

Understanding Personalized Search Algorithms: Analysis of the Effect of Modern Social Media Design on Adolescents

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Overview:

In recent years, adolescents have been spending more and more time on online platforms. With the normalization of machine learning algorithms that track data and preferences of users, media and advertisements are often specifically targeted towards individuals. It is important that adolescents at the most critical growth stage of their lives foster healthy habits and interactions, who may be at the greatest risk of developing developmental or mental disorders. In this project, prior research on this topic, indirect stakeholder analysis, and a value scenario will be used in order to determine whether the current design of social media is negatively impacting the mental well-being and attention spans of adolescents.

Problematization:

While the normalization in the use of technology and social media throughout the globe has resulted in numerous benefits, it has also impacted specific demographic groups more than others. In order to increase user retention, it is becoming more normalized for companies to personalize their recommendations, searches, and advertisements based on prior user data. On a similar note, the average screen time of teenagers has risen to a mean of 7.70 hours per day (Nagata et al., 2021) In addition, many other studies have noted correlations between higher screen time rates and worsening mental health (Apurvakumar & Pragya, 2021) or general psychological well-being (Twenge & Campbell, 2018). The purpose of this research is in order to ascertain adolescent opinion and preferences on modern social media design, and to determine whether or not it has any impact on their personal well-being and screentime.

Main Argument:

What are the current concerns in society about modern social media design on adolescents' well-beings?

Projected Outcomes:

While the intended audience that will benefit from this research is the adolescent population, improving the mental wellbeing of the younger generation will affect society positively as a whole. In the pursuit of company profit, many social media platforms implement design choices that may negatively impact users' wellbeing, but positively impact the company's growth because of greater user retention. Ideally, adolescent users will be more informed about the ways that software can be designed in order to entrap users and be able to recognize whether or not they are unconsciously being negatively impacted by social media design.

Technical Project Description:

Following the stakeholder analysis and construction of the value scenario, the goal of the technical project is to develop and launch a Minimum Viable Product of sample social media sites with different types of design. While the overall purpose of each site will be the same, each site will have different UI/UX and features, with specific sites including features ranging from "like" systems to "game" systems where users will be able to collect points from using the platform more. With my prior experience in using front-end tools like Django, HTML, CSS and Bootstrap, the project will require heavy use of these skills in order to create a full-functioning social media site with numerous different features. Each user will have an account in which their data will be stored through a SQL database, in which afterwards user retention will be measured and compared across the different site versions, with different designs and features. Because of the time-intensiveness of the project, the sites are intended to be "bare-bones" and not

comparable to professional social media platforms like Facebook or Instagram. Some example design systems involve features such as allowing users to “level up”, attain “rewards”, or garner “achievements” which can be shared with friends.

Preliminary Literature Review & Findings:

The impact of social media on adolescents’ mental wellbeing has been a popular research topic as of recent. Similar studies often focus on the relationship between adolescent online social media usage and other variables, such as their level of “FoMO” (Fear of Missing Out), stress, or their rates of mental disorder diagnoses. However, much of the existing literature centering on adolescent social media usage was written prior to the global COVID-19 pandemic, which has had drastic impacts on the specific population of adolescents. Furthermore, many prior studies are taken in the form of polls or surveys, focusing more on analyzing a general trend rather than trying to determine the opinions surrounding the topic. In addition, many existing studies are centered on a U.S. specific population, rather than adolescents around the entire world, which may introduce some sampling bias.

In some research, adolescents were surveyed in order to determine their opinions on social media, including the aspects of social media they liked and disliked the most. There appears to be a general consensus among adolescents themselves in believing that social media is more of a boon than a bane (Anderson & Jiang, 2019). Despite the overall positive opinion on social media from adolescents, many recent studies have linked an increased usage of social media to higher stress levels (Fabris et al., 2020), a decrease in short-term memory ability, and increased likelihood of being diagnosed with emotional and anxiety disorders (Sha & Dong, 2021).

In one specific study, three separate high school administrators were interviewed about

social media's impact on adolescent education (Stotler, 2022). Despite the paper not mentioning challenges in conducting the interviews, the author mentions how a major issue with modern ways of combatting the negative influences of social media is in how it focuses on purely "reactive" methods and tends to forego a more "proactive" approach. In addition, conducting interviews is intensive and is not feasible on a large scale like a poll or a survey. On the other hand, polls and surveys may often oversimplify complicated opinions, or focus too much on general trends. For instance, an individual may respond to one poll question by agreeing with the statement "social media has a positive impact on adolescents" but may also personally have negative experiences with social media.

STS Project Proposal:

STS, while evidently standing for *Science, Technology, and Society*, is generally considered to be an approach for engineers in order to ensure that their designs do not promote in-built discrimination or have unintended consequences. Often, modern technology places more emphasis on research and the pursuit of innovation over the promotion of the general well-being of the population, like Value Sensitive Design.

The approach of this project seeks to ultimately understand the implications of modern social media design on adolescent mental health. We would like to better understand the current targeted population's (adolescents between 13 and 17 years of age) preferences and opinions on social media application design to figure out how different design choices can be implemented in order to alleviate any perceived burdens. To do so, we plan to use the vast deposits of similar pre-existing research along with an STS-focused methodology of *Value Sensitive Design*. Among the 14 methods relevant to Friedman's system of *Value Sensitive Design*, our planned methods fall mostly under indirect stakeholder analysis and forming a value scenario. This

project attempts to analyze and incorporate recent statistical literature surrounding the topic into an STS methodology in order to counter the flaws of each research method.

While this project intends to combine multiple ethical approaches, it primarily focuses on the usage of *Value Sensitive Design* in order to understand the current direction of modern social media design. In *Value Sensitive Design*, engineers should create and design their ideas while considering relevant stakeholders, values, and any potential consequences. Through *Value Sensitive Design*, designers will be able to better understand the potential impacts of their technology and incorporate relevant human values into the technology itself, in order to create more ethical and responsible technologies. (Friedman et al., 2017).

Without considering the impacts of design prior to implementation, engineers may unknowingly or knowingly create a product that harms users or promotes potentially harmful values in society as a whole. If software engineers of modern social media do not consider the implications of their design choices on highly susceptible populations like adolescents, their software implementations may harm their userbase, potentially even permanently. It is important to recognize exactly what values and consequences that the design can promote, unintentional or not.

While the project attempts to use pre-existing literature centered on this topic, *Value Sensitive Design* methods are supplemented in order to counteract the flaws of traditional research methods. Many similar studies are often conducted through polls or surveys. Although these methods may provide insight into general trends, these studies may discount the opinions of the minority or falsely present complicated scenarios as binaries. By boiling down responses to binaries or rating scales, individuals might not be able to fully express their thoughts on the situation. Thus, we plan to fix these flaws by utilizing the *Value Sensitive Design* methods of

indirect stakeholder analysis (in the form of interviews) and the value scenario. As directly interviewing adolescents themselves requires IRB approval, our analysis and interview process will focus more on indirect stakeholders, such as parents, teachers, or administrators. These stakeholder interviews will then be used to form a value scenario.

In conducting a value scenario, designers create a plausible but detailed real-world scenario which they then evaluate. The designer evaluates how different stakeholder groups (e.g. direct or indirect) are affected by the technology, and what values may be relevant (Nathan et al., 2008). With every potential change to technology, the positives and negatives are considered. Any possible concerns from the hypothetical change are then addressed to better promote the relevant values to the stakeholders. This process is repeated until the technology design best aligns with what relevant stakeholder groups want. However, the primary flaw of this method is that the initial assumptions must be accurate. If the relevant stakeholders, values, or trade-offs in the narrative are misidentified, the end result may not actually promote the correct values to the stakeholders. Thus, the interviews with indirect stakeholders like the parents or teachers of adolescents will be corroborated with the narrative in order to ensure that the value scenario is as representative of the real-world situation as possible.

In the interviews, individuals will be asked open-ended questions about their beliefs on the effect of social media design on adolescents. In addition, they will be asked about their thoughts on specific design elements, such as personalized search algorithms and the introduction of gamification systems in modern social media, whether it be the addition of “progress bars” or “like” systems, where users may publicly “like” one another’s posts. Lastly, after each redefinition of the value scenario, individuals will be asked to evaluate the plausibility of the narrative and provide their own commentary.

Ultimately, this research seeks to construct an accurate value scenario through a diverse sample, including both pre-existing studies that focus on general trends (e.g. polling) and individual opinions (e.g. interviews). Directly speaking to relevant stakeholders would give the most accurate insight into the plausibility of the scenario, and the values the stakeholders believe are being promoted in the scenario. Through these methods, we will be able to better understand both the impacts and perception of modern social media design choices and figure out ways to better design our social media systems in order to promote the well-being of all users, but most notably adolescents.

Barriers & Boons

Most notably, the project can be divided into two parts: a stakeholder analysis and a value scenario. The biggest barrier in the stakeholder analysis is the requirement of IRB approval in order to directly interview adolescents themselves. Thus, the analysis will center on indirect stakeholders. Furthermore, I lack experience in actually conducting research, interviewing others, or sampling different populations. There are also financial barriers, as I am not conducting research under an advisor or professor, and thus am not being funded for the research. The method of interviewing relevant stakeholders is difficult to conduct on a large-scale basis, and thus the study may be inconclusive, as it may simply not be possible to generalize individual responses to respond to a larger question as a whole.

For the value scenario, the largest barrier is determining the accuracy of the value scenario. In order to help with this barrier, the stakeholder analysis and prior research and analytics will be used to ensure the narrative is as accurate as possible.

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