Technology and Digital Well-Being

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Course CS0, CS1, Ethics/Responsible Computing
Programming Language None
Knowledge Unit Software Development Methods
CS Topics Human Computer Interaction (HCI)
Resource Type Lab

Synopsis

In this lab, students reflect on technology's impact on well-being. Students learn about the possible negative effects of smartphones on well-being. Students also learn about how apps and websites use "dark patterns" to persuade users to act in the developer's best interest, instead of the user's best interest. Students practice identifying dark patterns in popular smartphone apps. For homework, students collect and analyze data on their smartphone usage.

Keywords

well-being, mental health, dark patterns, smartphones

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1 Engagement Highlights

Students prepare for lab by reading and watching recent news articles about the possible negative effects of smartphones on well-being. The debate is not settled, but there is evidence that the popularization of smartphones has contributed to a significant deterioration of teenagers' mental health. A key takeaway from the readings is that young people should not be blamed for the negative effects of technology, since they didn't develop the technology. However, young people can benefit from understanding how technology affects them, and from taking steps to protect themselves.

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Lab starts with a class discussion. In small groups, students respond to prompts reflecting on the readings. In particular, students discuss their experiences using smartphones, and whether they believe that smartphones have a negative impact on mental health. They also discuss the ethics of gambling mechanics in videogames, and whether laws should regulate such mechanics. After discussing each prompt within their group, a representative from each group shares a summary of their discussion with the class.

Next, students complete short readings about different kinds of dark patterns: temporal, monetary, social, and psychological dark patterns. Students briefly talk with a partner about any personal experiences with these dark patterns. Then, students download and test popular free-to-play (F2P) mobile games, looking for various dark patterns. Dark patterns are prevalent and easy to identify in F2P games. Students should write the names of the games they tested on the board. Towards the end of lab, the instructor should lead students in a discussion of their findings.

For homework, students should enable usage tracking on their smartphone. This feature is available in recent versions of iOS and Android ("Screen Time" and "Digital Wellbeing," respectively). After collecting data for at least two days, students should analyze the data. In particular, they should note the amount of time they spent on their smartphone each day, how many times they picked up their smartphone, and how many notifications they received. They should consider whether there are apps they have an unhealthy relationship with. If so, they should describe the dark patterns employed by those apps. Finally, students can develop a plan to control their technology usage, using various listed strategies (e.g., disabling notifications, setting time limits, and scheduling Do Not Disturb).

The lab uses multiple engagement practices from the NCWIT Engagement Practices Framework:

- **Use Meaningful and Relevant Content** The connection between technology and well-being is highly relevant. The readings describe patterns of technology use which may negatively affect users' well-being. Through the activities, students will learn about strategies to improve their relationship with technology.
- **Address Misconceptions About the Field of CS** Technology is often portrayed as a neutral, impersonal force. Highlighting developers' intentional decisions

to integrate dark patterns into mobile apps emphasizes that people are in control of technology. Individually, we can control how we use technology. As a society, we can impose laws to govern technology.

- **Incorporate Student Choice** First, students should choose which apps they test, so they will enjoy testing the apps. Second, students should choose which strategies, if any, they adopt to control their technology usage. Not all students will want to change their behavior. Finally, offer students optional readings that go into more depth about the effect of smartphones on well-being.

2 Recommendations

- When testing apps, encourage students to turn up the sound on their devices. Many mobile games include sound effects similar to slot machines, and this will make an impact on students.
- If students have difficulty identifying apps with dark patterns, these apps are ostensibly kid-friendly yet rife with dark patterns: Candy Crush, Clash of Clans, My Talking Tom, and Pokémon Go.
- Many design elements qualify as dark patterns. I recommend that students use the Dark Pattern Games website to review apps, since it includes a form to help identify game-specific dark patterns. In an advanced course, a more general ontology could be used to identify dark patterns in other kinds of software. For this purpose, AlternateActivity2.docx could be substituted for the Activity 2 described in the main Handout.
- When leading the discussion about dark patterns discovered by students, try to identify common dark patterns. Premium currency, daily rewards, and collections are especially prevalent.
- If a student doesn't have a smartphone for the in-class activities, pair them with a student who does have a smartphone.
- Most recent smartphones have usage tracking features. For example, Screen Time was introduced in iOS 12, which is compatible with iPhones sold since 2013. If a student doesn't have a compatible device, they could install a screen time tracker on a laptop, or just manually record the time they spend on digital activities. Alternatively, they could write a short essay responding in more depth to one of the reading discussion prompts.
- After the homework is due, ask students if they adopted any of the strategies, and if they worked. At the end of the semester, ask students if they are still using strategies to control their technology usage.
- The suggested readings are ideal because they present evidence for a connection between smartphones and mental health, while explaining that the science has not been settled. Also, the readings include the perspective of people who spend significant amounts of money on mobile games. It is important to instill empathy for these people, and to hear their perspectives. If the readings must be updated, keep these factors in mind when choosing replacements.

3 Related Online Resources

Students prepare for lab by reading and watching recent news articles about the possible negative effects of smartphones on well-being [13–15, 17].

In lab, students complete short readings about different kinds of dark patterns: temporal, monetary, social, and psychological dark patterns [5–8].

Students can use the Dark Pattern Games website to review apps. This website includes a form that helps students identify different dark patterns [4]. To add a review, students must create an account. Then, search for an app, and click "Add Your Review."

For homework, students should enable usage tracking on their smartphone. Instructions are available for iOS [1] and Android [9].

Finally, students should be offered optional related readings (e.g., [16, 18, 19]). In particular, Project YES includes smartphone-based interventions for improving mental health [18].

In addition to Dark Pattern Games, other resources describe more general taxonomies of dark patterns [2, 3, 10, 11].

4 Materials

- **Handout.pdf and Handout.md** This handout includes the expectations for the assignment and links to external resources. Provided in PDF and Markdown formats.
- **Discussion.pdf** Prompts for the discussion about the readings.
- **Rubric.pdf** An example rubric for grading students' submissions.
- **DarkPatternGames.pdf** An example form for reviewing apps, from Dark Pattern Games.
- **AlternateActivity2.docx** A handout which can be substituted for Activity 2 in the main Handout. This handout includes a more general ontology which can be used to identify dark patterns in other kinds of software [11, 12].

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