

# Prospectus

**Raising Deforestation Awareness through Online Education**  
(Technical Topic)

**Social Media and Political Polarization in the United States**  
(STS Topic)

By

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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.

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## Introduction

Political polarization, the ideological gap between conservatives and liberals, in the United States is skyrocketing. This trend can be traced to sometime between the years 1994 and 2016, as the percentage of Republicans who viewed Democrats as “very unfavorable” rose from 21% in 1994 to 58% in 2016. For Democrats, strong unfavorability of Republicans rose from 17% to 55% in the same timeframe (Pew, 2016). I believe that the root cause of this rise in polarization stems from the introduction of social media technology in 2004, and it’s growing user base’s interpretation of social media’s role in society.

I will be focusing specifically on two platforms: Facebook and Twitter. Facebook because of its massive share of the United States population (55% of Americans use Facebook “several times a day”) (Pew, 2016). Twitter was chosen because of it’s reputation as a “public square”, lending it to more political conversations than other leading social media platforms (Wired, 2018). A Pew (2019) survey found that among the top 10% of tweeters, almost 70% had tweeted about politics and over 40% had tweeted about politics in the last thirty days. I am intentionally not delving into the platform Snapchat because it lacks the market share that Facebook commands and the amount of political content that Twitter circulates. Only 40% of Snapchat users have used politics in their snaps (via a political geofilter) (Knight, 2017).

A growing concern for these platforms and their power over the political process in the United States is with the spread of misinformation. One example came during 2019 Amazon Rainforest wildfires, where notable politicians and celebrities were posting false images of the horrific fires and aftermath (Brown, 2019). This misinformation takes away from the good work

that organizations like AmazonAid do in spreading awareness about the destruction of the Amazon Rainforest by educating young children over the web. I am working on a technical project that will expand the functionalities of AmazonAid's youth education program (Amazon Voices). My team is seeking to improve the usability of the web application, add in options to revisit past content, and implement a user avatar feature that will allow elementary aged students to use the site more easily under teacher supervision.

### **Technical Topic**

Amazon Aid aims to put pressure on politically and economically powerful organizations because many continue to operate without any environmental accountability. E. Pereira, Ferreira, Ribeiro, Carvalho, and H. Pereira, experts in resource conservation and computational modeling, recorded the series of anti-environmentalist policies enacted by Brazilian politicians linked to the country's agribusiness since 2016. President Michel Temer eliminated multiple construction licenses previously required for companies cutting down the rainforest, and enacted other policies reducing the public's ability to oversee those construction projects. After deforestation rates increased in 2016, Temer's administration cut the Brazilian Ministry of Environment's budget in half, then froze the budget at that level for a twenty year period beginning in 2018. His successor Jair Bolsonaro promised to continue increasing access to the Amazon's resources (p. 8, 2019). Though not elected, consumer facing companies depend equally on their buyers' sentiments, and in some cases their buyer's ignorance toward irresponsible environmental practices. Because illegal gold mining motivates much of the

Amazon's deforestation, New Yorker writer Stephanie Boyd wrote that members of the jewelry industry created the Responsible Jewelry Council in 2012, promising to trace gold from its customers to its original origins. Within a year, Peruvian reporters caught a council member buying illegal Peruvian gold. Yet, with no punishments set in place by the voluntary council, that company, PAMP, continued its business and still successfully operates today (para. 20, 2012).

With an improved design, Amazon Aid's learning modules could begin educating the next generation of environmentalists to boycott politicians and companies who choose to ignore the deforestation problem. In the two semester capstone course led by Computer Science professor Ahmed Ibrahim, undergraduate Computer Scientists Trevor Bedsaul, Henry Clabby, Ryan Coulter, Sam Hecht, Dylan Peters, Rob Wallace, and Teddy Vallar will work with Amazon Aid Communications Specialist Ben Eppard to make the website's necessary changes. Within the first semester, the capstone team will solve the accessibility and navigational problems.

Though targeted toward middle school classrooms, the learning modules currently require a password protected account to track progress between logins. Public middle school teachers

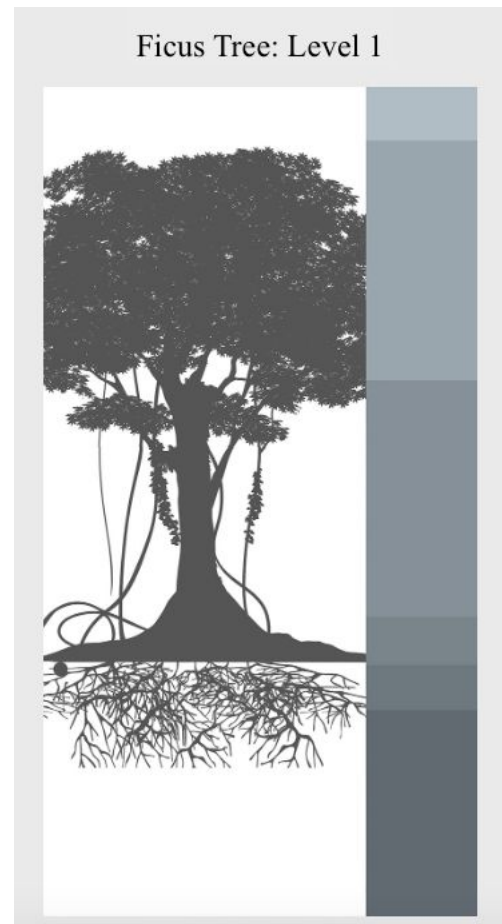


Figure 1: The silhouette of a Ficus tree shows the progress of a particular learning module in the Amazon Aid site, but features no navigation functionality, and fails to make clear the user's current level. (Adapted by Henry Clabby from "My trees" 2019)

require special administrative permission to use any sites which require student passwords. To eliminate this barrier to entry, the capstone team will restructure the student login process to use a classwide code, distributed by the teacher, followed by a personalized four digit code so that each student may track their progress without the need for a password. Once inside the site, users currently have no way of returning to previously completed “levels” within the learning progression, shown in Figure 1 as different strata of each tree, making classwide discussion about specific aspects of the curriculum unnecessarily difficult. Simply making those previous levels clickable will allow intuitive backwards navigation for students and teachers, and this user experience will be tested with real students to ensure ease of use.

In the second semester of the course, the capstone team will make the learning activities more engaging through improved gamification of the material. While the site currently features small games throughout the curriculum, an example of which is shown in Figure 2, they display multiple common pitfalls of serious games, games designed for something other than pure entertainment, explained by Wim Westera, an expert in learning media. Emphasis on rote memorization without contextual framing, such as a crossword with eight discrete questions and answers, aid in knowledge reproduction but fail to support deeper comprehension and general content understanding.

Apparently, games employing only extrinsic motivators like rewards or certificates suffer the same disadvantage

| <b>ACROSS</b>   | <b>DOWN</b>  |
|---|--|
| 2. A majority of the water in the Amazonia Rivers is attributed to rains created by the great missing of trees and melt from: | 1. What butterfly’s wings are so iridescent that they can be viewed up to one-half mile away?<br>3. Each species no matter how large |

Figure 2: One mini game embedded in the learning modules features an eight question crossword puzzle. (Adapted by Henry Clabby from “Ficus Tree” 2019)

when compared to games using intrinsic motivators, such as enjoyment of the game itself (pp. 61-64, 2019). Though moderately enjoyable, the crossword shown in Figure 2 simply uses the password to the following level as an incentive. By installing games that require deeper understanding, such as designing hypothetical ecosystems of plants and animals, the capstone team will make the learning modules more effective as well as engaging. These improvements to the system are summarized as follows:

### **MINIMUM REQUIREMENTS**

- As a USER I should be able to go back to previously completed levels within each “tree” when using the online learning platform.
- As a USER I should be able to enter the learning platform through a single teacher login.
- As a USER I should be able to enter the learning platform using a teacher’s login information as well as a personal avatar, so that each student doesn’t have to create an account.

### **DESIRED REQUIREMENTS**

- As an ADMIN I should be able to add images that are persisted in a database, so that content can be added and served reliably.
- As a USER I should be able to bypass the integrated minigames in order to move onto more content.

### **OPTIONAL REQUIREMENTS**

- As a USER I should be able to access and play a variety of minigames which are native to the web app while progressing through learning content.

The new and improved learning modules on Amazon Aid’s website will be publicly released for use in middle schools and for independent learners who come across it online. Along with the site gaining popularity, Amazon Aid’s ideals will begin spreading throughout the world,

promoting concern for the Amazon and encouraging citizens and consumers to pressure politicians and businesses to adopt practices protecting the rainforest.

### **The Crumbling of the Public Discourse: Facebook, Twitter, and Political Polarization**

As with any issue with large sums of money at stake, the proper response to the problems in the Amazon is controversial. On one side, the Brazilian government (led by President Jair Bolsonaro) is happy sacrificing the environment in favor of the economic growth farming, mining, and fishing affords (Casado & Londoño, 2019). This is contrasted by major firms in countries such as the United Kingdom calling for Brazil to slow their commercial industries in order to reduce deforestation (Jolly & Ambrose, 2019). With President Bolsonaro, not surprisingly, active on Twitter and Facebook the global debate over the use of natural resources in the Amazon has moved headstrong into the social media realm.

Tracking the history of Facebook and Twitter shows massive change from founding to 2019. Of course, this isn't unique to these two platforms, companies traditionally evolve over time. However, the framework of Social Construction of Technology (or SCOT) (Pinch & Bijker, 1987) can explain how social groups shaped Facebook and Twitter. Both platforms have had their mission and purpose interpreted and guided by the society that they serve. Defined in 1987 by T.J. Pinch and W. Bijker, SCOT argues that technology is directed by social groups rather than by its creator(s). Social groups, or aggregations of individuals, are required in the 1987 paper to "share the same set of meanings, attached to a specific artifact". The presence of many such social groups lends to the idea of the problem-solution link. This is the concept of how different social groups form solutions for the same problem that best suit their "set of

meanings”. The principal piece of evidence Pinch and Bijker use is the Penny Farthing Bicycle from the 19th century. The bicycle’s air tires weren’t accepted by the public until they saw them utilized in a race and viewed them not as practical but stylish. The second argument they make is that technology is extremely flexible in its early stages of development. This flexibility allowed for society to direct the technology with increased effectiveness during development. They call this “interpretative flexibility” (1987).

Going back to the history of Facebook and Twitter proves to uncover potential for “interpretative flexibility” in both companies. Back in 2004, Mark Zuckerberg was a Harvard undergrad with impressive coding skills. He created a website to compare girls in which he had to scrape photos from multiple “face books” that Harvard used to document students, his frustration with having to manually grab photos from numerous Harvard repos led to his desire to see all Harvard students under one unified “face book”. He then founded a company in order to do this, and after overwhelming success at Harvard, his company Facebook expanded to other elite universities before opening up to everyone over 13 years old in the world (Barr, 2018). At this time, Zuckerberg saw Facebook as a place to “most importantly... see who people’s friends are” and “find some interesting new information about people” (Bullseye, 2004). Compare this with the Facebook of 2019 that includes features like Facebook Dating, Facebook Marketplace, a cryptocurrency venture, non-profit fundraisers, all while boasting a United States user-base of over 200 million (Statistica, 2019). Zuckerberg’s original vision of founding a company to unite his University took on a life of its own, and I believe that Facebook’s “interpretative flexibility” during its early years contributed to it fulfilling the wishes of a society that so desperately wanted to interact more.



Around the same time, another college-dropout, Jack Dorsey, was developing his own new idea for a connective platform, Twitter. New Yorker writer D.T. Max (2013) offers an intimate look at Dorsey, chronicling the developer-by-trade's 'invention' of Twitter. Max details the well-known story of Dorsey and two co-workers trying to come up with ideas to save their failing company, as Dorsey asks, "What if we used S.M.S. to report what you're doing, and also to receive news of what everyone else is doing?" (2013) The rest is history. In the years since, Twitter has evolved from a platform in which user's were invited to share what it was they were *doing* to one in which users were guided to share how they *felt*. This is supported by Twitter's 'Tweet' feature switching from asking "What are you doing?" to "What's happening?" in 2009.

Max gave an inside look on how Twitter had evolved from 2006 to 2013. The article portrays an early stage Twitter that didn't know what they were, and that they were extremely flexible (per Pinch & Bjiker's "interpretive flexibility") to become whatever company the world needed or wanted them to be. This led to the transition of Twitter from a status update service to a service for giving voice to opinions.

Understanding the rise of Facebook and Twitter is helpful but unimportant without the knowledge of their link with a rising problem in the United States. This problem is political polarization at its modern-day worst. Social psychologist Jonathan Haidt and free speech expert Greg Lukianoff noted polarization at its worst on college campuses, and noted this as a change that began with the arrival of Gen Z, everyone born after 1995, students on campus in 2013 (Lukianoff & Haidt, 2018). These students that Haidt and Lukianoff write about were of an age to go through all of middle and high school with Facebook at their fingertips. In their original Atlantic article, Haidt and Lukianoff argue that Facebook has allowed both an easier way for

people to share their moral judgements and a way to alter the power balance between students and teachers for the first time in history (Lukianoff & Haidt, 2015). Social media, they say, has cultivated a “call-out culture” that has made its way to universities. Their evidence for this comes from various incidents around the country where students call for greater restrictions on free speech. This rise in polarization and radicalization, specifically on college campuses, takes place within a segment of the United States in which a large amount of people have spent a majority of their lives using social media.

### **Research Question and Methods**

To what extent have Facebook and Twitter contributed to heightened political polarization in the United States in the last decade? In my research project, I will seek to explore the influence of society on the development of Facebook and Twitter through the lens of the Social Construction of Technology framework. In the years leading up to the American Civil War, Abraham Lincoln remarked, “A house divided against itself, cannot stand.” His words carry so much weight today with polarization on the rise again, and are precisely the reason that these questions and this research is so important.

I plan on cultivating a large amount of survey data from reputable sources, such as the Pew Research Center, and analyzing so as to find out how unique the polarization the United States is currently experiencing is. This will draw a picture that understands the polarization found in the United States as well as the reach that Facebook and Twitter have on a large portion of the United States public. Additionally, I plan on looking into how notable, both in office and out of office, United States politicians use their Twitter accounts, understanding the volume of

their tweets, the number of followers they have, and the content of their tweets. By understanding how politicians utilize Twitter, I will understand the methods by which political statements and stances are formulated from the root source. This will also grant a glimpse at the first responses to tweets, gauging the initial reactions of supporters and protestors in real time.

Facebook's algorithms have become increasingly more complex, making it very difficult to understand how Facebook decides to show each user content. Yet we do have some evidence about how the algorithms work. Lars Backstrom, Facebook's Engineering manager for Newsfeed explains, "For example, if we show an update to 100 users, but only a couple of them interact with it, we may not show it in your News Feed. But if a lot of people are interacting with it, we might decide to show it to you, too." (McGee, 2013) This inevitably leads to the most profound, inflammatory, and potentially divisive posts to be ranked quite high every time. In another round of research, I will be conducting a survey of Facebook users that identify with a political party. The goal of the survey will be to discover political beliefs, rate of Facebook activity and/or use, and rate of seeing information users agree or disagree with.

In my final round of research I will scrape the Twitter and Facebook feeds of individuals that lead the University Democrats and College Republicans at UVa and other colleges, so as to get a glimpse at the partisan differences of partisan social media feeds. With this data I can additionally perform side-by-side analysis to note party differences in rhetoric.

## **Conclusion**

Political polarization is knocking on the door of civil war for the United States. This research seeks to understand the cause of this tension and explain why. The research is expected to uncover that Facebook and Twitter users in the US are trapped in digital echo chambers that amplify tensions and bring the most radical and divisive thoughts to the forefront.

In addition to researching political polarization and social media in the United States, I will be working with my technical team of developers to release a viable product for AmazonAid. By the end of the first semester of 2019, we expect to have completed the back button functionality and the single teacher login functionality. By the end of the spring semester of 2019, we plan on improving the mini-games and improving the overall user experience on the site. This will culminate in a technical paper that details the work we did for AmazonAid.

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