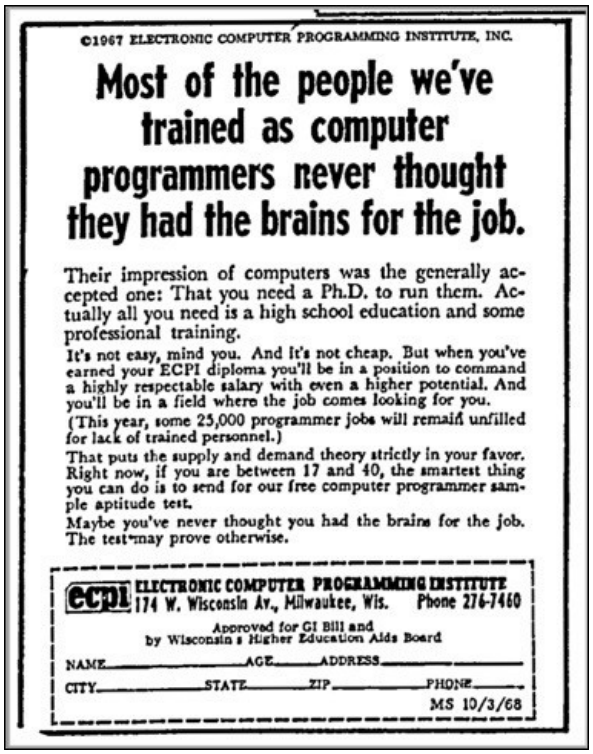

©1967 ELECTRONIC COMPUTER PROGRAMMING INSTITUTE, INC.

Most of the people we've trained as computer programmers never thought they had the brains for the job.

Their impression of computers was the generally accepted one: That you need a Ph.D. to run them. Actually all you need is a high school education and some professional training.

It's not easy, mind you. And it's not cheap. But when you've earned your ECPI diploma you'll be in a position to command a highly respectable salary with even a higher potential. And you'll be in a field where the job comes looking for you.

(This year, some 25,000 programmer jobs will remain unfilled for lack of trained personnel.)

That puts the supply and demand theory strictly in your favor. Right now, if you are between 17 and 40, the smartest thing you can do is to send for our free computer programmer sample aptitude test.

Maybe you've never thought you had the brains for the job. The test may prove otherwise.

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MS 10/3/68

Figure 1 (L): Institute of Computer Technology ad from the Boston Globe, Jan. 28, 1969
Figure 2 (R): ECPI ad from the Milwaukee Star, Oct. 5, 1968

Prospective students who were convinced to send away for an EDP school sales kit in the mid-to-late 1960s were presented with a sales pitch that proffered a vision of computer programming as a trailblazing career path with endless opportunities across a variety of industries. A 1966 booklet from ECPI featured large, glossy pictures of well-groomed men and women in professional clothing working on or next to computer equipment, portraying a fantasy of a futuristic workplace filled with workers unconcerned about the looming threat of

automation. Despite this leading-edge portrayal, computer programming was also represented as accessible to people from all walks of life. This characterization is not at all subtle, with a box on the bottom of the third page of the booklet declaring "NO RIGID EDUCATIONAL REQUIREMENTS OR MATH BACKGROUND NECESSARY" (see Figure 3).

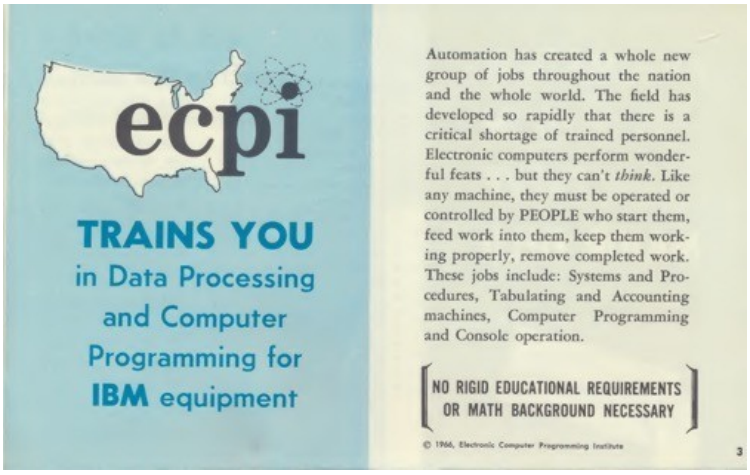

Figure 3: A page from from an ECPI recruitment booklet, 1966

EDP school leaders characterized their schools as "an essential part of the supply chain for computer personnel" that offered curricula, equipment, and training that was more up-to-date and aligned with the needs of business than the "outdated basics" offered at universities.[54] The ECPI sales pitch relies heavily on this framing, promising a rigorous curriculum shaped by corporate needs, instruction by industry leaders, and job placement at blue-chip companies. The booklet asserts that "a distinguished staff and faculty assures your SUCCESS," and lists a "few examples" of staff members who have worked at prestigious corporations, including Bell Labs, IBM, Honeywell, and General Electric (see Figure 4). A page toward the end of the booklet offers "a partial list of companies where our graduates work in responsible positions" across a variety of industries, including banking, publishing, telecommunications, manufacturing, retail, and consumer goods. These successes, the pamphlet suggests, are thanks to ECPI's "reputation for professionalism" and its free job placement assistance for graduates.

Figures 4-7: Pages from an ECPI recruitment booklet, 1966

The images featured in ECPI's recruitment materials make it clear who they are targeting. Throughout the sales booklet, images of women and people of color are regularly used to represent both the school's graduates and the programming profession more broadly. This begins on the cover of the booklet, which features photographs of a white man, two white women and a dark-skinned man inside the letters E, C, P, and I. Within the booklet, every page portraying computer workers features a photograph of either a woman or a person of color, and sometimes both at the same time (see Figure 5).[55] The presence of marginalized groups is particularly marked amongst the students chosen to illustrate the school's success in placing graduates in jobs (see Figure 6 and Figure 7). Out of 10 graduates featured, two were black men (Astley Johnson and Raymond Bernard, Jr.), two were white women (Eileen White and Olga Tarr), one was an Asian-American woman (Juliette Tang), and one was a black woman (Althea Moore). These images clearly interpellate a specifically racialized and gendered target audience, giving the

impression that these high-paying and futuristic careers were readily available to them with only a few months of straightforward training. Whether this impression was realistic, however, is another issue entirely. It was certainly true that women and Black people worked in computing during this time period;[56] however, the idea that computing was a field where anyone could enter and rise through the ranks was questionable. As will be discussed shortly, this claim was certainly challenged by alternative narratives that began to surface in the late 1960s and early 1970s.

"Build A Career You Love"

Just like the symbiotic relationship between the rise of EDP schools and the software crisis discourse, the rise of coding bootcamps is also imbricated with the coding fetish discourse.[57] Within the discourse, there is a strain of bootcamp coverage that features rags-to-riches stories where struggling people making subsistence wages attend a bootcamp and subsequently get hired into tech jobs at triple their previous salary or more. For the people featured in these articles, bootcamps are nothing short of a revelation, with many describing their experiences as life changing.[58] A 2015 article in *The New York Times* featured several such accounts, including a math major who went from making $20,000 a year waiting tables to making $100,000 a year as a software developer, an English major who became an IBM software engineer with a six-figure salary, and the barista from the lobby of a coding bootcamp who signed up for the course and got hired into a job making $80,000 a year after graduating.[59] Furthermore, many of these stories center people who are traditionally excluded from the tech industry, such as women, people of color, and immigrants. A 2015 article in the *Wall Street Journal*, for example, tells the story of Edgar Cordova, the 20-year-old son of a janitor who, after attending a coding bootcamp, got a job at a software development company in Colorado. "For the first time, I can afford the things I need," Cordova explained.[60]

Coding bootcamp sales pitches trade heavily on these success narratives, reporting high average salaries for graduates and even higher job placement rates. Celebrating their extensive "alumni networks" and featuring infographics filled with impressive statistics, coding bootcamp websites encourage prospective students to "Learn tech skills. Build a career you love".[61] Coding bootcamp promotional materials almost invariably feature enviable starting salaries and logos of

blue-chip corporations where their graduates have landed—Google, Facebook, PayPal, Visa, Amazon, Uber, American Express and more. As of June 2021, the website for Flatiron School touts an average starting salary of $75,000 for U.S. graduates and an 86% global job placement rate; Hackbright Academy reports an average starting salary of $88,000 and a 71% job placement rate; Hack Reactor proclaims an average starting salary of $75,000 and a 67% job placement rate; Fullstack Academy advertises a $80,000 average starting salary. Almost every bootcamp website features graduate "success stories", profiles of former attendees with full-time jobs at major tech companies like Etsy and Spotify. "Ironhack is not only a bootcamp; it's a life-changing experience and a family that will always be there for you", gushes Alvaro from Miami. "Fullstack was one of the best experiences of my life," enthuses Sean, who now works at Google.

Much like the claim that EDP schools offered more up-to-date curricula than universities, bootcamps are said to impart skills that are directly relevant to the immediate needs of employers, primarily due to the fact that the curricula for these programs are ostensibly developed in partnership with tech companies;[62] in comparison, computer science departments are said to be "10 years behind in a field that changes every 10 minutes".[63] Coding bootcamps are frequently framed as a way to "disrupt" higher education in the United States and address its purported failures;[64] unlike a university education that takes four or more years and can incur extensive student loan debt, coding bootcamps are said to take less time and be more financially accessible.[65] This financial accessibility is said to make bootcamps more appealing to underrepresented groups in tech and encourage more "diverse" candidates to sign up.

The "diversity" of coding bootcamps, particularly in comparison to traditional computing education pathways, is one of their key selling points. Bootcamps are often framed as a key solution for addressing the needs of the tech "pipeline";[66] this is because they are seen as having lower barriers to entry than conventional forms of engineering education.[67] A 2015 Fast Company article on women and bootcamps explained that unlike traditional forms of education, bootcamps have different admissions criteria: in an echo of the ECPI booklet, Startup Institute CEO Diane Hessan stated, "We don't have 'standard' prerequisites: special schools, degrees, ages, standardized testing, or even past careers. Bootcamps offer more of a meritocracy, and that attracts people of all kinds."[68] Flatiron School CEO Adam Enbar made a similar claim in a 2014 *New York Times* article; describing his selection process for the school's inaugural class, which

included a boxer, an investment banker, a professional poker player, and an NPR producer, Enbar explained, "We made it diverse, and they all got jobs."[69]

Figure 8 and Figure 9: Images from the Fullstack Academy (left) and Iron Hack (right) websites, 2021

For many bootcamps, "diversity" is a key selling point when it comes to companies hiring their graduates, and they often position themselves as sources of "hidden genius", particularly for programmers originating from "low opportunity communities".[70] Much like the ECPI booklet, bootcamp websites interpellate students from minoritized groups by promising "inclusive and diverse learning environments" and by showcasing imagery of multi-racial and multi-gendered adults in environments reminiscent of modern tech workplaces or startups (see Figures 8 and 9). Much like EDP school sales pitches, coding bootcamp websites and materials infer that high-paying, futuristic careers are available to anyone with the interest and desire for just a few months of straightforward training and the cost of tuition. However, as is the case with both EDP schools and coding bootcamps, the alluring vision on offer is often quite different from reality.

"Loose standards and shoddy business practices": The broken promises of EDP Schools and Coding Bootcamps

The appealing vision offered by both EDP schools and coding bootcamps suggests that accessible skills acquisition leads to socially mobile employment for anyone interested, but particularly groups traditionally excluded from white-collar technical fields. Unfortunately, EDP schools failed spectacularly to help its students turn this vision into reality due to a combination

of fraudulent practices, inferior quality training, poor reputations, and larger, structural biases that acted as gatekeeping mechanisms. While the story of coding bootcamps is still in the making, there are some marked similarities between EDP schools and coding bootcamps that offer cause for concern, particularly when it comes to cost, educational quality, reputational matters, false advertising, and regulatory issues.

"No EDP School Graduates"

By the mid-1960s, disturbing accounts about the exploitative practices of EDP schools began to appear in the press with alarming regularity. These articles acknowledged that some programs operated "on an honest basis",[71] and others and were "sincerely attempting to provide a good education".[72] Yet as William Raspberry wrote in The Washington Post,

> Other, less reputable outfits are flooding newspapers and magazines with attractive ads which promise $10,000-a-year jobs for the investment of perhaps $1,000 and a few months' training. The promise almost never materializes.[73]

In 1968, former EDP instructor Edward Markham published an article in trade magazine Datamation that offered a damning indictment of EDP schools overall, describing poorly trained staff, insufficient curricula, outdated or broken equipment, useless placement services, and weak accreditation processes.[74] Furthermore, Markham explained, these programs made their money by hoodwinking people who were desperate to transcend their circumstances. [75]

> In large part, advertisements are answered by recent high school graduates with no long-range educational goals, from homes in which neither parent went beyond high school. The breadwinner is often a laborer in awe of those in occupations that he doesn't understand, and taken by the promise of glamor [*sic*], high pay, and rapid advancement. He wants his kid to have it better than he did. They are answered by men in factories who feel trapped, those who believe factory work is but a temporary expedient and "know" something bigger is in store for them; by nonprofessional family men seeking a rapid

> income advance with less overtime in an inflationary economy; by those in the throes of personal problems who believe the change will somehow straighten out their lives.[76]

From the from the late 1960s to the mid-1970s, a series of investigative articles probed EDP schools' predatory practices, and these articles overwhelmingly reinforced Markham's claims. In 1968 and 1969, *The Baltimore Sun* ran three features on EDP schools that detailed their "loose standards and shoddy business practices" as well as their "indifferent instruction".[77] Students detailed how they were pressured to sign up—paying the 2021 equivalent of $6,000 up to $11,700—only to find out after enrolling that the schools' descriptions of job openings and salaries were misrepresentative. In 1974, the investigatory *Boston Globe* Spotlight Team conducted a series of exposés on the Andover Institute of Business and ECPI that reinforced how the exploitation of "the poor and naive" was at the heart of some computer schools' profit-making tactics.[78] Unlicensed salespeople would target youth from economically depressed areas, ensnaring them in illegal contracts that failed to inform them of their right to refunds under certain circumstances.[79] Sales staff were incentivized with a bonus system to close sales, and most salespeople achieved their numbers by signing up large numbers of students from the school's "primary market" of "high school dropouts and underprivileged youths".[80] The *Globe* also hired a data processing consultant to evaluate ECPI's curriculum and was told that the school was providing a course that was "substantially different in content than the one it advertised".[81] ECPI staff made several false statements to the reporter posing as a student, including the number of computers the school had and the job placement rates for its graduates.

The *Globe* series also provided evidence of how the Andover Institute of Business violated immigration law, bringing foreign students with next to no knowledge of English into the country, only to take their money and provide them with sub-par training that left them with no prospects for employment.[82] For students who were unable to obtain student visas after being accepted to training programs, their sizable tuition deposits were never returned.[83] These articles particularly highlighted the plight of immigrant women from Caribbean nations who saw the computing courses as a pathway out of domestic service in their home countries but were forced to return to those jobs after their hopes of becoming computer operators were dashed.[84]

The *Sun* and *Globe* investigations were part of a broader trend, and comparable stories about other EDP schools appeared in newspapers across the country in the late 1960s and into

the 1970s.[85] The components of these stories are largely the same: vulnerable students looking for better-paying work are dazzled by promises of high salaries, low barriers to entry, and job placement services, only to find that their training was inadequate and that their skills and degrees were unwanted by employers. To make matters worse, a rash of abrupt EDP school closings in 1969-1970 left hundreds of students stranded in the middle of their courses, leaving their students with minimal recourse except to hope that governmental agencies were able to secure refunds for them.[86]

For Black computer trainees, the situation was even more dire. Although "inner-city residents" were often targeted for government-funded computer training programs,[87] they often found that getting hired was nigh impossible due to racist hiring practices. A three-article series published in Computerworld in 1969 highlighted the challenges facing Black people who attempted to become computer programmers.[88] "There is a programmer shortage," wrote Joseph Hanlon,

> …so there must be a shortage of people who want to be programmers, and underemployed black people should be groomed for jobs as programmer trainees. Wrong! Despite the programmer shortage, companies are training relatively few new programmers. Competition is stiff, and the screening works against the black underemployed.[89]

The articles go on to describe the insurmountable obstacles faced by "black ghetto" residents, particularly the requirements that programming trainees have college degrees and achieve "A" grades on the IBM Programming Aptitude Test (PAT). "It was naive of us to teach them a course and assume they would be hired," said instructor Chuck Martin. "It was futile and very frustrating."[90] Despite the fact that the trainees learned advanced programming skills and had written multiple programs, they were either rejected outright or offered positions at salaries far below the market rate. As a result, most trainees ended up back in their previous jobs. "People seem to have a preset mental image of what a programmer should look like," complained Martin. "And these people don't fit the image."[91]

The disconnect between the promises of EDP training and the reality of the job market was enough of a problem by the late 1960s that the issue was raised in Congress in April 1968 by

New Jersey Rep. Cornelius E. Gallagher. Under the heading "EDP Training Does Not Ensure A Worry-Free Future", Gallagher entered a report written by Martin Kohl of trade newspaper Electronic News into the Congressional Record.[92] The report explained that getting a job as a computer programmer without a college degree was extremely difficult, and that 90% of hardware companies refused to consider hiring EDP school graduates; one of the few companies that said it would take EDP graduates happened to run its own school. The report also noted that while software companies were more open to EDP graduates if they had related experience, the poor reputation of EDP schools prevented most graduates from getting that experience in the first place.

Over the course of the 1970s, the Federal Government began cracking down on exploitative vocational schools and correspondence courses on the whole,[93] and computer schools were included in those efforts. In 1974, the Federal Trade Commission fined Lear Siegler, Chestkin Corporation, York Mountain Computer Corporation, Data Processing Resources, Inc., and two branches of ECPI (New York and Fresno) for deceptive advertising practices that encouraged students to pay "substantial sums" for courses that were "virtually worthless".[94] As a result, at least two of the programs shut down: Lear Siegler ended up selling off its schools in 1974,[95] and ECPI ceased operation, filed for bankruptcy, and went into liquidation in 1976.[96] Unfortunately, despite continued press coverage of predatory tactics and unfulfilled promises,[97] computer schools continued to do brisk business into the 1980s, thanks to the combined factors of a recessionary economy and the ever-increasing demands for computer programmers and other computer workers generated by the advent of personal computers.[98]

"A veneer of so-called 'innovation'"

Although the coding fetish discourse and coding bootcamps themselves position their educational model as an innovative, cost-effective, and "disruptive" alternative to four-year degree programs and other forms of traditional education, critics of for-profit coding bootcamps argue that they are simply a form of "lower ed" and as such, are based on the same exploitative fundamentals as other forms of for-profit education.[99] Indeed, concerns about cost, quality, and duplicitous marketing practices arose shortly after the first bootcamps opened their doors.

A primary claim made by coding bootcamps and their promoters is that they are agents of social mobility that facilitate the "ticket into the middle class" that coding supposedly offers; some even go so far as to suggest that the coding bootcamp model could be a solution for easing the student debt crisis.[100] However, a closer look at the cost of coding bootcamps indicates that most bootcamps are prohibitively expensive for those who do not have financial resources: the average tuition price of in-person coding courses is approximately $14,000.[101] According to a 2016 *TechCrunch* article titled "Are coding bootcamps only for the rich?", a prospective student would need approximately $34,000 to attend the average coding bootcamp after accounting for tuition, living, and job-hunting expenses.[102] Furthermore, the available data show that the majority of bootcamp attendees tend to be white, male, and educated;[103] given that these demographic qualities tend to be associated with socioeconomic privilege, it casts doubt on the narrative that most bootcamp students are enrolling in order to transcend their socioeconomic circumstances.

For bootcamp students who are struggling financially, bootcamp attendance has the potential to leave them worse off than they started. Because bootcamp students are ineligible for federal financial aid,[104] those without financial resources can end up taking out private loans at higher interest rates and less favorable terms.[105] Many students, particularly those from low-income backgrounds, make use of Income Share Agreements, or ISAs, that are offered by numerous bootcamps in a "code now, pay tuition later" model.[106] ISAs allow students to enrol "for free" in exchange for a percentage of their future pre-tax income, a practice that has been likened to "indentured servitude".[107] In a submission to the California Department of Financial Protection and Innovation, the Center for Responsible Lending, National Consumer Law Center, and Student Borrower Protection Center collectively described ISAs as "dangerous" and accused ISA lenders of

> …peddling high fees and predatory loan terms under a veneer of so-called "innovation." ISAs can cost borrowers as much as 40 percent of their pre-tax income and frequently include unconscionable contract terms like mandatory arbitration agreements or unfettered access to borrowers' bank accounts. Moreover, the programs that these ISAs prop up often have a poor track record of student success, including a history of actively misrepresenting students' academic and employment outcomes.[108]

A poor track record of student success resulting from sub-standard training is one of the main critiques levied at coding bootcamps. Indeed, while the coding fetish discourse is filled with inspiring stories about bootcamp graduates transcending unfortunate circumstances, there are also many tales with the opposite outcome. A widely circulated *Bloomberg* article told the story of students at Coding House, a Silicon Valley school that trained their students so poorly that they were unable to answer basic questions in technical interviews;[109] *Fast Company* ran a similar article about students who were unable to get jobs after attending programs at Mobile Makers and the now-defunct Dev Bootcamp.[110] The perception that bootcamp graduates are poorly trained has led to a stigma that has made it difficult even for qualified graduates to get a foot in the door;[111] this is because they are seen by many employers as lacking the depth of foundational knowledge compared to computer science graduates.[112] This stigma is quite overt, with hiring managers from a wide variety of companies including Google, Cisco, Airbnb, Monetate, Autodesk, Surfwatch Labs, Ontraport, Level 11, and Stack Overflow Careers publicly expressing reservations about coding bootcamp graduates or stating explicitly that they generally do not consider them for positions.[113]

Perhaps unsurprisingly, regulators have begun to pay attention to bootcamps and the claims that they make. In 2014, *VentureBeat* and *Wired* reported on the widespread crackdown on coding schools including Coding Dojo, App Academy, and Hackbright Academy by the California Bureau for Private Postsecondary Education (BPPE), a regulatory agency that licenses and oversees private vocational schools.[114] While some of these schools became compliant and were able to continue operations, others had intractable problems; Coding House, for example, was fined for failure to comply with regulations and eventually closed.[115] In the ensuing years, other coding schools have faced similar regulatory issues; in 2019, Lambda School was fined $75,000 for failing to register properly,[116] and in 2020, the San Francisco campus of Holberton School was ordered to immediately cease operations after it failed to meet "institutional minimum operating standards".[117] In an Emergency Decision ordering Holberton's shutdown, the BPPE labelled the school as an "immediate danger to the public's health, safety, and welfare".[118] Schools outside of California have also run into problems. In 2017, Flatiron School was fined $375,000 by the New York State Attorney General's office for failing to operate without a

license and for publishing misleading statistics about their graduates' success rates and starting salaries.[119] A press release from the New York State Attorney General explained that

> Flatiron did not disclose clearly and conspicuously that the 98.5% employment rate included not only full-time salaried employees but also apprentices, contract employees and self-employed freelance workers, some who were employed for less than twelve weeks. Similarly, Flatiron failed to clearly and conspicuously disclose that its $74,447 average salary claim included full time employed graduates only, which represent only 58% of classroom graduates and 39% of online graduates.[120]

Given that coding bootcamps have only existed in their current instantiation for a decade, it is too early to definitively conclude whether the coding bootcamp story will end like that of EDP schools. However, given the similarities between the marketing tactics, operational quality, and regulatory concerns of both EDP schools and coding bootcamps, there is certainly cause for concern.

Conclusion: *Caveat Emptor*

There are many lessons to be learned from the history of computer schools, particularly given the parallels between the EDP school zenith and the current coding education craze. Both moments feature a powerful discourse driven by the perceived need for programming talent that positions programming as accessible, a tool for social mobility, and a fix for labor exclusion for marginalized groups. Both moments feature an industry of for-profit, short-term computing training institutions that draw heavily on prevalent computing discourses in order to draw in students from populations traditionally excluded from white-collar technical work. And the similarities between these institutions, despite the decades between them, raise some considerable red flags given the failure and demise of EDP schools.

As this paper shows, very few of the possibilities that were promised by EDP schools ever came to fruition: the poor reputations of the schools combined with the gatekeeping practices of the computer industry meant that the promises circulating within the discourse were unlikely to be realized for many people who enrolled in these schools. This was not just because

the instruction offered by EDP schools was subpar—although that was certainly true in many cases—but also because the populations targeted by EDP school recruitment efforts were typically those already excluded from technical identities on the basis of race, gender, and/or class (or any intersection of these characteristics). EDP school students were told that computer programming training was a low-risk, low-friction path to a well-paid job and a fulfilling career, but the reality was very different. Just like the current discourse around coding, EDP schools promised a range of exciting possibilities to those who have faith in the power of programming, but not all who believed were rewarded, especially if they were subject to larger structural forces like classism and racism.

Although this paper draws many comparisons between EDP schools and coding bootcamps, that is not necessarily to say that the future of coding bootcamps is foreclosed, but rather that the history of EDP schools could—and should— act as a cautionary tale. This history is particularly salient given the framing of coding bootcamps as novel, "disruptive" forms of education that have the power to address structural power imbalances, all through the miracle of code. Even more significant is that, despite the fact that this claim is made emphatically throughout the coding fetish discourse, there is little data to support this assertion. In fact, there is very little reliable data about the outcomes for coding bootcamp attendees in general, and the data that does exist has been subject to unclear and/or questionable methodologies, particularly when it comes to student outcomes.[121] Aside from the bootcamps themselves—who are notorious for their creative reporting— the main source of data on the North American coding industry is Course Report, the self-described "leading authority on immersive technology education" whose relationship with the bootcamp industry is blurry at best.[122]

In the absence of reliable data, the lessons of EDP schools are even more important for us to remember, because the stakes of forgetting them are high. As the history outlined in this paper (and other sociotechnical histories) show us, a so-called "upskilling" process is no match for the power of racism, sexism, ableism, classism, and other entrenched forms of bias: when it comes to the success of computational skills training initiatives, it is not just the quality of instruction or the ability of the students, but the identity and social location of the students that matter. Indeed, the few pieces of published peer-reviewed research about coding bootcamps show that those who tend to succeed after attending a bootcamp are those with bachelor's degrees (particularly STEM degrees) who have already had workplace experience and the financial resources to withstand the

"brutal" post-bootcamp job search.[123] Furthermore, the bootcamp model has been adopted globally, and is being peddled aggressively to countries and populations from the Global South. This paper may focus on the American context, but ethnographic research into coding bootcamps both inside and outside the U.S. suggest that the barriers that existed historically for American EDP school graduates persist today both within and across a variety of national contexts.[124]

Both Christo Sims and Anita Say Chan have pointed out that the types of faith and promises that tend to coalesce around technologically-oriented social solutions—what Chan refers to as "hype"—often echo similar moments in the not-so-distant past.[125] In writing about the EdTech sector more broadly, Chan argues that the "logic of hype…somehow manages to conjure and sustain a pronounced sense of belief, despite the evidence of past records demonstrating that doubt would perhaps be better warranted".[126] Indeed, it seems that coding/programming is what Morgan Ames calls a "charismatic technology"— a technology that derives its power through the "possibility or promise of action" even when the outcomes or actions of the technology do not match its promises.[127]Ames suggests that "charisma's naturalizing force can make critique and debate appear unnatural" as they are up against "what appears to be a natural and inevitable path"; however, as she also points out, no technology or technological practice "transcends both historical precedent and daily life".[128] As such, it is essential that we continue to draw from the past to inform the present, even in the face of seemingly intractable forms of hype and charisma. For if we don't, it is rarely the powerful people and interests that push these agendas who bear the brunt of any failures; rather it's the already-vulnerable groups that are targeted by them.

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Notes

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