Combating Digital Distractions

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ABSTRACT

With the growing prevalence of digital devices there is an increasing concern regarding their distracting use. Since users have constant access to these digital devices, many distractions happen unconsciously and frequently. Some digital solutions have been developed to combat this problem. In this paper, we discuss three software-based solutions that address digital distractions in group settings, schoolwork settings, and the workplace using context-awareness.

Keywords

Mobile phone usage, context-awareness, distraction, software-based intervention

1. INTRODUCTION

Throughout the day, there are multiple things that compete for our focus. These include things that we intend to focus on, as well as distractions that steal our attention during moments of vulnerability. Distractions can come from our environment, such as a text messages from our phones. They can also be self-initiated. For example, we may lose interest in something and seek novelty from our computers. Digital devices are boundless sources of novelty and provide many opportunities for distraction.

Digital devices are also important for many tasks in our daily lives. For example, we have email and texting for communication, social media for updates on our world, and games for entertainment. Digital devices are nearly indispensable, but most importantly they are pervasive and powerful. Having them around all the time affords their users lots of help, but also creates many opportunities to become distracted.

Though digital devices can be sources of distraction, it is possible to leverage their capabilities against this problem. A helpful capability of many digital devices is context-awareness: the ability to sense information about the user or their environment, and react in a helpful manner. Given the commonness of digital distractions, it is also possible for digital devices to connect people with the goal of reducing digital distractions. In this paper, we discuss three software-based solutions that leverage these abilities to combat digital distractions in novel ways.

UMM CSci Senior Seminar Conference, May 2020 Morris, MN.

The first solution was developed by Ko et al. [9] and was designed for group contexts. Specifically, this mobile phone application allowed users to collaboratively restrict phone usage during group activities. The app also created accountability by sharing usage information between users. In addition, it used context-awareness to encourage users to "limit" together in future activities. This solution is further discussed in Section 3.

The second solution was made by Kim et al. [7]. This mobile application was designed to reduce mobile phone use in the classroom. Similar to the previous solution, it shared usage information among classmates to establish norms of not using phones during schoolwork, and provoke feelings of competition. It also used context-awareness to infer when a user was in class and then offered to restrict phone usage for that period. This solution is discussed in depth in Section 4.

The third solution was created by Tseng et al. [13]. This solution was a system comprised of a browser extension and chatbot. Its purpose was to improve productivity in the workplace by strategically blocking distracting websites on workplace computers. The system's context-awareness used recent user activity to infer when a user was vulnerable to distraction and then initiated usage restrictions on the user's computer. This is discussed in Section 5

After outlining the main solutions and discussing the accompanying studies and results, we discuss some common takeaways of the studies' findings. This is comes after the three solutions and is in Section 6. However before we explore the software-based solutions of this paper, we will first go over some background information in the following section.

2. BACKGROUND

In this section, we will discuss context-awareness and social learning. This is to aid in understanding the three solutions. We will also discuss previous interventions created to address digital distractions, some methods they used, as well as their drawbacks.

2.1 Context Awareness

Our definition of context-awareness was adopted from computer scientist Anind Dey [2]. If we first define context, then the definition of context-awareness can be better understood. 'Context' is defined as "...any information that can be used to characterize the situation of an entity." Entities include the user and device. A system is defined as context-aware if "...it uses context to provide relevant information and/or services to the user, where relevancy depends

on the user's task."

Digital devices, especially mobile phones, have various means of gathering context. A simple example is an application that uses GPS to track a user's location across time and then calculates how fast they are moving. When a user's speed exceeds a threshold, certain applications will characterize the user as being in a vehicle. If the application concludes the user is driving, then the app may restrict phone use until the speed has decreased. The app provides this as a service to the user. Different implementations of context-awareness that address digital distractions are discussed in the main studies of this paper.

2.2 Social Learning

As mentioned earlier, digital devices have the ability to connect users. For digital distractions, connecting users with common goals to limit device usage could benefit all users involved. The works described in this paper that leverage social connection are based on social psychologist Albert Bandura's theory known as Social Cognitive Theory of Self-Regulation. The idea is that people learn to regulate their behavior through continually observing the behaviors of others and comparing it to their own [1]. The theory explains not just the initiation of the behavior, but also maintenance of the behavior to remain in alignment with social norms. The solutions discussed in Section 3 and Section 4 are based on this theory.

2.3 Recent Interventions

There has been a significant amount of work towards using software-based solutions to combat digital distractions, but many of these solutions have failed due to their limitations. These solutions varied in their methods. Some solutions presented users with statistics on their usage history, so the user could reflect upon and change their behavior. In relation to work productivity, one study showed web usage unrelated to work decreased significantly when users' web browsers displayed a productivity ratio. This ratio represented time spent on productive sites against time on unproductive sites [11]. Other solutions outright restricted problematic activity, such as access to distracting apps or websites. Kim et al. [8] developed PomodoLock, a solution that allowed users to temporarily block distracting content simultaneously on their work computer and mobile device.

These solutions and many others were heavily reliant on the awareness and willingness of the users. Specifically, the users had to initiate the restrictions and hold themselves accountable to their commitments. Some problems were that users forgot to take action against distractions (e.g. start the blocking timer) and users were not aware of when they were most vulnerable to distractions. Furthermore, being digitally distracted has seemingly been the norm. Even when people know better, the commonness of the behavior could work against someone's sense that their own behavior is problematic.

For combating digital distractions, the solutions outlined in the following three sections sought to address the problems of the user's absentmindedness and overall normalcy of inappropriate device usage.

3. LOCK N' LOL

Digital distractions can go beyond affecting just the individual user. In social contexts, digital devices may enhance the group activities in many ways. However, their usage can also be detrimental to connection among members of the group. A study by Misra et al. [12] showed that group members conversing without the presence of smartphones reported greater levels of empathetic-concern than members of groups with smartphones present. Device usage by an individual may also encourage other members to use their devices, as suggested by a study by Humphreys [4]. When one member started to use their cellphone, others were then more likely to use their phones.

Some previous work based on Social Cognitive Theory has found some success in addressing digital distractions. One mobile application developed by Ko et al. [10] allowed users to individually limit their phone usage and share their limiting statistics with other users. The intervention showed that total usage and self-perceived usage management improved for users who shared their statistics compared to those who did not.

Basing their efforts on this and other previous works, Ko et al. [9] developed a mobile application called Lock n' LoL. This application addressed digital distractions in a novel way. It allowed group members to limit their phone use together and share limiting behavior among users engaged in the same activities. In addition, the application used context-awareness to encourage users to repeat this behavior when together.

3.1 Application Design

The main feature of Lock n' LoL was the group limit mode. Users could create virtual 'limiting rooms' or join existing limiting rooms via invitation. Once in the limiting room, all other apps and notifications were blocked. However, users were allowed five minutes of unrestricted access every hour. This was called 'temporary unlimit mode.' If the user desired additional time, then they needed permission from other members of the room. Permission was requested and granted through the application.

The creator of a limiting room could also label the room with an activity (e.g. studying or hanging out) which was visible to all users. The user could see their total time spent in the room and limiting status, which was also visible to everyone else. This was important for fostering group awareness that all other members were currently limiting their phone usage and establishing a norm of not using their phones during group activities.

In addition, users had access to a 'friends' list (a collection of all users with whom they had ever limited their phone use). The list displayed current limiting statuses of all users, total limiting time spent with that user, and the option to join the user's current limiting room.

Related to the friends list, the application used context-awareness to encourage users that were friends to once again limit their phone usage together. Information was gathered about each user to determine if they were physically co-located. This co-location was determined by the mobile phone occasional scanning to collect the SSIDs and signal strengths of nearby WiFi access points. The server then calculated a measurement of similarity between sets of information collected for pairs of users. If this similarity exceeded a certain threshold, Lock n' LoL sent push notifications to both users to encourage them to start usage limiting together.

3.2 Campaign Design

3.2.1 Setup

A campaign promoting the application was held at a large university in Korea. Posters on campus were used to advertise the application and its purpose. Finally, the application was made available on the Google Play Store for anyone to download. The campaign lasted 25 days, following mid-term exams to the end of the semester.

3.2.2 Data Collection

Users were first asked to complete a survey before using the app. This included questions related to smartphone habits. Usage data from the application was also collected. All interaction types (e.g. when group limiting was started, or when a user left a room) were noted and timestamped. After the campaign was complete, users completed a survey detailing their experiences, as well as a repeat of the questions used to gauge a user's smartphone habits.

3.3 Results and Discussion

In this section, we will discuss results found for 976 users total. These results encompass user susceptibility to smartphone distraction, predictors of user engagement, and reports of user experiences with the app.

3.3.1 Changes in Distraction Susceptibility

The researchers wanted to know if there was a significant reduction in smartphone distractions. Before using the app, users completed a survey which included questions to measure the user's susceptibility to smartphone distractions. These measurements were done on a 4-point scale called the Smartphone Distraction scale. An overall score above 2.0 indicated the user suffered from smartphone distractions. Users also completed an exit survey that repeated the measurement from the first survey.

The initial survey revealed that the mean score for susceptibility to smartphone distractions was 3.30 with a majority of participants (83.4%) scoring over 2.0. The exit survey revealed a reduction in scores with a mean of 2.36 and only 50.1% of users scoring over 2.0. The researchers determined the difference in mean scores was statistically significant. This showed that Lock n' LoL had a positive effect in combating digital distractions.

3.3.2 Predictors of Engagement

The researchers also wanted to know what types of users were engaging with the app the most. By examining the users with the longest and most frequent limiting sessions, they found some common characteristics.

In the exit-survey, users were asked about the other people they limited with and the nature of those relationships. Regarding the duration of limiting sessions, users who used Lock n' LoL with family or club members had the longest sessions. The researchers reasoned this was possibly because these contexts happened on a recurring basis and therefore helped establish the habit of limiting. Users were also likely to have longer limiting sessions if they engaged in a greater variety of activities (derived from the labels of their limiting rooms). Regarding frequency, users who limited with both a greater variety of relationship and activity types were likely to use Lock n' LoL more frequently.

Relevant to the context-awareness of Lock n' LoL, co-location was positively predictive of both duration and frequency of use. This was despite only 23.8% of sessions had some degree of co-location. Since Lock n' LoL allowed many users to limit together without being co-located, this category was defined as a limiting group with at least two members who were physically co-located. While the context-aware notifications for co-located users may have played a role in directly increasing duration and frequency of use, the researchers did not investigate this connection. However, based on the effectiveness of regularly scheduled and co-located contexts, the researchers suggested that a future design might utilize context-awareness in a similar manner (such as the user's proximity to a particular location rather than another user).

3.3.3 User Experiences

Users reported a variety of experiences with the app. Some usage activities included work, studying, dating, clubs, and socializing. Studying was most common. One user reported they had a habit of frequently checking their smartphone and said, "Lock n' LoL's limit mode reminds me that I should focus on my work." Users also reported benefits in group activities outside of studying. For example, one user stated, "Lock n' LoL was helpful especially for chorus practice... we used Lock n' LoL and could focus on how others were doing. This helped us to facilitate our communication and perform better."

Outside of work and studying, users also reported improvements in social interactions. Reports indicated feelings of mutual attention and positivity, and increased attention and coordination. One user even reported a change in the nature of their interactions, "We often watched YouTube or read online news articles together when we met, but we could talk about each other's everyday lives when using Lock n' LoL. I think this can improve our relationships."

4. LET'S FOCUS

Schoolwork demands continuous focus inside and outside the classroom. However, digital distractions can be a problem for students. While some digital device usage might be useful, such as looking up information relevant to an assignment, students can easily become unproductive while using their phones. Junco et al. [6] gave a survey to college students that revealed a relationship between multi-tasking during schoolwork and overall GPA. Among respondents, texting and using Facebook during schoolwork were predictive of lower GPA overall, with 51% and 33% of respondents (respectively) admitting to doing these frequently. To address the specific problem of digital distractions in schoolwork settings, Kim et al. developed an intervention called Let's FOCUS [7].

Let's FOCUS is a mobile application that addresses digital distractions by temporarily blocking notifications and access to other apps. Similar to the previous solution, Let's FOCUS uses context-awareness and social learning to assist the user in refraining from mobile phone use during schoolwork.

4.1 Application Design

Like Lock n' LoL, a user could enter virtual rooms to limit their phone use. Once in a room, the user was in 'focus-mode' where all other apps and notifications were blocked. The application interface also displayed information about

the user's activities in the room, including the total time of their current session and their cumulative focus time for that room. A user could exit focus-mode or the virtual classroom anytime. Additionally, users could activate 'temporary use mode', where they were allowed five minutes of unrestricted phone use.

The room interface also displayed information about other users. Like Lock n' Lol, this application showed a list of other users who were in the room and their current statuses (focus-mode, temporary use mode, or logged out). It also displayed all users' cumulative focus times for that room on a leaderboard. The justification for this feature was that it would encourage a healthy amount of competition among classmates and study-mates.

Using context-awareness, the application took advantage of a mobile device's WiFi detection. It could infer a user's location based on the MAC addresses of WiFi access points around them. Specific physical spaces in a college (e.g. classrooms or lecture halls) could be identified based on these parameters. Known as 'virtual classrooms', the application maintained a list of all instances of these on campus.

To take advantage of this context-awareness, a user could choose to receive notifications when they were near a classroom where they had previously used focus-mode. The notification asked the user if they would like to enter the virtual classroom and start focusing. If the user considered the notifications to be annoying or inaccurate, they could mute them for up to an hour. Alternatively, the user could choose to receive notifications based on the time instead of location. Differences in user experience for both notification types are discussed later in Section 4.3.

4.2 Campaign Design

4.2.1 Setup

The campaign took place at a large university in Korea. It ran for six weeks from the beginning of the term to midterm. First, the authors created virtual classrooms for every class. The WiFi fingerprints (a unique set of MAC addresses and signal strengths of nearby WiFi access points) were collected for every class's physical space. Pairing each class with its corresponding room, 1003 virtual classrooms were generated total. After the technical aspects were put in order, the application was available for download and promotion of the application began.

4.2.2 Data Collection

All user activities on the application were recorded and time-stamped (entering a room, start and end of focus time, break time, etc). This was used for general usage statistics and identifying abnormal application usage that may have skewed the results. Following the campaign, an exit survey was administered to understand the users' experiences and the application's usability.

4.3 Results and Discussion

In this section, we discuss the results derived from 379 users of Let's FOCUS. These were the users that used focus-mode at least once. Specifically, we will discuss user experiences of the app's features, experiences related to the social influence of other users, and post-campaign attitudes towards in-class mobile phone usage and towards the app itself.

4.3.1 User Experiences of App Features

Regarding Let's FOCUS's main feature, focus-mode, users were generally positive about this. 63.3% of users considered this feature helpful, citing an increased awareness of their smartphone habits and a perceived reduction in smartphone distractions as they continued to use the app. One respondent reported a sense of pride after they had "...focused on the class for 75 minutes without any smartphone use."

Regarding the temporary use mode, 96% of users reported using this feature. The authors determined that the five-minute allowance was short enough to prevent distractions, but long enough to enable productive use. One user reported they used their allowance to search for information relevant to class and stating, "However, sometimes after searching I was tempted to view amusing content, such as Facebook. In those situations, the five-minute allowance effectively prevented that kind of irrelevant use." This suggests the feature prevented users from being drawn into distraction after appropriate use of their phone.

Users also reported that the location-based reminders were helpful and preferred them over the time-based notifications. For many users, the notifications served as a reminder of normative classroom behavior. The classroom is a place to focus, not use your phone. The ability to 'snooze' the notifications was also useful. One user said, "When I received the notification near a classroom, I recognized that the class would begin soon and that I should focus on the lecture." Let's FOCUS's context awareness was helpful in this regard.

4.3.2 Social Influence of Users

There were three notable ways that Let's FOCUS facilitated social influence among users. First, other users' statuses (focus-mode, temporary use mode, or logged out) were effective in influencing individual users. Many users reported guilt when they were not focusing while others were. Some users even became aware that they were being late to class when they compared their status to others who were already in focus-mode.

Second, the amounts of time other users spent focusing in a room were influential. This is how the leaderboards were organized. The influences were dependent on two things. First, many users reported being motivated by the records of people familiar to them. One user reported, "When I saw my friends' records, I wanted to beat them as if we were in a competition... The records of my friends motivated me more than when the competitors were unknown." Second, users were more motivated by records that were similar to theirs. Another user reported that "...if the record differences were excessively large, for example ten hours, I did not feel any sense of competition"

Finally, users were more motivated by other users who were co-located with them. Users reported that in those cases, they were working on something together and shared a common purpose. In the case that users were in a limiting room but not co-located, they did not necessarily know what the other users were working on and therefore were not as motivated.

These reports indicate that Let's FOCUS helped to establish norms of not using mobile phones in class. While some guilt was created among users who did not follow the group behavior, there was also a healthy sense of competition among users with common characteristics and usage behavior.

4.3.3 Post-Campaign User Behavior

After the campaign, users were asked about attitude changes towards mobile phone use in class. Of those who reported changes, 84% of respondents reported more negative attitudes. The reasons for this varied. Some users realized their purpose for using their phone was not as urgent as they once believed. Others realized that mobile phone usage was negatively impacting their focus. In addition, some students who used their phones for searching information relevant to class realized this was not necessary if they were actually focusing on the lecture. This is another indication that Let's FOCUS helped to establish the norm of not using a mobile phone in class.

Concerning attitudes towards the app itself, 74% of users wanted to continue using the app. Users cited improved concentration and better awareness of their behavior using the app's usage tracking. However, the remainder of respondents did not want to continue using the application. One notable reason was that the focus-mode was not restrictive enough. In particular, some users would leave focus-mode and were not deterred by appearing 'offline' to others in the virtual room. A second common reason was more general. Students felt that software-based interventions did not address the underlying problem. One user reported, "I think that it's better for students to voluntarily focus on the lectures and they should improve self-regulation by practicing self-control."

5. UPTIME

Many people use their computer in the workplace. While working online they also have access to personal email, messaging, social media, and other inappropriate activities. As the access to digital devices in the workplace increases, the divisions between work and personal activities weaken. This obscures the boundaries between the professional and personal realms. Since many jobs require frequent online activities, eliminating computer and mobile phone use is unreasonable. Hence, digital distractions remain a threat to workplace productivity.

Many computer workers choose to take breaks throughout the day. Some may take physical breaks by choosing to spend time walking around. Others spend their breaks on the computer doing non-work related activities. Taking breaks during work can increase productivity. Depending on the nature of the break, they also have the potential to disrupt productivity if they last too long. Epstein et al. [3] showed that workers have trouble resuming their tasks if they feel unready, and that digital activities during breaks are particularly likely to result in breaks lasting longer than intended. In addition, workers who prolong their breaks with digital activities are vulnerable to a 'chain of distractions' where one digital distraction leads to more [5].

To address the vulnerability to digital distraction after work breaks, Tseng. et al created the UpTime system [13]. This solution monitored a user's periods of computer activity and idleness to infer when a user had gone on break. Once the user returned, UpTime automatically blocked distracting websites for a short period of time.

5.1 System Design

The UpTime system was comprised of two components that are important to understand: an internet browser extension and a Slack chatbot. The browser extension was responsible for monitoring user activity and reacting appropriately to prevent digital distractions.

Using a rudimentary form of context-awareness, the extension initiated blocking mode when it inferred the user was vulnerable to distraction. In particular, the extension monitored for periods of computer idleness. If there was an idle period longer than five minutes, it characterized the user as taking a break. Based on previously discussed research that suggested users are more likely to be distracted with digital breaks, UpTime proactively initiated blocking when activity resumed. Users were then blocked from distracting websites for 25 minutes.

After blocking started, the browser extension notified the UpTime server, which then notified the Slack chatbot. The user then received a message from the bot indicating that they were in blocking mode. If a user attempted to visit a distracting website, the chatbot informed the user that it knew what they were trying to do. It then asked the user if they truly wanted to visit the website. If the user clicked the confirmation button, the bot asked the user to input a reason why they needed to visit the site. Any text the user gave would grant them access. The point of the question was to prompt the user to reflect on their decision.

Outside of the 25-minute time blocks, users were free to access blacklisted sites. However, the browser extension continued to monitor activity and log total time spent on these sites. If the user spent more than 15 consecutive minutes on a site, the Slack chatbot notified the user and offered to start a 25-minute time block away from the distracting sites.

5.2 Study Design

The usage study of UpTime lasted three weeks and participants experienced a new experimental condition each week. In the first week, no blocking mechanism was implemented. Instead, the browser extension collected baseline measurements of user activity. All the computer's active and idle states were logged, as well all website visits and time spent on those. At the end of each day, an online survey was administered. Participants were asked to rate (on a 7-point Likert scale) how productive and stressed they felt throughout the day. They were also asked if anything unusual happened that would make their experience exceptional. To avoid influencing behavior, activities were logged discreetly and participants were given a vague description of the survey's purpose. After the first week, participants were asked to submit a list of websites they considered distracting.

During week two, participants were randomly divided into two conditions. In the first condition, they experienced the UpTime implementation described in the System Design section. To reiterate, UpTime used context-awareness to infer when users were returning from breaks and automatically initiated 25-minute blocking sessions. To access blocked websites (comprised of the list they submitted after week one), users had to interact with the Slack chatbot. In the second condition, participants were given the UpTime Pomodoro timer (based on a time management method called the 'Pomodoro Technique'). This was a 25-minute timer that blocked distracting websites in the same fashion. However, participants had to start the timer on their own and were not given any prompt to initiate blocking. Blocking could also be cancelled with a single button click and no interaction with the Slack chatbot was required.

Participants' conditions were swapped in the third week.

The same surveys from week one were administered after each week. Following the third week, surveys with open-ended questions were administered to help understand user experiences and the differences between the two implementations.

5.3 Results and Discussion

In this section, we will discuss the results for the 15 workers who participated in the study. First, we will consider statistics on post-break user activities. Then we will discuss user experiences regarding productivity and stress for the different conditions. Finally, we will discuss user experiences of the design features specific to the UpTime and Pomodoro conditions and how they may explain the results.

5.3.1 Post-break Activity

Based on information collected during both the baseline and Pomodoro conditions, 53% of all computer time between any two breaks was spent during the 25-minutes following the first break. However, the majority of this time (73%) was spent visiting websites classified as distracting. This was consistent with previous works that indicated workers are more apt to be digitally distracted after work breaks. As a reminder, automatic blocking was not implemented in either of these conditions.

In a comparison of the UpTime automatic blocking condition and Pomodoro user-initiated blocking conditions, some key differences were noted. In the UpTime condition, users were significantly less likely to visit distracting websites in the 25-minute post-break period. After a break, Pomodoro users visited distracting sites 17.8% of the time whereas UpTime users only visited distracting sites 5.5% of the time. While this may suggest that UpTime helped to decrease digital distractions, the authors also noted that these results were not necessarily an indication of increased productivity, which is discussed the next section.

5.3.2 Self-perceived Productivity and Stress

Some interesting results were revealed in the user reports of self-perceived productivity and stress. Regarding productivity, the Pomodoro condition had significantly less reported productivity compared to the baseline condition. In addition, self-reported stress was significantly higher in the Pomodoro condition than the UpTime condition.

This may explain the reduction in reported productivity, as the mental effort of regulating one's own behavior may have stressed users enough to negatively affect productivity. While UpTime automatically initiated blocking for users, the Pomodoro condition required more self-regulation and accountability to avoid distractions. This is supported by open-ended user responses. For example, one user liked how the UpTime system "...automatically starting a session when I'm back online. It was nice if I was back from a break. Even [*sic*] it's not a break, such as reading paper documents or a discussion with others, it was OK because I didn't need any willpower to avoid being distracted."

These results show that the automatic blocking of UpTime was preferable to user-initiated blocking. Not only did the UpTime condition have significantly less distractions than the Pomodoro condition, but it was also less stressful. The reported stress may have been responsible for the reported decrease in productivity of the user-initiated blocking Pomodoro condition.

6. DISCUSSION

Regarding the three previously discussed interventions for digital distractions and the results of their implementations, there are two important takeaways. First, using context-awareness to encourage or initiate usage restrictions is helpful in mitigating digital distractions. Many users forget to do this when appropriate and use their devices longer than they intend. Solutions with context-awareness take stress and required effort away from the user and help them to be distraction free.

Second, it is clear that creating accountability through means outside the individual user can be helpful. This could be through social cooperation or mutual showcasing of behavior (Lock n' LoL and Let's FOCUS). It could even be facilitated through mock social interaction (UpTime). All of these circumstances provide the user with opportunities to reflect on their behavior, whether through direct social comparison or by considering their own motivations in relation to what they ought to be doing. This helps the user to establish the norm of abstaining from inappropriate digital device usage.

7. CONCLUSIONS

Digital distractions remain a problem in multiple contexts, but digital devices can be leveraged against the problems they create. We discussed three software-based solutions that addressed digital distractions in group settings, schoolwork settings, and the workplace. Using context-awareness and social learning, digital solutions were effectively used against the problems they created. When the user's self-control was not enough, leveraging the capabilities of digital devices to connect people socially and automatically aid the user with context-awareness were viable means for combating digital distractions.

Acknowledgments

Thank you to Dr. Kristin Lamberty for her continuous guidance and feedback throughout the process of researching and writing on this topic. I would also like to thank Michael Small and Ethan Hamer for their feedback in the early stages of writing, and Dr. Peter Dolan and UMM alumnus Scott Steffes for their detailed reviews in the final stages.

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