Effect of Modern Media on the Engineering Stereotype

A Thesis Prospectus
In STS 4500
Presented to
The Faculty of the
School of Engineering and Applied Science
University of Virginia
In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science in Computer Science

By
Ishan Koroth

May 9, 2023

On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

ADVISORS

Alice Fox, Department of Engineering and Society

Upsorn Praphamontripong, Department of Computer Science

Effect of Modern Media on the Engineering Stereotype

Overview:

This project involves diving into how media today portrays the engineering stereotype, the effects of it on peoples' perceptions, and potentially finding factors that may have discouraged people from pursuing the field. The reason I am interested in learning about such a topic is to understand how and why society does not seem to give engineering a lot more interest and respect than other fields. Growing up, I had wished that engineering was something that had interested me from the start of my childhood. My approach into figuring out the various relationships between media and engineering stereotypes is to first gain credibility from actual engineers who may have experienced the impact of media's perspective of engineering in a negative way and can also provide input on how the media could better convey the stereotype. Other approaches include looking into viable reports regarding peoples' thoughts on how engineering and the stereotype was applied in various entertainment and informative media, as well as looking into data on peoples' general opinions on engineers because of what they have seen.

Positionality:

Engineering has always been a part of my life, but I only realized it when I took an Advanced Computer Math course in 10^{th} grade at my high school. Early signs I had that should not have been overlooked was my love for LEGOs, sci-fi shows like Ben 10 and Danny Phantom, computers, electronics, and solving puzzles/problems in general. Along with that, my dad was a computer engineer, and he showed me cool experiments related to computers/electronics he would do in his spare time and explain to me how the experiments worked. All these interests that I had should have made me realize that I was an engineer. However, the term "engineer" did not appeal to me as I thought that I would become a weak

buck-toothed man wearing spectacles that went to the office every day rather than doing the fun activities I did by myself and with my dad. Another factor that may have hindered me was the fact that my parents had immigrated from India, and they did not expect me to end up becoming an engineer despite my early interests. Today, technology has evolved to a point where more people are able to access it and discover various opportunities much easier than before. However, the development of technology had also been seen as a double-edged sword as it could negatively impact people, especially kids, by influencing them into the wrong path when it could have done the opposite. After seeing the great potential that technology has and will have in the future, I felt that something could be done where media could be used as a tool/platform to fix and elevate the engineering stereotype in a more positive and appealing manner. The intent is not to simply recruit people into the field, but to also make the stereotype seem valuable and cool to the public. Had the engineering stereotype stood out more to me than the other stereotypes like police officers and celebrities, I would have become a better engineer as I would have started developing my skills much earlier. Others who had experienced similar delays and issues in their interests would also agree.

Problematization:

The problem of the engineering stereotype negatively affecting people has been established in various studies, and one source has determined that those who hold negative stereotypical beliefs regarding STEM fields and self-efficacy in its activities end up either not meeting their expectations at work or do not pursue a career in STEM (Luo, T., 2021). One of the main issues with the engineering stereotype is the fact that diversity of people of different sex and color tends to be a bit biased towards a predominantly white and male demographic due to factors regarding sociocultural norms and more (Thébaud, 2018). Another issue with the

stereotype is how it is being used in entertainment-related media, especially in movies and series like *Dilbert* and *The Big Bang Theory* where the tropes tend to emphasize the unkempt and nerdy white-male and the comically social-awkward tropes respectively. Even though such tropes seem to convincingly characterize engineers to the public, the reality is that engineers aren't just pocket-protectors with thick rimmed glasses, but they are also people who like to pursue other diverse interests like the arts, sports and other personally relatable activities (Schultz, 2021). With more input and voicing from engineers who desire to improve the image of engineering in the realm of entertainment, the engineering stereotype would not be impacted heavily as entertainment is also a huge influence on how people perceive engineers as a particular type of person.

Guiding Question:

How does media shape engineering stereotypes currently? How can it be improved to more accurately depict how engineers view themselves and the field and encourage interest from a broader range of people?

Projected Outcomes:

The problem is to overcome the hurdle that the engineering stereotype has already posed by making people think of engineering as something that only a particular type of person would pursue and discourage them to acknowledge engineers as people who benefit society in magnified ways. This research will delve deep into how this issue could be remedied to a good extent and would advocate for a solution that would both benefit the image of engineers and become something that people can either acknowledge positively or gain interest in.

Technical Project Description:

My expertise in computer science as a major in that field has made me realize that computer science, despite being a hot topic in society and the industry, has been seen as something surreal to people who may not even have dabbled on the idea itself, and even I was amazed by how contrasted the views and the realities of computer science were. Some aspects of this project I want to highlight are ideas that involve blending real-life applications of engineering into something that the public can relate to and see engineering as something that can be applied in everyday life, even if the theme is a bit subtle. Coming up with ideas relevant to this objective could involve researching studies in media that have significantly changed peoples' perceptions of a certain topic and interviewing/discussing with engineers on how I could somehow incorporate such elements into something executable that could also address issues like diversity in the workplace.

After taking a special topics course called Internet of Things (IoT) at UVA, I have decided to do my Capstone project regarding my experiences in the course and what I learned from there as IoT is a topic that has been growing in interest. As I looked into different protocols like Bluetooth Low Energy (BLE) and WiFi being applied in various projects like Smart Homes and Wearable Technologies, I am able to see potential in more interest being garnered in the field as IoT is a topic that pertains to a tantamount of ideas that can solve many everyday problems that can be fixed with engineering and technology.

Preliminary Literature Review & Findings:

Sources ranging from different perspectives of the engineering stereotype have been analyzed. The challenges faced involve trying to turn speculations made in the sources into reality in relation to what examples have worked before, which is what this project is going to address. A blog from the Society of Women Engineers discusses the potential of a female-led

remake of a TV series “MacGyver” as it could cause a “CSI Effect” that would attract more engineers (Turning engineering into entertainment, 2022). The term “CSI” is derived from another TV series that attracted an influx of students into forensics. An engineering student, discusses how the engineering stereotype, especially in popular media, affects the enrollment rate of students (Fabian, 2012). He then brings up examples like *Mythbusters*, *Big Bang Theory*, and *Iron Man* while highlighting attributes like viewership, positive qualities like Tony Stark’s relatable character development from *Iron Man*, and negative qualities like aerospace engineer Wolowitz’s social-awkwardness and other tropes used to make him a comical character in *The Big Bang Theory*.

An article discusses how the lack of women may have taken root from the development of stereotypical beliefs starting around the age of 6, resulting in decisions made during high school. (Eckart, 2021). This is backed up by the source this article used more specific statistical information while also stating that educators, parents, and policymakers are attempting to address the issue of the gender gap in STEM (Houston, U. of., 2021). An article by an associate professor discusses concerns related to diversity and inclusion in STEM while also elaborating on the female engineer characters from *Hidden Figures* and *Black Panther* that have displayed promising qualities and ideas that could help promote the “If She Can See it, She Can Be It” slogan (Livingston, 2022).

STS Project Proposal:

Science Technology and Society, or STS, is a topic that every field in the realm of STEM and other relevant field should be firm on as understanding the impact that creations and ideas have upon coming to existence is essential to ensure that such an existent creation is beneficial to society and does not pose any major barriers and constraints upon people. This project that I

have proposed would be considered an STS project since it involves improving the peoples' perceptions of engineers and other professionals who apply ethical STS practices in everyday life and make careers in such fields more interesting and relatable to the public.

The problems regarding the effects of media upon the engineering stereotype can be seen from the perspective of those who are underrepresented in the workplace, like women, people of color, and the Latinx population (Turley, 2020). Another aspect to consider is the overall portrayal of engineers seen as people who are good at math and are overly obsessed with technology, which is not always the case since not all fields are limited to such constraints, which may seem to have discouraged people in general from considering a field within the realm of engineering. My primary authors in this case are those who studied the effects of the engineering stereotype on gender, race, and other factors, which will provide more leads into how the underrepresentation could be addressed and is of great interest.

One main approach that I plan to take would be doing a critical analysis on a particular media form, similar to that of film, comics, and TV shows. Within the realm of pop culture, people have done analyses on various examples of the engineering stereotype, and I plan to develop case studies on those as well. An electrical engineering student from Ukraine discusses various examples, like how a TV show called *Prison Break* balances the engineer's qualities like the stereotypical social awkwardness and mystery with more positive qualities like problem-solving in risky situations with great odds since the stakes are high when trying to break people out of prison (Prozapas, 2015). A better example of a positive engineering stereotype would be from the film Iron Man, which showcases how an engineer named Tony Stark designs the iconic Iron Man suit with high-tech abilities that left the entire audience in awe. Along with Tony Stark's handsome and good-looking appearance, which contrasts that of the stereotypical

appearance and behaviors portrayed by Dilbert from the TV show Dilbert, Iron Man places itself as one of the best examples of a highly positive portrayal of the engineering stereotype.

A method that I have decided upon was to develop a few case studies and analyze them to dissect attributes that should either be more emphasized or ignored to develop a successful project. I plan to go through different ideas and proposals that some of my sources discussed like using media, both entertaining and informative, as a tool to recruit people into the field of engineering, which might also reference other sources that may be insightful to investigate briefly as well. Some of those other sources may require textual/narrative and film analysis depending on the medium used to execute the works. Along with that, something that I plan to look into is how the media constructs culture, race, and ethnicity with the stereotypes it puts out to the public, which tend to draw concerns towards how people perceive certain racial stereotypes portrayed in negative roles (Dixon, 2019). If possible, I would try to get in touch with engineers/professors and do interviews with them with questions directed towards their opinion on the media and how they are being portrayed. Along with that, I would also try to gather data from focus groups who may be potential candidates for pursuing the field of engineering and survey them questions on how much influence media has upon them, especially with regards to the engineering stereotype.

Barriers & Boons

When it comes to coming up with ideas to addressing the engineering stereotype issue, it needs to be understood that diversity is also something that needs to be carefully considered as a factor since people have different opinions on issues, which could impact the overall reception of what is being proposed. It is difficult to gauge every single factor that could trigger an emotional reaction from the public, so the best that can be done with this research is to ensure a mostly

positive reception of how engineering stereotypes are portrayed. Another factor to consider is that I might need to learn a bit more about media/film studies to get a better idea on what made a particular medium well-known and make an impact on peoples' views of a particular subject, which may have been relevant to that medium. Perhaps understanding how the media algorithm works could also help me understand how to gauge peoples' interests and how to come up with something that can both execute well and be a part of something that people want to watch rather than something that was forced. Lastly, getting in contact with engineers may be something I would need to work on since I do not have many connections with engineers in general and need to come up with flexibilities in timing to have a better experience at communicating with them and gathering helpful information on the topic at hand.

References

Dixon, T. L., Weeks, K. R., & Smith, M. A. (2019, May 23). *Media Constructions of culture, race, and ethnicity*. Oxford Research Encyclopedia of Communication. https://oxfordre.com/communication/display/10.1093/acrefore/9780190228613.001.0001/acrefore-9780190228613-e-502

Eckart, K. (2021, November 22). *Kids, teens believe girls aren't interested in computer science, study shows*. UW News. https://www.washington.edu/news/2021/11/22/kids-teens-believe-girls-arent-interested-in-computer-science-study-shows/

Fabian, A. (2012, April 17). *Engineers in Popular Media: Hollywood as a Recruiting Tool for Engineering Colleges*. Engineers in Popular Media. https://phoenixfiles.olin.edu/do/522/iiif/6f8b70b1-4e87-4337-8555-4c55937ebe3a/full/full/0/Engineers_in_Popular_Media___Hollywood_as_a_Recruiting_Tool_for_Engineering_Colleges.pdf

Houston, U. of. (2021, November 22). *Stereotypes in STEM fields start by age six*. ScienceDaily. https://www.sciencedaily.com/releases/2021/11/211122172716.htm

Livingston, J., & House, R. (2022, September 3). *Seeing vs. being: Film representations of Women in Engineering*. ASEE PEER Document Repository. https://peer.asee.org/seeing-vs-being-film-representations-of-women-in-engineering

Luo, T., So, W. W. M., Wan, Z. H., & Li, W. C. (2021, May 17). *Stem stereotypes predict students' stem career interest via self-efficacy and outcome expectations - International Journal of STEM Education*. SpringerOpen. https://stemeducationjournal.springeropen.com/articles/10.1186/s40594-021-00295-y

Prozapas, A. (2015, June 1). *Media portrayals of Engineers*. Looking in the Popular Culture Mirror. https://lookinginthepopularculturemirror.wordpress.com/2015/05/31/media-portrayals-of-engineers/

Schultz, M. (2021, May 26). *Challenging the engineering stereotype*. LandDesign. https://landdesign.com/challenging-the-engineering-stereotype/

Thébaud, S., & Charles, M. (2018, July 9). *Segregation, stereotypes, and Stem*. MDPI. https://www.mdpi.com/2076-0760/7/7/111

Turley, M. (2020, December). Not All Computer Scientists: An Analysis of Computer Science Stereotypes in Popular Media. https://cardinalscholar.bsu.edu/bitstream/handle/123456789/202920/2020TurleyMadison-combined.pdf?sequence=1

Turning engineering into entertainment: How the media is challenging stereotypes. All Together. (2022, January 8). https://alltogether.swe.org/2015/04/turning-engineering-into-entertainment-how-the-media-is-challenging-stereotypes/