**Factors that Discourage Girls from Majoring in Engineering and Computer Science at University in Countries with More Gender Equality**

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**Abstract:** This project is focused on investigating the causes of the gender-equality paradox in Iceland, specifically, what factors in Nordic countries are still deterring women from choosing to pursue engineering and computer science at the undergraduate level. In this proposal, I will outline the gender-equality paradox and request funds to research this phenomenon in Reykjavik, Iceland. My methods for research include conducing interviews and surveys at the University of Iceland, as well as at nearby high schools. Additionally, I will speak with officials in the city or national government to determine steps still being taken toward complete gender equality, or lack thereof. I will discuss possible results based on current theories in the fields of gender studies and engineering/computer science.

1. **Introduction**

It is no well-kept secret that gender gap exists in the fields of computer science and engineering. More attention is being paid to this issue in the fields of STEM and gender studies, much of which is focused specifically at the ratios in college and university engineering and computer science programs. Girls, despite having aptitudes toward math and science, are not choosing to major in these subjects when they reach the undergraduate level. There are disputes as to the causes of this imbalance, with experts arguing about whether social and cultural influences or inherent gender biological differences are responsible for a female disinterest in engineering.

**II. Background/Related Work and Motivation**

If social and cultural factors are to blame for low numbers of women in STEM, it would be assumed that countries with greater levels of gender equality and that make greater efforts to combat gender inequality would have a more balanced gender ratio in STEM. However, in Nordic countries, such as Iceland, Sweden, Norway, and Finland, despite reported greater levels of gender equality, men still dominate in the engineering and computer science fields, even at the undergraduate level (Science, 2018). According to the 2013 study by Statistics Iceland, only about 37% of students pursuing a secondary degree in engineering are women (Plos One, 2016).

In fact, they are even outperformed in this area by countries with much poorer records in women’s rights and gender equality. This has been deemed the “gender equality paradox”, where in places that women have more equality, they are less likely to pursue careers in engineering and computer science than in countries with poorer records in gender equality. For example, compared to Iceland’s 37%, 41% of Algeria’s graduating engineers are women (Big Think, 2018).

This research project is focused on investigating the “gender equality paradox”, a phenomenon where women in countries with high levels of gender equality still have low numbers of women in STEM, and attempts to determine the factors that deter girls from choosing to pursue engineering and computer science at the undergraduate level.  Furthermore, it will involve an analysis of possible social and biological factors involved, as well as question the extent of the influences gender-equality in Iceland.

**III. Methods**

To complete my research, I am requesting funds to travel to Reykjavik, Iceland to conduct interviews, surveys, and observations about women choosing to pursue careers in STEM, and their experiences once they have done so. I will speak with and submit proper paperwork to the Institutional Review Board for approval for surveys and interviews conducted.

Firstly, I will meet with professors and students at the College of Engineering at the University of Iceland in Reykjavik to conduct interviews. I will be asking about the female experience as an engineering student in Iceland, and what things influence women’s decisions to pursue these kinds of careers. Additionally, I plan to meet with someone in the Admissions department to discuss gender ratios in terms of applications as well as the university’s strategies for public outreach. I also plan on administering a survey to a greater number of female students at the university to pinpoint factors that led to their college major decision.

I will also visit a local high school to administer a survey to female students who are in the process of choosing their undergraduate majors. Here, I will be able to see which factors are affecting girls’ decisions in the peak of their decision time. Lastly, I plan to speak with local politicians and government workers in Reykjavik to discuss the legal equality between men and women and the steps they are taking to continue to work toward equality.

**IV. Expected Results**

I expect to find that some social, cultural, and educational factors affect girls’ decisions in university majors. There are some theories already out there, and I expect either one of them or a mix of several of them, as follows:

* + Due to biological differences in the way that men and women learn, women are less likely to pursue engineering and computer science because of the ways that engineering and computer science are taught and presented. However, I do not expect to find that women do not choose their fields purely because their brain chemistry rears them less attracted to the field, rather, that the way that society and schools teach STEM subjects is geared towards the way that boys learn rather than girls (Noteworthy - The Journal Blog, 2018)
  + Although these countries claim to have a more gender equal society and they do have legal and cultural initiatives to promote gender equality, stereotypes, implicit bias, and institutionalized sexism still exist in society, which affect women’s career decisions. Even though there might be nominal gender equality, the way that people view men and women still stems from these stereotypes and notions, therefore impacting where women and men see themselves in the workforce. (Journal of Personality and Social Psychology, 2009).
  + Because Iceland and the other Nordic countries are more or less welfare states, women feel more financially sound, not needing to pursue more lucrative fields like computer science and engineering. However, if this was the case, I would have to expand my research as to why this does not apply to men in the same capacity (*Science, 2018)*
  + In terms of the paradox, poorer countries with poorer records of gender equality, still try to encourage people to pursue engineering to improve the economy and status of the country. Because of this, it is possible that more women are involved, and begin to outnumber countries (like Iceland) that do not have these issues. However, this alone still does not explain low numbers of women in STEM in Nordic countries alone (Plos One, 2016)
  + It is cyclical: because women are not already equally represented in computer science and engineering, women do not want to enter a field in which they are the minority because they feel like they do not belong (Proceedings of the Royal Society B: Biological Sciences, 2012).

After conducing this research, I will present my findings in a paper, as well as a presentation at the Honors Research Symposium.

**V. Conclusion**

As a woman in engineering (specifically, one of three women in my 19-person engineering program this semester), I understand and feel the negative impacts of having an imbalanced gender ratio, even at the undergraduate level. I know from personal experience that many young women both excel in and enjoy math and science, but I do not see this reflected in my college experience. In Iceland, which claims to be much closer to gender equality, the engineering and computer science fields do not reflect this; if legal gender equality does not solve this imbalance in STEM, targeting the actual root of the issue can help not only female representation in STEM internationally but also improve overall perceptions of women and gender equality. By conducting this research in a place that is reported to have more gender equality, I can isolate the factors that specifically discourage women from pursuing engineering and computer science instead of just identifying sexism and discrimination in a more general platform.

The factors that dissuade women from studying computer science and engineering are currently up for debate in the fields of gender studies and STEM. In the wake of the publication of the Google Memo, where James Damore claimed that women do not choose to pursue computer science related careers due to biological differences between genders, people are passionate on either side of the argument. Many women find such claims offensive, which leads to more hostility in the workplace and in the field. This research hopes to be able to isolate relevant and frequently discussed factors and work to resolve them to eventually work towards a more balanced gender ratio in the fields of computer science and engineering.

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**VI. Budget**

* Roundtrip flight: $500
* Hostel: $450
* Transportation (car rental): $40 a day
* Compensation to survey participants

Total requested: $2000

**VII. Timeline**

Day 1: flight to Reykjavik from Newark

Day 2: Meet with professor and students at University of Iceland to conduct interviews

Day 3: Administer survey to students at University; sit in on class and visit engineering firm

Day 4: Visit local high school to administer survey and conduct interviews there

Day 5: Talking to politicians and government workers to discuss the equality between men and women and steps that are taken to work towards complete equality

Day 6: flight from Newark to Reykjavik