Not Your Mother's Profession:

An Exploration of Computing Women in Madurai, India

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Class of 2018

Introduction:

The air conditioner rattles loudly in the corner to provide a reprieve from the constant heat of Madurai, India. As much as each woman who enters the room enjoys the chill, the AC exists for the sole purpose of keeping the rows of computers at operating temperature. The room is full of women in their final year of undergraduate schooling; some wear colorful salwar kameezes, others opt for jeans. One woman stands at the front of the room, exemplifying the "yo-pro" vibe with a suit jacket and pants to match. She presents a calm front while telling her peers, "We all know, women are better at the bargaining and the trading, so we decided to make an all women e-commerce application for female empowerment." Her colleagues nod appreciatively and applaud when she goes to sit down. She is replaced by another woman who speaks on her team's development of a breast cancer awareness app. Their invention is aimed at women who are too embarrassed to raise concerns about breast abnormalities with a male doctor. The app would let the user check symptoms and seek advice in the privacy of their own home, no men involved. Lastly, a girl speaks about her dream of developing the Indian version of Indigogo, a crowd funding platform, which she plans to call "Indicome."

All of these projects are to be completed in the upcoming semester where students continue their partnership with a local NGO to create useful web applications. Each project is designed, overseen and completed by students in order to simulate the work flow of a software engineer in the IT industry. While a noble goal, this exercise does not remotely match the current state of technology. Nowhere in India's formal, commercial IT industry can one find applications being designed by Indian women, for Indian women, and yet these students approach the task as if it was the most natural idea in the world.

It is no secret that the tech workforce can be unwelcoming towards women. In the U.S there is a formal movement aided by workshops and self-help books like "Lean In" to entice women into the computing field. These initiatives have had marginal success. Here in India there is no parallel movement, yet women are enrolling in computer science courses at rates which put their American counterparts to shame. This dissonance between an industry stereotypically hostile to women and women's high rates of enrollment in computer science inspired this paper. Through observations, conversations, and surveys, this paper seeks to discover what roadblocks and incentives exist on young women's path to entering the computing profession, how they interact with the subject, and how they perceive the workforce. This paper concludes that while the computing profession is inexorably entwined within the forces of globalization and patriarchy, women still seek to navigate, engage with, and benefit from the topic. And, through taking ownership of the subject, they are able to expand the space for other women in Madurai.

Background:

The concept of an educational pipeline is a common tool used when discussing strategies to increase the number of underrepresented groups in computing. Four points on the pipeline are important for this paper. The first is when perceptions of computer science are forming, typically in high school or middle school. Positive relationships with computing necessitate breaking existing cultural stereotypes about the field; primarily, that it is only for geeky, anti-social, white, men who hate fun and collaboration. Next, assuming the individual makes it to college, is matriculation in a computing field. In this step, introductory classes must be accessible, welcoming, and not allow those with previous computer science experience to trample those who do not. After matriculation, the student must continue within the field of computing to either higher

education or to a job in the industry. Lastly, the hope is that the student will remain within the computing field and welcome in others from under represented backgrounds (Educational Pipeline FAQ 2006). My background research was structured to parallel the pipeline in the U.S. while examining the flow to industry in India. Many pieces will discuss the tech boom in India, but few focus on the Indian workers who helped facilitate that change. At times, I had to contend with gaps in the available academic literature. As such, I've attempted to synthesize different resources, including scholarly articles and interviews with industry professionals, to paint a picture of computing for women in India.

The role of women in computing in India is inevitably shaped by prominent gender ideologies. Partha Chatterjee (1989), an Indian scholar, explores the history of the woman in Indian society, and the effect that legacy has on them today. Chatterjee specifically explores the role of 19th century nationalist thinking in creating an ideological and spatial dichotomy between the 'home' and the 'world. The 'home' is considered to be the domain of the wife, and the outside world belongs to the man; however, this split was not always present. Colonization of India and India's subsequent nationalist movement are among largest factors in shaping women's role in society. Upon arrival, the Europeans reported a "long list of atrocities perpetrated on Indian women" not by a group of people, but by "the entire body of scriptural canons and cultural practices" (1989:622). This in turn served as a justification of European rule, and India's national identity was formed in many ways, in opposition to this rule. Which elements of western culture to accept and which to reject became a central question immediately following independence. General consensus became that material goods may be adopted, but the spirituality of India should remain untouched. Herein developed the separation between the outside world (material goods) and the heart or the home (spirituality). Thus, as domesticity evolved, the realm of the house and spiritual life became the woman's, and the outside world went to men.

Today many women are challenging their role in the home and are stepping out into the workforce. However, this transition is not easy. The New York Times did a series exploring India's female workers and found a drop in participation from 2005 to 2012, sliding from 37% to 27% (Barry 2016). Some of this drop is attributed to barriers put up as rural women are forced out of work by their village leaders. Barry discusses one village where seven working women became "outcasts" to the village; they were "symbolically denied the hookah" and "water from the shared pump" (Barry 2016). As outcasts, they were not welcome at village functions such as marriages or funerals, and all members of their families refused to speak with them, scared of becoming outcasts as well. One group of women chose not to give in and continued working. As they trekked to work, "men lined the roadway" and jeered "Are you going to star in a pornographic movie?" (Barry 2016). Though these women persisted and fought back against their village, it is easy to imagine why many may not. Through this example, it is clear that traditional gender roles have a strong grasp on some communities, and women who attempt to work outside that system face punishment. While many women do not face this kind of roadblock on the way to the IT industry, the sentiment and value system this example exposes makes apparent the uphill battle women have in entering the workforce.

While seeking paid labor, women's unpaid labor is a continued expectation in the home that may not be lifted to ease the struggle. In 2008 the IT workforce was 36% female, though women are not distributed equally throughout the sector (Bhattacharyya and Ghosh 2012:46). Most women in industry must perform both their jobs in the workforce and all the traditional jobs of home maker. This double duty is expected as they seek to break down their gender role. By continuing to perform the same tasks as before but with decreased responsibilities, the transition would be smoother. Some tech companies are providing accommodations for employees involved in maintaining a household, and notably some husbands are stepping up to the plate to help with childcare. In one published case, the man runs the home while the wife works, which is an enormous shift from the village life outlined in the previous paragraph. The IT industry cannot be solely credited for this shift; women who can enter the industry are likely to have better access to education and resources than women seeking work at garment factories. In turn, women and families with more resources are likely to have more positive associations with computing due to exposure.

The associations families and students form with computing play a role in which field women matriculate into. Regrettably, there is no study which

examines if this is the case for women in India. One piece by Hewner and Mishra (2016) works from the Indian context, speaking with engineering students. The research team does not publish a gendered breakdown of the participants and thus one can assume mostly men answered because of their predominance in the tech field. The article reports that, in India, prospective college students apply to a major program within a college only after receiving their test scores. Many students do not know what kind of school they will be admitted to or what they will major in until their test scores are released. Thus, the decision of major and college is undergone with little research or trepidation, most students simply apply for the school that matches their test score. Parental influence and monetary pay-off post-graduation are listed as a large factors in choosing a computer science major, but even more common is the perception that computer science is "the best major" (Hewner and Mishra 2016:3). To supplement this information, I looked to Serapiglia and Lenox (2010), who provide female-specific research in a U.S. context. Through surveys and follow up interviews, they found four main factors which influence choice of major. The four groups are; positive influence of male role models (i.e. family, community members, teachers); positive associations with computers either in the home or at school (typically during early development); enjoyment of puzzle solving; and monetary incentive of an industry salary (Serapiglia and Lenox 2010). Of these factors, influence of a male role model was the most common, with 92% of respondents citing it as a reason they chose the computer science major. Serapigilia and Lenox argue that, because men are assumed to be more competent when using computers, their excitement and confidence could be transferred to the female when she is discovering computing, creating a positive association with the field. Whether this study has any bearing on Indian women, however, remains to be seen.

Once women enter the computer science major the question becomes what will they do in their post grad careers. After all, having a lot of female computer science majors will mean substantially less if none of them enter the industry post-graduation. Hewner and Mishra's study is closest to answering this question. Once enrolled in classes, the study finds that most CS students are engaged in and enjoying their class material. Despite pleasure in the subject, very few students want to pursue a career in the industry, believing that career path to be uncreative and dull. Reasons cited by the paper include "no say in the design or feature set," only solving "trivial problems," "work long hours," and "conservative environment" where students would be forced "to work regular business hours or have a dress code" (Hewner and Mishra 2016:7). Most students were seeking alternatives like startups, grad school, or government positions (CS is a common background for politicians). The lack of interest in the industry may stem from bias encouraged by professors, few of whom have exposure to industry. Another possible cause is that many IT jobs are writing out the code designed by someone else, rather than inventing it on your own. Despite the perception of the industry's work being dull, many companies in India find that graduates are ill-equipped to handle the jobs' demands. Only a quarter of technical graduates are considered employable immediately following college completion. As a result, the IT sector in India spent $438 million in 2008 to train entry level employees (Garg and Varma 2008:2). One issue is the lack of standard curriculum across the country. Employers train all recruits to ensure they have a shared knowledge base. Another is the traditional, lecture-based classroom setting. While this set-up is beneficial for conveying more conceptual, abstract principles, it does not provide students with the hands-on experience of dealing with complex issues that they need as software engineers. Another obstacle is the rarity of software engineering (SE) concentrators, as there is minimal course work available on the topic. The SE class is often taught by a teacher with little software engineering experience apart from when the course they took in college, mainly because of the deficit in SE teachers (Garg and Varma 2008). The subject suffers from a lack of research. If software engineering is an interest, most students would rather work in the higher-paying software development jobs than to do research in software engineering. Many students choose not to lean SE tools or techniques because it is not part of the final examination. The skills which "experts from industry" wished most to see improved in new recruits are problem solving skills and self-learning (Garg and Varma 2008:3).

If the students are imperfect for the job market, the question remains if the job market is beneficial for the students. One researcher, Nitya Rao (2014), challenges the prevailing assumption that women in the workforce gain autonomy within their social structure because of their increased economic power. Through a series of interviews with Dalits and members of the

backward caste, two lower caste groups, in a 5 villages cluster in Tamil Nadu, Rao asserts a different narrative. She finds that women are able to move more freely in the social structure and have a larger say in household decisions by filling the housewife role and being a good mother rather than seeking work. The work being referred to here is paid labor, typically in the garment business. In conclusion, Rao speaks of the people she interviewed who view their work as more of a "burden" than a "source of agency" (Rao 2014:97). The pervasive narrative that women's importance is determined by their economic participation is complicated by the pre-existing power structures.

While Rao's study raises a valuable question, I do think it is beneficial to lay out some of the key differences between her study and mine. Rao's women are mostly Dalits and Backwards cast in smaller rural villages and I am looking at the women on Lady Doak College, an elite institution in Madurai. Access to a school like this is more likely among higher class members of society, and while I did not ask students or teachers what their background was, many people were from Madurai and many professors had gone to Lady Doak for their undergraduate educations. Another obvious difference is that the labor in question here is non-manual, and occurs in a private space with a high salary. The garment industry involves physically demanding work with few to no benefits for little pay. Unfortunately, I don't have the resources to ascertain how women in more rural locations choose majors, at what rate they go to college, or what percentage pursue any kind of computing career.

Rao's study also serves to underline another important point: the bias in my research. I have approached this question with the underlying assumption that having more women in tech is a positive change that leads to improvements within those women's lives and society as a whole. This assumption stems from my positionality. I am an upper middle class white woman from the United States. I study computer science at Grinnell College, an elite liberal arts college in the Midwest. One day I hope to enter into the computer science workforce in the states. While I have many worries about working in the IT field, undoubtedly the most prominent is being the only woman in my department and having to deal with exclusion, discrimination, and harassment on a daily basis. This fear has lead me to become an advocate for women in computing both in the U.S., and now in India. While I tried to approach the education system, my research, and my interviews with an open mind, I'm sure some of my ardent belief that there needs to be more women in computing slipped into my analysis.

Methods:

The data for this paper is the result of conversations, observations, and surveys conducted at Lady Doak College. This college is an elite, all-women's, arts and science university in Madurai. Many strong computer science programs are housed in engineering colleges. Lady Doak does not fall under this umbrella, but retains a respected department and offers both under graduate and post-graduate coursework. This institution fit my needs as a researcher because it was an obvious source of women in computer science where all classes are conducted in English. To study how women interact with computing, I felt there was no better location for study than an all-women's environment. It is possible that this has biased my results because most workplaces and colleges are not single gender.

During my observation period at Lady Doak College I sat in on a few classes, both as an observer and as a presenter. Classes included; discrete structures, a chemistry computer science cross over, software development and a biology computer science crossover. I designed a questionnaire which inquired about the student's interest in computer science, their plans post graduation, and if they would be willing to meet for further interviewing (see Appendix 1). This questionnaire was distributed to 2nd and 3rd year undergraduates and first year post-graduate students during their normal class time. From that sample I had hoped to receive a number of students for interview. However, this proved more difficult than anticipated, as Lady Doak was in their last week of classes, which was then followed by finals and a break where many students go out of town. The timing of my study could not have been less ideal. While I was able to speak with some students, the majority of my interviews took place with faculty members. In addition to my conversations with faculty, I was able to work often in their teachers' lounge and gained insight into their work environment from my interactions and observations there.

Designing and administering surveys were new practices for me. This methodology seems to be newer to SITA's research library as well, thus before the piece continues I'd like to make note of what I observed while administering and logging the surveys. Some of

the questions seemed to be difficult for the students to understand. Particularly "what are five words you associate with the computer science industry?" and "what are five words you associate with computer science academia?" While this word-association question format is familiar to me, it is not one I think the students had encountered before. This confusion lead to a lot of discussion amongst neighboring students about what to write. Before administering each survey, I made sure to stress that there was no correct answer to any of the questions, and that I only wanted to know what participant's thought. The first time I distributed the questionnaire I fielded many queries on the word-association questions. For the subsequent classes I made sure to elaborate on the two questions before passing out the survey. Regardless, I think there was still a sense or fear of misrepresenting oneself on the survey in a non-native language which lead to collaboration with classmates.

While this behavior compromised the quantitative merit of the surveys, I allowed it for two reasons. The first is that I wanted the survey and myself to be presented as non-threatening and informal to the students. To demand that they complete the survey in silence, I felt, would undermine that tone. The second is that if someone truly did not understand the question, perhaps their neighbor could explain in a way that I, with my limited Tamil, simply cannot. The collaboration among the students is evident when looking at the papers. Runs of five or six papers all contain the same, or variants of the same, answers. Particularly in response to the word association questions, where I was hoping to receive more information about how the students felt about each subject, I got words, like "software," "hardware," and "cloud computing" in almost every survey. For these word association questions I have only reported the results for words that are unique within the dataset, or speak to the respondent's emotional relationship with the topic.

While each student would ideally be able to understand and articulate themselves honestly on the survey, that is not a realistic expectation. Because all classes and tests at the college are conducted in English, I felt that translating the survey into Tamil was unnecessary, but perhaps having a Tamil version would have been beneficial. On the other hand, the group answer approach in some instances, I believe, played to my advantage. Only in one class did students report that they were dissatisfied with their computer science education and would not have picked the major if it had not been for their parents' prompting. No other class gave me that result, and I happen to know that of the seven surveys I received with that response, five of the students were sitting by each other. To undertake the small act of rebellion of stating that you did not choose computer science, especially to myself a researcher who is very enthusiastic about the importance of computer science, would be tough, and undoubtedly easier to speak truthfully if you know your friends will be as well. For future research, I want to spend more time exploring literature on survey creation and proctoring. My surveys still proved extremely useful in opening dialogues with students and professors on my research, developing a general sense of the department, and gathering contact information for future participants.

Results:

During my interviews with professors, many agreed that the IT industry was not suited for women, but each approached their initial career decision from a different background. Some professors chose both their career and their major based entirely on their parents' advice or wishes. While others had parents who wanted them to be in industry and travel abroad, but decided to teach instead. All of the women saw issues with the IT industry that made it suboptimal for women; primarily working night shifts or working late, demanding workload, and difficulty balancing the expectations of both work and home. This section explores the narratives of three women, each of whom has been deterred from working in the IT industry by some aspect of the patriarchal system. While their work in the IT industry was discouraged, none of them have given up their passion for computing. Now each of them works within the system to aid, encourage, and guide the next generation of women who will attempt to enter the workforce.

Some women who pursue computer science degrees are already convinced that the IT industry is not for them. Professor K., who started in CS department only this year, said that after her graduation her family, "a strict family", asked her to go into the teaching field because it is a "career for ladies" due to its regular hours, plentiful vacations, and the fact that teachers are shielded from the public gaze. The IT industry, in her view and the view of her family, is "not suitable for ladies" because "after 8 o'clock they come home" and as a software engineer they "will not be able to manage the family" and the other household chores women are

expected to complete. Prof K. in no way is passing a judgment on those already in the IT field. Her advice for students entering the workforce is that they must be "strong in all aspects," indicating her belief that while the work is challenging, it is possible for some women. As for herself, she would not be able to "care for [her] family" if she worked in the field and "that is a problem" both for her parents and for herself. It's clear that the lifestyle inspired by the IT industry of long hours, moving away from home, and late nights is not copasetic with traditional family values still held by many people in India today.

Some of the women I talked to were sure that they were headed for a career in the IT field until unfavorable reports from other women in the industry deterred them. Professor T., a hardware specialist, was planning to go into tech, and even had a second on-campus interview lined up with a potential employer before she backed out. Some friends of Prof. T's, who were already in industry, told her that if you're put on a team with a male lead you have to "pamper your manager." As a woman she would have to "talk to him, you know…you have to keep satisfying him in all aspects, so that you can get promoted." Prof. T. decided she was unwilling to join that type of work environment, so she turned to teaching, which she said is a "little bit [more safe] for girls in India." Even though her plans for career have not materialized as hoped, Prof. T. still wants to help students pursue their dreams of working in the industry. Her advice to them, however, does not ring of hope, but rather of risk calculation. "Only [pursue a career] if you are going to get married to an IT person…you cannot survive on your own." The logic behind the advice as she explains it is: if your husband is at your job and interacting with the other men then they will know to leave you alone. Prof. T.'s husband was her professor when she was in school, and helped to sway her towards a professorship rather than a software engineering career.

While she has resigned herself to teaching for the present, Prof T. is still toying with the idea of dabbling in the tech world, just not in India. "It's not like this everywhere… my friends say it isn't like that in America," Prof. T. explains as she begins to lay out her one-day plan of moving to the states with her husband and two-year-old daughter to join her sister working in the Midwest. Another professor mentioned that "around 10%" of the students choose a computer science major because they think it will give them an opportunity to go abroad. Prof T. outlines that it's a bit trickier than that, but also one of the most realistic ways that she would be able to engage in the work that she loves. In her mind, the only thing standing in her way is a PhD, which may seem like a large barrier to some, but when compared with the barriers some other women face to enter the workforce does not seem too big. Moving internationally is another way in which the women, discouraged by the patriarchal control over the computing industry in India, seek to maneuver outside of or escape from it.

Not all workforce experiences need to be escaped from; one professor returned to college after an immensely positive two-year stint in the industry to aid her marriage prospects. Professor R., after graduation, worked at a small, satellite office in Madurai with nine other computer science "freshers", or first years. On her team were 6 men and 4 women who worked to develop tools for the larger company, headquartered in Bangalore. Together the team worked on an internal e-mail system and then an internal database to serve as a forum for trouble shooting and a record of what software the company had already developed. Prof R. relished her time in industry saying it was the "very first time" she could "sit alongside men" who became her "close friends" during her two years of work. The experience gave her "confidence" and a new perspective on her current job as a teacher. There was one marriage between colleagues, but the rest remained only platonic. After all, there were only ten of them.

Professor R., in switching from her satellite office to a college professorship, was seeking the stability that came with a university position to make her not only a more attractive marriage candidate, but also a better future wife. Working in IT required her to come home late some nights, which is "not accepted" by society and seen as "not feasible" if she wants to marry in Madurai. Prof. R. states that she "cannot be money minded" about the issue, after all she does take a large pay cut to go from one profession to the next. The choice to switch professions was not solely based on how society will view her work. The IT industry is demanding and prof R. wants to ensure that she will have enough time to take care of her "husband and child" and "relax." So far, prof R. is content with her work at the college, describing it as "a very spiritual profession" to teach the next generation of computer scientists.

Each of these women, in her own way, is paving the way for future women of in computer

science. Navigating the system has lead them away from directly interacting with the IT industry, however it has not discouraged them from continuing their work permanently. In this way, professorships are able to serve as buoys in the sea of the workforce. Teaching is considered a safer profession than IT, and to see a women professor is commonplace in Madurai. The next step for women is to go into the workforce. Professor R. made some strides by working in the satellite office, even if it was only for 2 years. Another professor spoke to me about how her wish to go into industry was denied by her father who was vexed by the idea of his daughter having to move to a large city, to "live in hostel" and "manage everything alone." This same father has let his younger daughter go into the IT industry after watching other families send their daughters to do the same thing. There is no doubt that the perceptions of women's place are changing in society, and it seems only natural that one day the IT industry will be as common for women as the teaching profession. This change can be seen by talking to professors, but also through talking to the students and interpreting what they want to do next.

Questionnaire:

Through the questionnaires and limited follow up conversations, I hoped to see the impact that female professors had on the students' trajectory (if any). While no student directly referenced any difficulties being a woman in computer science, almost everyone who filled out the survey either plans to go on to further studies or to seek a job in IT or business administration where they would surely confront discrimination. As far as reasons to matriculate go, I found four main themes in the questionnaire responses: the relevance of technology in the world today, a long standing interest in the capabilities of computing, input from their parents, and attraction to the opportunities afforded them through a computer science major.

Keeping in mind that many of the responses were made in collaboration with other students, the first broader theme of response spoke to the overall enjoyment of computing, whether in program creation, programming languages, or subject matter. Responses in this category often contained phrases like "I have an interest in computers," "I love computers," or "it is a very interesting field." Some students elaborated on their previous computer science coursework explaining that it was their favorite subject in high school while others did not seem to have a sense of the field before going to college.

The next set of response found throughout the surveys is similar to the first and is a general interest or excitement about the technological revolution. Responses in this category contain phrases like "now-a-days, computer is day-to-day essential in all life," "In this world, technology of computers play a vital role" or "today's world is running on technology", "now-a-days all the things are becoming digital-based. So, this is a most important field for a developing nation." These answers normally ended with the writer saying that, because of the importance of technology, they felt they needed to stay updated on the modern systems and saw a CS major as the best way to do that.

One response trend, only found in a cluster from one of the classes, was that their parents made the decision for them. Responses surrounding this motivation included responses like "Actually I did not plan taking this major. Unfortunately, I was forced to take this major," "unfortunately… my fate…" and "because of my parent's compulsion." One respondent in this category went on to elaborate and say that she now loves the subject matter, however that sentiment does not seem to be ubiquitous amongst her colleagues. Why the parents wanted their children to enter in to computer science is not expounded upon in the survey. It is possible that computer science's reputation as "the best major" has a role to play here. Another possibility brought forth in an interview later is that this degree makes the women more eligible for marriage. Because of the esteem associated with the degree, parents may think that it will make their daughter more attractive when they are trying to arrange her marriage. Lastly, one professor, who said she had both marks for CS or engineering, was instructed by her father to go into computer science because there are fewer jobs for engineers in India. "Most of the crimes happening here is only from engineering students. They study well but they don't get jobs so they go and put a skimmer on the ATM machine." Regardless of the parents' reasoning, each of them sees some promise in the computer science major, a field not conforming with many traditional Indian values, for their daughter which shows the subjects integration into culture.

The last broad group is respondents who viewed their computer science education as a gateway to productive futures. Responses in this category included vague responses like, "because it is very useful for all technology. But it is useful for future

also. So I choose this course. Because this technology has wide varieties type for every things," and "There are many opportunities after completing graduation in computer science," to more specific ones like "to become a web design in the IT field" or "to become a professor in a college" and "to become a programmer in IT field." In conjunction with this response, often times the promise of "high salary" was listed on the survey. These responses lay clear the sense of promise held in computer science either through the economic independence of a job or the freedom to follow a passion. Whether participants were planning to continue their studies after graduation or pursue a degree, the majority of respondents expected to continue engaging with computer science, with the exception of a few who cannot seem to escape it fast enough!

Hewner and Mishra's assertion that CS is the best major seems to not be true here. Yes, some students did come just because of the scores, but most students, even the "my parents made me" group, are here for a different reason. Many did list salary as shown in the Hewner and Mishra study, but very few seemed to come just for the status of being a computer science major. In my interactions with students, they aspired to pursue a career or further studies. My survey also did not align with Serapigilia and Lenox's work. Positive influence of men was not mentioned in any conversation I had or survey response I read. Early positive exposure could be seen in the students that mentioned their high school work, but largely, early positive computing experiences are not listed. Natural interest in problem solving is also never listed. In fact, some students state that they believe computer science to be an easier field of study than other STEM fields. The one point that the findings support is interest in a higher salary as a motivator for women in the U.S. and the Indian context.

Discussion:

The contradictions between my research and that of Hewner and Mishra or Serapigilia and Lenox is a clear indicator that more research is needed. Women in the tech field are battling centuries of gendered expectations every day. How they interact in these spaces, engage in the material, and claim a space in the computing world are topics that not only apply to women in tech, but women all over India. In conversation with a sociology professor at LDC, Prof. R. explained to me how "women getting into this industry has widened up spaces for women generally." Take the example of travel. Ten to fifteen years ago it was rare to see a woman traveling alone from Madurai to Chennai. Now, slowly, more and more women are making the commute because there are few tech opportunities in Madurai and many more in Tamil Nadu's capital, Chennai. According to Prof R., one daughter's need to travel for work is inducing individual families to begin the process of "letting her go." This process of "letting go" can be viewed in multiple ways – in terms of the daughter's actual travel, her engagement with crafting space for herself, and in terms of her allowing to make her own decisions based on her newfound economic sovereignty. The benefit of her work is seen not just in her ability to move within society, but also in her family "negotiating" the mobility of women. With this negotiation comes more acceptance for women who have other dreams. For instance, maybe the next daughter doesn't want to be a computer scientist, but rather a fashion designer in Chennai. That ambition is no longer as foreign to the family, and is more likely to be accepted.

Other researchers, like Susan Seizer (2005), have examined the way women find and utilize their agency to expand the traditional mold of a "good woman" to include themselves.

Seizer's work focuses on how Tamil stage actresses attempt to change the stigma surrounding their profession by leading quiet, private lives and fulfilling the role of a good woman on stage (2005:32). The actresses would take control of their public perception by creating private space within the public. This can be seen in the curtains on the private buses, imitating a good woman on stage and setting up boundaries in the booking process (Seizer 2005).

In the realm of computer science, while actions may vary, the overall desire to expand a public domain to include women remains the same. This paper has elaborated on how women not only stretch the definition of good woman to include themselves, but in doing so create space for women who come after them. Because both education and employment in computer science take place in a more private space, women are more easily able to claim aspects of this patriarchal, western invention as their own. After all, what computer science teaches is nothing more than a tool kit, within which rests the ability to affect one's larger community. That community, though, is neither inherently masculine nor inherently western.

In conversation with a third-year student, the

current developer of Indicome, I asked why jobs in the IT industry were considered boring. She replied, "there's not any chance for invention here. Working for a large company you're just implementing algorithms handed you by your boss." Your boss, answering to demands from America, was the unstated end to her sentence. While my work did not deal directly with the influences of American firms on the Indian tech sphere, the connection is unavoidable. When students at Lady Doak told me that they would love to work at Microsoft or Amazon India, it was a direct parallel to what some of my peers in the U.S. are telling me as they begin their internship hunts. Here, working those jobs implies hours sitting in a room staring at a monitor, whereas in the U.S. there are expectations of free lunches, corporate buses, and other business perks. One professor at Lady Doak mentioned that her brother, who worked in IT, quickly lost his perfect eyesight staring at the screen and lived an inactive lifestyle until her father paid for him to go back to school to become a teacher. This description is a far throw from the open office, free gym access, free bus to work, and free meal perks that are commonly associated with IT in America today. As long as Indian tech remains claimed by the U.S., these conditions may never change. It is small actions to claim technology as the Indian woman's own that can change this system.

I saw these acts of laying claim to technology throughout my stay at Lady Doak. I saw it when students my age described the applications they planned to build which catered to a specifically Indian and sometimes specifically female audience. I saw it in the positive workspace among the faculty where each member's achievements were congratulated with hugs and smiles (and sometimes tears), and faculty's children's birthdays were celebrated with chocolate bars for the whole staff. I saw it in the enthusiasm with which one professor addressed my question about a breadth first traversal of a tree in class and then again the next day when she approached me to amend her answer to one she had looked up the night before. Despite the inhospitality of the computer science world for women at the moment, these women still see something worth committing their lives to. It may be the ability to step outside the home and pursue a job, or the economic freedom that accompanies a computing's higher salary. It could be because of a nudge from a parent, or a long-standing interest in the way technology shapes our world. Regardless of the reason, Indian women are taking ownership of this patriarchal, western system to create a space for themselves, and we as an academic community would be amiss not to recognize this.

Works Cited

Barry, Ellen
2016
In India, a Small Band of Women Risk It All for a Chance to Work . The New York Times, January 30. http://www.nytimes.com/2016/01/31/world/asia/indian-women-labor-work-force.html, accessed November 22, 2016

Bhattacharyya, Asmita, and Bhola Nath Gosh
2012
Women in Indian Information Technology (IT) Sector: a Sociological Analysis. Journal of Humanities and Social Sciences 3(6): 45–52. http://iosrjournals.org/iosr-jhss/papers/vol3-issue6/f0364552.pdf?id=5734, accessed October 5, 2016

Chatterjee, Partha
1989
Colonialism, Nationalism, and Colonialized Women: the Contest in India. American Ethnologist 16(4): 622–633

Duraisamy, Malathy, and P. Durisamy
1999
Gender Bias in the Scientific and Technical Labor Market: A Comparative Study of Tamil Nadu and Kerala. Indian Economic Review 34(2): 149–169

Educational Pipeline FAQ

2006
Educational Pipeline FAQ. http://www.highereducation.org/reports/pipeline/faq.shtml, accessed November 22, 2016

Garg, Kirti, and Vasudeva Varma
2008
People Issues Relating to Software Engineering Education and Training in India. Proceedings of the 1st Conference on India Software Engineering Conference - ISEC '08

Hewner, Michael, and Shitanshu Mishra
2016
When Everyone Knows CS Is the Best Major. Proceedings of the 2016 ACM Conference on International Computing Education Research - ICER '16: 3–11

Kellar, Govind, Girija Shrestha, and Veena N
205ADAD
Women's Agency and the IT Industry in India. Essay. In Gender and the Digital Economy: Perspectives from the Developing World. Cecilia Ng and Swasti Mitter, eds. Pp. 110–131. London: Sage Publications Inc

Rao, Nitya
2014
Caste, Kinship, and Life Course: Rethinking Women's Work and Agency in Rural South India. Feminist Economics 20(3): 78–102

Serapiglia, Constance Patricia, and Terri L. Lenox
2010
Factors Affecting Women's Decisions to Pursue an IS Degree: A Case Study. Information Systems Education Journal 8(12): 3–13. http://isedj.org/8/12/. issn: 1545-679x, accessed October 5, 2016