

# Combating Digital Distractions

2020 CSCI Senior Seminar

Nathan Foss

Division of Science and Mathematics  
University of Minnesota Morris  
Morris, Minnesota, USA

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# Digital Distractions

# Digital Distractions

- What are digital distractions?

# Digital Distractions

- What are digital distractions?
- Digital devices are everywhere

# Digital Distractions

- What are digital distractions?
- Digital devices are everywhere
- Technology is helpful... but also distracting.

# Outline

- 1 Background
- 2 Digital Distractions in Group Settings (Lock 'n Lol)
- 3 Digital Distractions in Classwork Settings (Let's FOCUS)
- 4 Conclusion
- 5 Acknowledgments

# Outline

- 1 Background
  - Previous Interventions
  - Context-Awareness
- 2 Digital Distractions in Group Settings (Lock 'n Lol)
- 3 Digital Distractions in Classwork Settings (Let's FOCUS)
- 4 Conclusion
- 5 Acknowledgments

# Previous Interventions



# Previous Interventions

- Methods

# Previous Interventions

- Methods
- Problems

# Previous Interventions

- Methods
- Problems
- *Context-awareness* can address these problems

What is 'context-awareness'?

What is 'context-awareness'?

- Context is...

What is 'context-awareness'?

- Context is...
  - *"...any information that can be used to characterize the situation of an entity."* (Dey, 2001, p.2)

# Context-awareness (example)

- Example: App restricts phone functionality while driving.

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- Context: Movement speed



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- Characterization: User is in a vehicle.

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- Example: App restricts phone functionality while driving.
- Context: Movement speed
- Characterization: User is in a vehicle.
  - *Are they driving?*

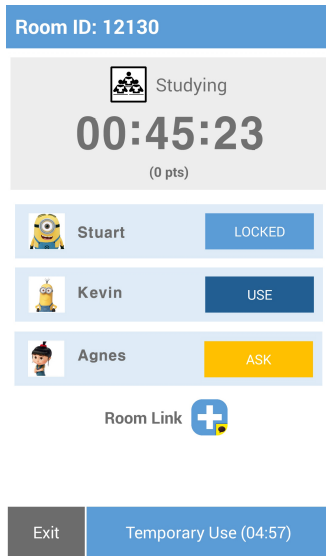
# Context-awareness (example)

- Example: App restricts phone functionality while driving.
- Context: Movement speed
- Characterization: User is in a vehicle.
  - *Are they driving?*
- Action: Phone functionality restricted.

# Outline

- 1 Background
- 2 Digital Distractions in Group Settings (Lock 'n Lol)
  - App Design
  - Deployment
  - Results
- 3 Digital Distractions in Classwork Settings (Let's FOCUS)
- 4 Conclusion
- 5 Acknowledgments


# App Design: Group Limit




# App Design: Group Limit


- Virtual Limiting Rooms

**Room ID: 12130**


 Studying  
**00:45:23**  
(0 pts)

 **Stuart**


LOCKED

 **Kevin**

USE

 **Agnes**

ASK

Room Link 


Exit


Temporary Use (04:57)


# App Design: Group Limit


- Virtual Limiting Rooms
- Block Apps & Notifications


**Room ID: 12130**

 Studying  
**00:45:23**  
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 **Stuart** **LOCKED**

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Room Link 


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# App Design: Group Limit


- Virtual Limiting Rooms
- Block Apps & Notifications
- Temporary Unlimit Mode


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Room Link 


**Exit** **Temporary Use (04:57)**




# App Design: Group Limit


- Virtual Limiting Rooms
- Block Apps & Notifications
- Temporary Unlimit Mode
- Other user statuses

**Room ID: 12130**


 Studying  
**00:45:23**  
(0 pts)

 **Stuart**


LOCKED

 **Kevin**

USE

 **Agnes**

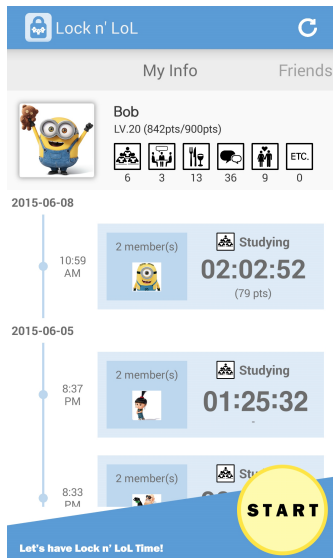
ASK

Room Link 

Exit

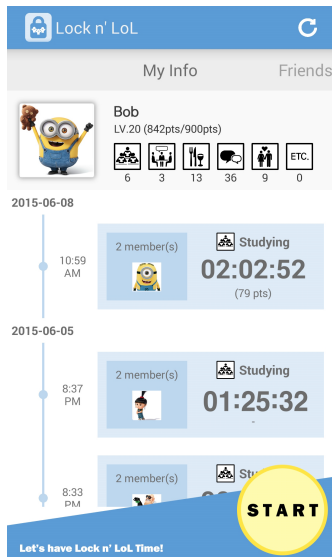
Temporary Use (04:57)

# App Design: My Info



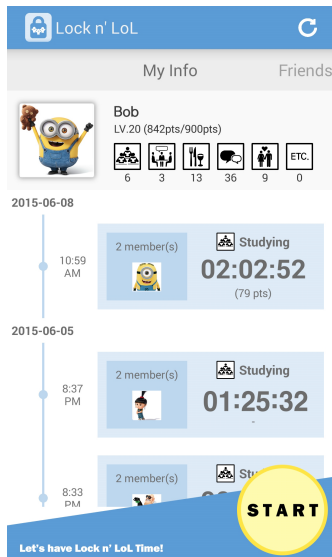
# App Design: My Info

- History of limiting

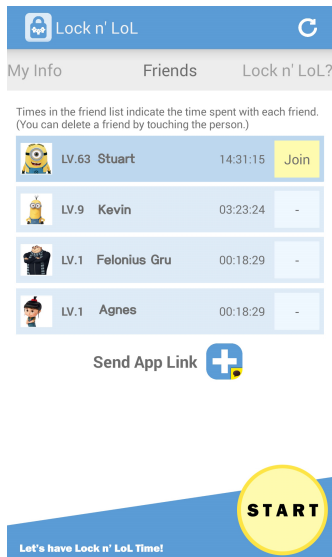


# App Design: My Info

- History of limiting
- Achievement level

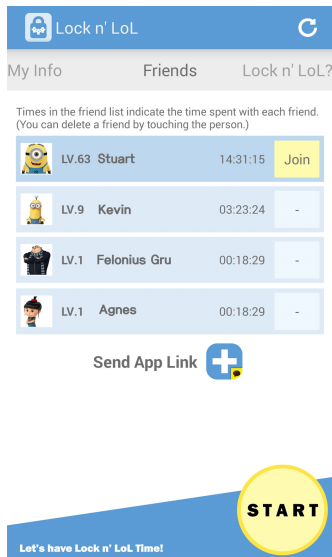


# App Design: Friends List



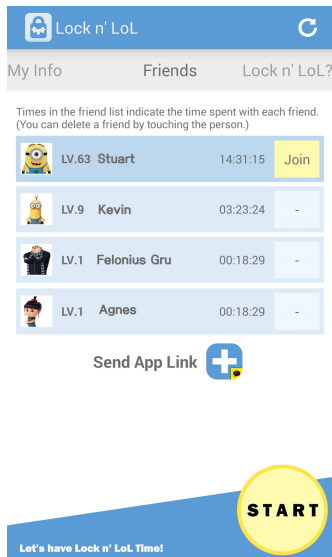
# App Design: Friends List

- Users ever limited with

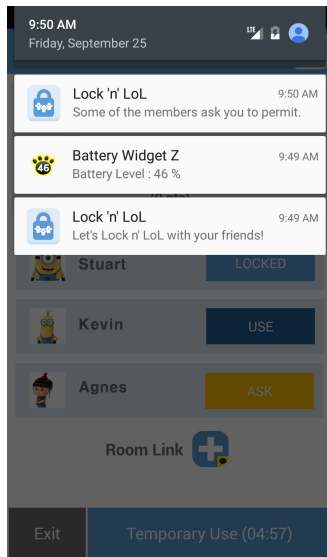


# App Design: Friends List

- Users ever limited with
- Total time



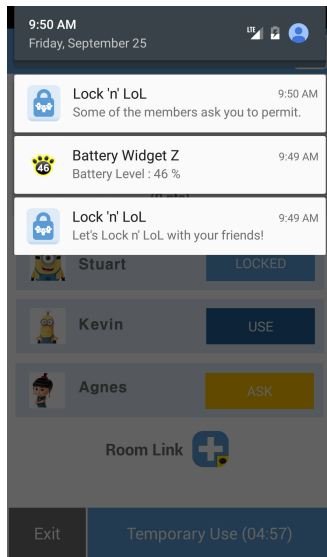
# App Design: Co-location Reminder





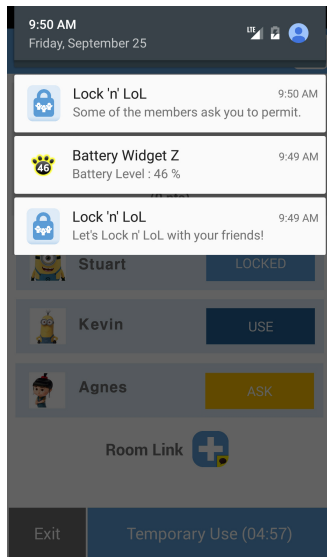
# App Design: Co-location Reminder

- Co-located friends



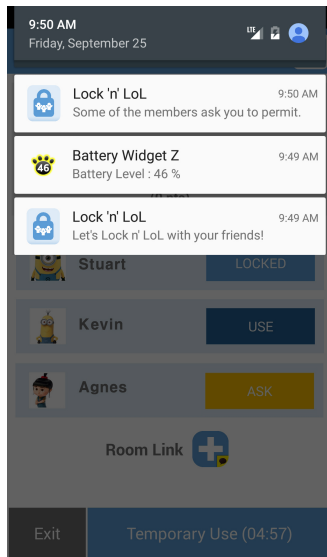
# App Design: Co-location Reminder

- Co-located friends
  - WiFi AP's and signal strengths



# App Design: Co-location Reminder

- Co-located friends
  - WiFi AP's and signal strengths
- Push notifications



# Deployment

- Large Korean university

# Deployment

- Large Korean university
- 25 days (mid to end of term)

# Results: Reduction in Smartphone Distractions

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- Smartphone Distraction Scale (4-point)



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  - Scores above 2.0 indicate suffering from smartphone distractions

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	Mean Score	Percent of Scores >2.0
Pre-use Survey	3.30	83.4%
Exit Survey	2.36	50.1%

# Results: Reduction in Smartphone Distractions

- Smartphone Distraction Scale (4-point)
  - Scores above 2.0 indicate suffering from smartphone distractions

	Mean Score	Percent of Scores >2.0
Pre-use Survey	3.30	83.4%
Exit Survey	2.36	50.1%

- Statistically significant difference

# Results: Predictors of Engagement

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- Duration

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  - Diversity: activity

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- Frequency



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- Frequency
  - Diversity: Relationship, activity

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  - Relationship: Family & club-members
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  - Diversity: Relationship, activity
- Co-location

# Results: Predictors of Engagement

- Duration
  - Relationship: Family & club-members
  - Diversity: activity
- Frequency
  - Diversity: Relationship, activity
- Co-location
  - 23.8% sessions had co-location

# Results: Predictors of Engagement

- Duration
  - Relationship: Family & club-members
  - Diversity: activity
- Frequency
  - Diversity: Relationship, activity
- Co-location
  - 23.8% sessions had co-location
  - Predictive of duration and frequency

# Results: User Experiences

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- Improved focus

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- Improved focus
- Improved social connection

# Results: User Experiences

- Improved focus
- Improved social connection
  - *"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."*



# Results: Experience of App Features

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- Group Limit Mode

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- Group Limit Mode
  - Peer pressure

# Results: Experience of App Features

- Group Limit Mode
  - Peer pressure
  - *"I feel awkward if I use the phone alone because we agreed that we would limit phone use together at first."*

# Results: Experience of App Features

- Temporary Unlimit Mode

# Results: Experience of App Features

- Temporary Unlimit Mode
  - 2.36 times (50.3 sec average)

# Results: Experience of App Features

- Temporary Unlimit Mode
  - 2.36 times (50.3 sec average)
  - *"I had a feeling that I should not waste the five minutes allowance. Once I finished the app use that I really needed to use, I immediately returned to the group limit mode."*

# Results: Overall



# Results: Overall

- Addresses inappropriate use

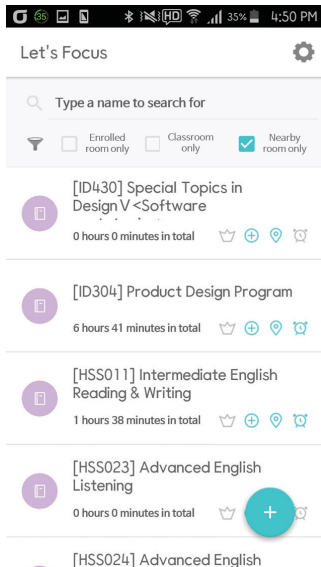
# Results: Overall

- Addresses inappropriate use
- Establishes norm of non-use

# Outline

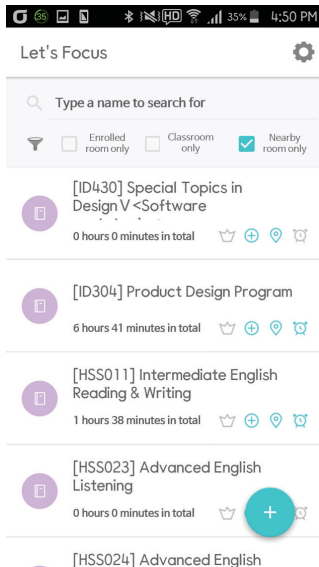
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# App Design: Virtual Limiting Rooms



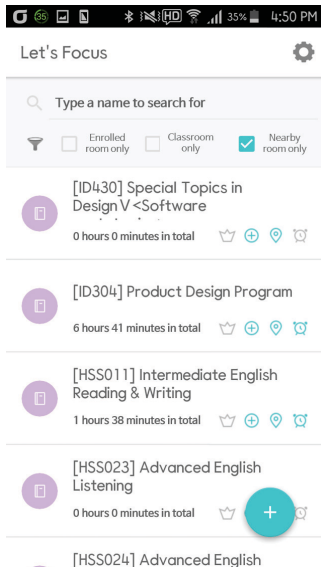
# App Design: Virtual Limiting Rooms

- Physical spaces



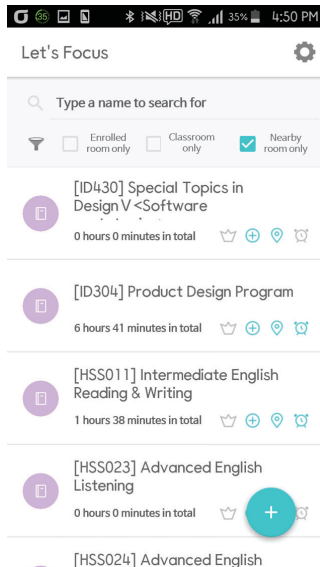
# App Design: Virtual Limiting Rooms

- Physical spaces
- Classes

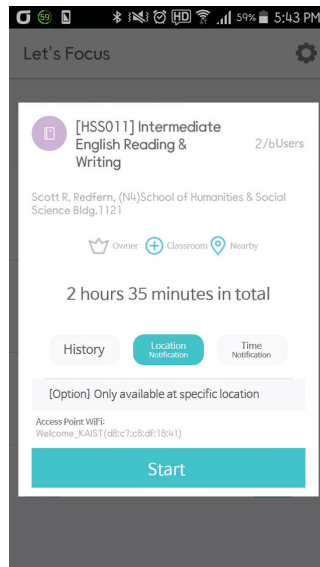


# App Design: Virtual Limiting Rooms

- Physical spaces
- Classes
- User created room



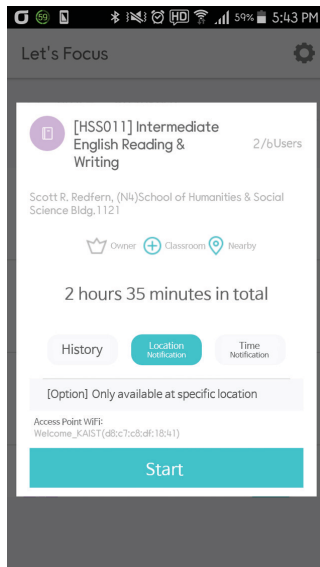
# App Design: Joining a Room (cont)





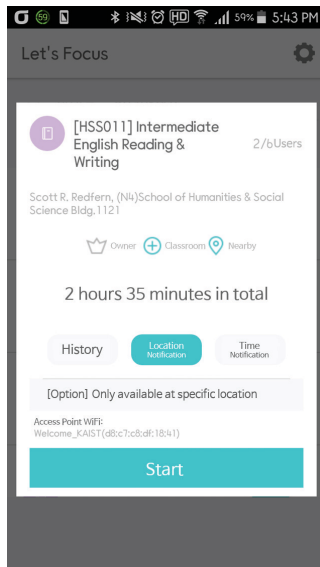
# App Design: Joining a Room (cont)

- Join room

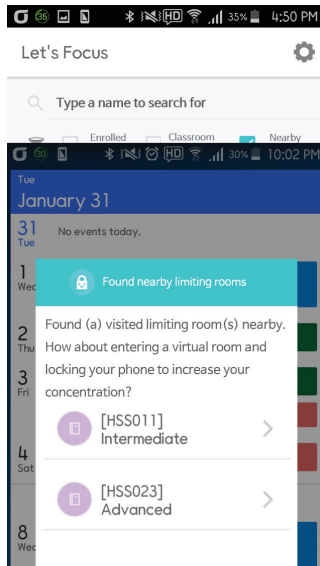


# App Design: Joining a Room (cont)

- Join room
- Time Spent

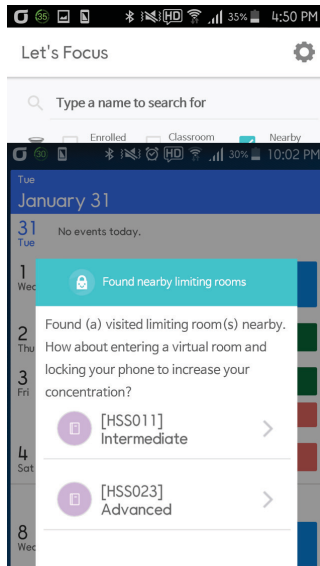


# App Design: Context-Awareness



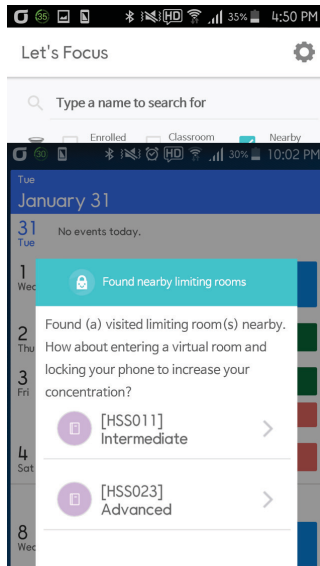
# App Design: Context-Awareness

- Push notification

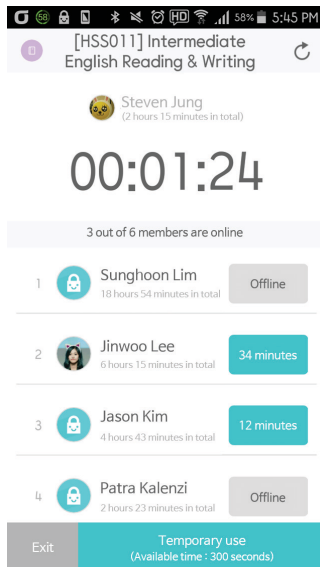


# App Design: Context-Awareness

- Push notification
- Location-based



# App Design: Focus Mode



# App Design: Focus Mode

- Block apps/notifications

The screenshot shows a mobile app interface with a dark status bar at the top displaying various icons and the time 5:45 PM. Below the status bar, the app title "[HSS011] Intermediate English Reading & Writing" is shown with a refresh icon. A user profile for "Steven Jung" is displayed with a yellow circular icon and the text "(2 hours 15 minutes in total)". A large digital timer shows "00:01:24". Below the timer, a status bar indicates "3 out of 6 members are online". A list of four members follows: 1. Sunghoon Lim (18 hours 54 minutes in total, Offline), 2. Jinwoo Lee (6 hours 15 minutes in total, 34 minutes), 3. Jason Kim (4 hours 43 minutes in total, 12 minutes), and 4. Patra Kalenzi (2 hours 23 minutes in total, Offline). At the bottom, there is a grey "Exit" button and a teal "Temporary use (Available time : 300 seconds)" button.

[HSS011] Intermediate English Reading & Writing

Steven Jung  
(2 hours 15 minutes in total)

00:01:24

3 out of 6 members are online

- 1 Sunghoon Lim  
18 hours 54 minutes in total Offline
- 2 Jinwoo Lee  
6 hours 15 minutes in total 34 minutes
- 3 Jason Kim  
4 hours 43 minutes in total 12 minutes
- 4 Patra Kalenzi  
2 hours 23 minutes in total Offline

Exit Temporary use  
(Available time : 300 seconds)

# App Design: Focus Mode

- Block apps/notifications
- Timer

58% 5:45 PM

[HSS011] Intermediate English Reading & Writing

Steven Jung  
(2 hours 15 minutes in total)

00:01:24

3 out of 6 members are online

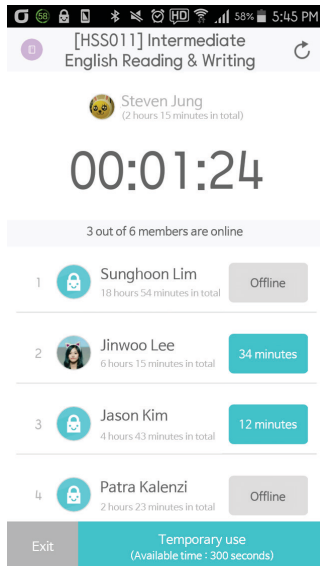
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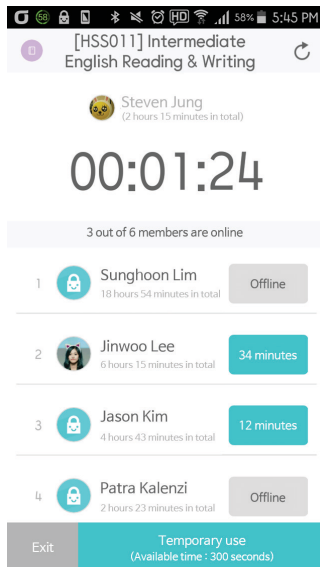
# App Design: Focus Mode

- Block apps/notifications
- Timer
- Temporary Usage Mode

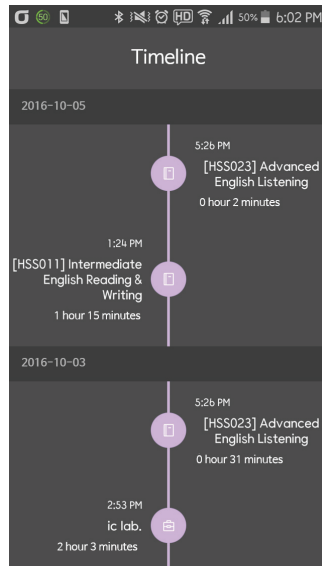


# App Design: Focus Mode

- Block apps/notifications
- Timer
- Temporary Usage Mode
- Leaderboard

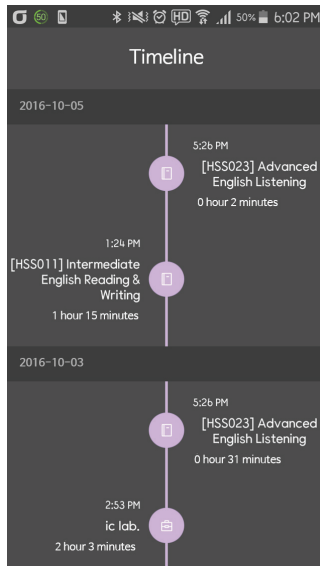


# App Design: Timeline



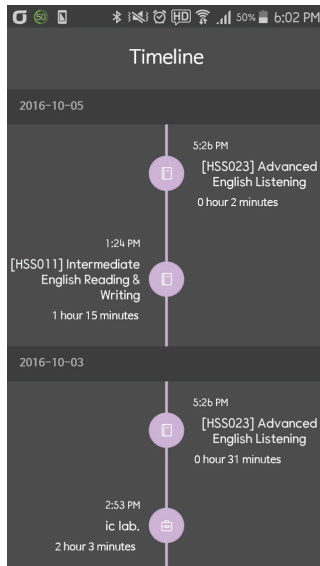
# App Design: Timeline

- Usage History



# App Design: Timeline

- Usage History
- Reflection and recall



# App Design: Android vs. iOS

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- iOS Limitations:

# App Design: Android vs. iOS

- iOS Limitations:
  - App/notification blocking



# App Design: Android vs. iOS

- iOS Limitations:
  - App/notification blocking
  - Temporary Use Mode

# App Design: Android vs. iOS

- iOS Limitations:
  - App/notification blocking
  - Temporary Use Mode
- Difference in results

# Deployment

- Large Korean university

# Deployment

- Large Korean university
- 47 days (beginning to mid term)

# Results: Overview

# Results: Overview

- User experiences

# Results: Overview

- User experiences
- Social influence



# Results: Overview

- User experiences
- Social influence
- Post-study changes

# Results: User Experiences

# Results: User Experiences

- Focus Mode

# Results: User Experiences

- Focus Mode
  - 63.3% users considered helpful

- Focus Mode

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- *"After the class, I could see the amount of time that had accumulated during the class. I was proud of myself because the time implied that I focused on the class successfully for 75 minutes without any smartphone use."*

# Results: User Experiences (cont)

# Results: User Experiences (cont)

- Temporary Use Mode

# Results: User Experiences (cont)

- Temporary Use Mode
  - 96.3% usage rate



# Results: User Experiences (cont)

- Temporary Use Mode

- 96.3% usage rate
- *"I used temporary use to search materials related to the class. 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."*

# Results: User Experiences: Android vs. iOS

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- Usability (5-point scale)

# Results: User Experiences: Android vs. iOS

- Usability (5-point scale)
  - Android = 3.99
  - iOS = 3.55
  - Significant Difference

# Results: User Experiences: Android vs. iOS

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  - Significant Difference
- User dissatisfaction

# Results: User Experiences: Android vs. iOS

- Usability (5-point scale)
  - Android = 3.99
  - iOS = 3.55
  - Significant Difference
- User dissatisfaction
- No significant difference in limiting hours

# Results: User Experiences (cont)

# Results: User Experiences (cont)

- Context-Aware Notifications



# Results: User Experiences (cont)

- Context-Aware Notifications
  - Preferred location-based over time-based

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- Context-Aware Notifications
  - Preferred location-based over time-based
  - Reminder of class

# Results: User Experiences (cont)

- Context-Aware Notifications

- Preferred location-based over time-based
- Reminder of class
- *"When I received the notification near a classroom, I recognized that the class would begin soon and that I should focus on the lecture."*

# Results: Social Influence

# Results: Social Influence

- Limiting Status

# Results: Social Influence

- Limiting Status
- *“When I entered a virtual classroom somewhat late, I saw the other classmates who were already in focus mode and I became aware that they had entered the room from the beginning of the class, yet I didn’t. I felt that I should not be late next time.”*

# Results: Social Influence

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- Leaderboards



# Results: Social Influence

- Leaderboards
- Familiarity

# Results: Social Influence

- Leaderboards
- Familiarity
  - *“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 users.”*

# Results: Social Influence

- Leaderboards
- Familiarity
  - *“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 users.”*
- Difference in records

# Results: Social Influence

- Leaderboards
- Familiarity
  - *“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 users.”*
- Difference in records
  - *“If other users’ records were similar to me, I felt very encouraged to match them. However, if the record differences were excessively large, for example ten hours, I did not feel any sense of competition.”*

# Results: Social Influence

# Results: Social Influence

- Co-location

- Co-location

- *"In the case of the virtual classrooms, there is a shared purpose of concentrating on the class together and I was strongly motivated to use Let's FOCUS. However, in the case of a virtual study room, I did not care as much because I was unable to know what they were doing and where they were. Moreover, there was no common purpose for limiting."*

# Results: Social Influence



# Results: Social Influence

- Established norm of non-use

# Results: Social Influence

- Established norm of non-use
- Healthy competition

# Results: Attitudes towards in-class Use

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- 84.2% negative

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  - Less concentration
  - Helpful use not necessary
- 15.8% positive

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- 31.7% reported change in attitudes
- 84.2% negative
  - Not as urgent
  - Less concentration
  - Helpful use not necessary
- 15.8% positive
  - Helpful use

# Results: Attitudes towards the app

# Results: Attitudes towards the app

- 74% wanted to continue

# Results: Attitudes towards the app

- 74% wanted to continue
  - Helped focus

# Results: Attitudes towards the app

- 74% wanted to continue
  - Helped focus
  - Tracking usage

# Results: Attitudes towards the app

- 74% wanted to continue
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  - Tracking usage
- 26% didn't want to continue

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  - Not restrictive enough



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- 74% wanted to continue
  - Helped focus
  - Tracking usage
- 26% didn't want to continue
  - Not restrictive enough
  - *"I think that it's better for students to voluntarily focus on the lectures and they should improve self-regulation by practicing self-control."*

# Results: Attitudes towards the app

- 74% wanted to continue
  - Helped focus
  - Tracking usage
- 26% didn't want to continue
  - Not restrictive enough
  - *"I think that it's better for students to voluntarily focus on the lectures and they should improve self-regulation by practicing self-control."*
  - Unaddressed underlying problem

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# Conclusion

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- Improve user awareness

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- Context-awareness aids users

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- Improve user awareness
- Context-awareness aids users
- Establish social norms

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# Acknowledgments

- Thank you to K.K. Lamberty and Michael Small for feedback and guidance.

## Questions?

- 1 Dey, Anind K: Understanding and Using Context, 2001
- 2 Ko, Minsam and Choi, Seungwoo and Yatani, Koji and Lee, Uichin: Lock 'n Lol: Group-Based Limiting Assistance App to Mitigate Smartphone Distractions in Group Activities, 2016
- 3 Kim, Inyeop and Jung, Gyuwon and Jung, Hayoung and Ko, Minsam and Lee, Uichin: Let's FOCUS: Mitigating Mobile Phone Use in College Classrooms, 2017