Texting from the Toilet: Mobile Computing Use and Acceptance in Public and Private Restrooms

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CHI'13, April 27 – May 2, 2013, Paris, France.

Abstract
The proliferation of mobile computing devices, wireless and cellular Internet connections, and an always-on culture have led to an upsurge in usage of mobile devices in unexpected and possibly unusual settings for many different tasks. As technology becomes adopted, it is important to examine how it is used and people's reactions toward these unusual uses. This will help in understanding and describing the expected etiquette surrounding the technology's usage. People now often use their mobile computing devices in both public and private restrooms. Through a survey of 204 respondents, we explored the acceptability of those practices and the types of tasks people complete using their mobile devices while in a restroom. We discovered 77% of respondents report using some type of mobile computing in restrooms, both public and private, for activities such as text messaging, web browsing, and email. We also determined that younger, male, and heavy technology users were more likely to use technology within restrooms. We discuss the various uses, social acceptance, and implications for technology design.

Author Keywords
Mobile computing, mobile phones, restrooms, social acceptance, social norms, etiquette

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms
Design, Human Factors

Introduction

The shrinking of mobile computing devices, their enhanced capabilities, and the availability of wireless Internet access has led to an "always on" culture of being connected wherever we go. Although this phenomenon has increased our connectivity in the world, it has also led to a number of uses of these devices in unexpected and unusual situations. Similar to how others have studied the etiquette surrounding other technologies [15], such as email [8],[17], the Internet [4], and general computer-mediated communication [14], there is now a strong need to understand what people consider acceptable uses of mobile technologies.

A recent Intel survey [10] reports that 92% of its respondents wished people practiced better etiquette when it comes to using their mobile devices in public areas. 91% of the respondents have seen people using their devices in unusual places; for example, 48% of the respondents have seen others use mobile devices in public restrooms. In addition, ubiquitous computing applications for use in restrooms have already been developed, such as using QR-codes on public restroom advertising, location-based public restroom finding and rating applications, capturing activities of daily living for elders [2], and even novel input techniques [7]. What these applications are used for, how they are used, and the extent to which people consider these uses to be disruptive or otherwise socially unacceptable is still not yet known. Thus, understanding the acceptability of computing within these spaces leads to better, more socially acceptable designs. Thus, in this work, we aim to better understand the current usage and acceptability of mobile device use in restroom scenarios.

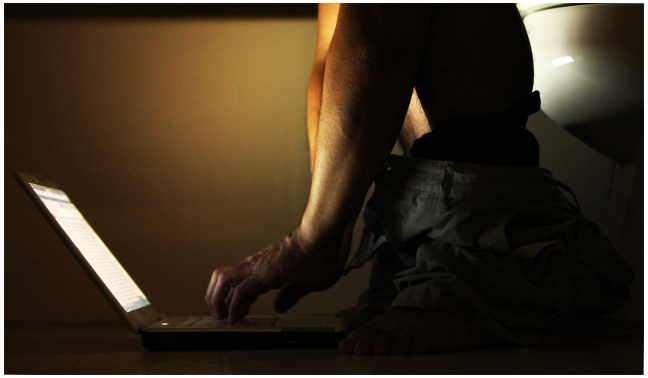

Figure 1: A person using his laptop while using the restroom.

In this paper, we present a study aimed to understand the use of, attitude toward, and etiquette for mobile computing devices in restrooms, both public and private. Through an anonymous online survey with 204 respondents in the United States, we were able to determine the percentage of people who use mobile computing devices in restrooms, the types of devices, the types of tasks, and the length of time spent. We also probed respondents on their opinions on the social acceptability of using devices within restrooms, and what use cases are appropriate. Lastly, we provide a short discussion on the design insights that can be learned from this work.

Survey Design

We designed an online survey that would allow us to obtain completely anonymous feedback to receive honest answers from respondents. There were a total of 34 questions, a mixture of closed-ended and open-ended, which asked about device use, device use frequency, task frequency, and specific incidences of device use in public restrooms. We also asked respondents to provide non-identifying demographic information, such as age, gender, occupation, and education level. We used Amazon's Mechanical Turk as a method for recruiting large numbers of respondents (Turkers) anonymously, using guidelines from Kittur et al. [5]. We filtered eligible responses to Turkers having at least a 95% hit acceptance rate and those residing within the United States. Each survey respondent was paid $0.25 USD, and the survey took 6–8 minutes. We also had respondents answer a verification question about objects within a photo to ensure that they were not bots or scripts. The design of the survey was reviewed by a university Institutional Review Board, and all respondents agreed to an informed consent statement prior to completing the survey. We considered other methods of obtaining the data, such as diary studies or interviews, but believed a completely anonymous data collection would result in the most honest responses from the widest range of users. This work complements other recent surveys that have explored mobile technology use [3],[10] as well as a marketing survey on specific use of information technology in restrooms [1] by going more in-depth on the qualitative experience as well as attitudes toward social acceptance and the nature and timing of tasks.

Table 1: Demographics of survey respondents

Demographic	Percentages
Gender	Male (36%), Female (64%)
Age	18-27 (36%), 28-34 (23%), 35-42 (17%), 43-50 (14%), 51 and older (10%)
Highest Level of Education	High School (9%), Some College (30%), College (34%), Some Grad. School (6%), Grad. Degree (18%)
Overall Technology Use	Much more than others (29%), More than others (38%), Average (30%), Less than others (3%), Much less than others (0%)

Results

We were able to recruit a fairly diverse set of survey respondents, although our sample is biased toward younger females and heavier technology users due to the demographics of MTurk users. Respondents came from 38 U.S. states. Professions included sales, information technology, students, self-employed, homemakers, education, and unemployed. Table 1 shows the overall demographics for the 204 respondents. Although our population is skewed toward younger users, a recent survey conducted by Pew Internet Research identified similar trends among mobile computing users in general [18]. Thus, our population is likely representative of the age distribution of mobile computing users.

A surprisingly large number of respondents (77%; 157 of the 204) use mobile computing devices in both public and private restrooms for a variety of tasks. We used a chi-square test of independence to examine the relation between demographics and technology use in a restroom. The relation between a number of variables was significant, including gender (χ^2 (1, N = 204) = 4.37, p < .05), age (χ^2 (4, N = 204) = 24.69, p < .001), overall technology use (χ^2 (3, N = 204) = 14.70,

$p < .01$), text messaging use (χ^2 (6, N = 204) = 46.34, $p < .001$), and whether the respondents had a phone with a data plan (χ^2 (2, N = 204) = 27.36, $p < .001$). This suggests that males, younger people (see Figure 2), heavier technology and text messaging users, and those with mobile phone data plans are more likely to use technologies in a restroom. These numerical trends seem to be similar to findings from previous work [1].

For those who answered "Yes" to ever having used a mobile device in the restroom, we also asked questions about which devices they used, how frequently, and for what tasks. Not surprisingly, the majority of devices used in restrooms were mobile phones (both cell phones and smart phones), with 95% saying they had used them. The other devices used, in order of most to least used, were music players (41%), laptops (34%), cameras (17%), e-book readers (6%), PDAs (6%), tablet computers (2%), and other devices (2%). For frequency, we asked respondents to report on whether they used each device daily, weekly, or monthly. Overall, 48% of all devices that respondents reported using were used monthly, 35% were used weekly, and 16% were used daily. Finally, we also asked whether respondents used their devices at home (*i.e.,* private), at restrooms away from their home (*i.e.,* public), or both. The majority reported that they used the devices in private only (48%), followed closely by both public and private (45%), and then a few reporting only using them in public restrooms only (7%). On a per-device basis, we noticed that mobile phones and music players were used in both locations, while laptops, e-book readers, tablet computers, and cameras were used mostly in private restrooms (see Figure 3).

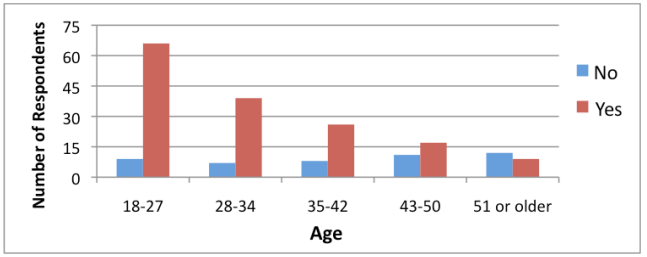

Figure 2: Technology in restroom use by age. Young people are more likely to use technologies in the restroom [Age: χ^2 (4, N = 204) = 24.69, $p < .001$].

Specific Tasks and Timing

Respondents reported on the types of tasks for which they used their mobile devices within the restroom. Survey choices included texting, email, phone calls, web browsing, games, work-related, social networking, taking photos, listening to music, watching videos, reading, and other, with respondents reporting on tasks completed in public, private, both, or never (see Figure 4). Because mobile phones were the most commonly used devices, the most popular tasks people completed in the restroom were text messaging and phone calls. Phone calls were more likely to be a private-restroom only task, though a surprising amount of respondents stated they made phone calls in both public and private restrooms. Web browsing and email were the next most common tasks. The least common tasks included work-related tasks and taking photos.

We asked respondents who reported using mobile computing devices to provide a detailed example of a task they had recently completed in the restroom, and followed up with questions on reasons, whether it was planned, and predicted and actual timing. We coded these tasks using open coding and the constant comparative method. The tasks people described

aligned similarly to the overall tasks people reported, including texting (43), phone calls (36), email (22), web surfing (15), and games (12). Others provided detailed descriptions of unique or opportunistic uses, such as "*I had to look up diagrams of toilet parts in order to determine what specifically was wrong with ours*." On average, people expected the task would take them 4.4 minutes (*SD* = 6.1); however, people reported it typically took them longer at 5.1 minutes (*SD* = 7.5). At a minimum, tasks took just a few seconds, but respondents reported a maximum expected time of 42 minutes, but then spending up to 60 minutes on the task. Respondents who used devices in restrooms reported how much time they typically spent doing a task and then how much time using computing devices added to their intended stay in the restroom (see Figure 5). The majority stated that tasks took between 1-2 or 3-5 minutes, and over half said that the time added to their restroom stay was 1-2 minutes.

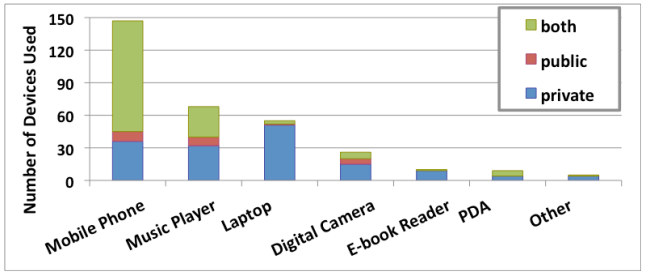

Figure 3: Usage of mobile devices in public vs. private spaces.

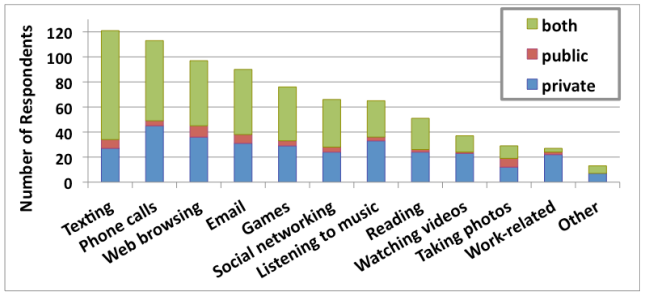

Figure 4: Tasks people conducted in restrooms by location.

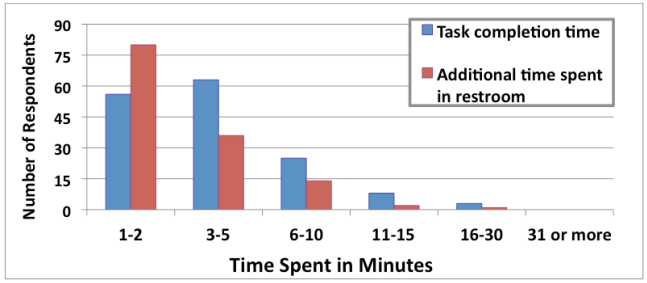

Figure 5: Timing of tasks completed while in restrooms.

Reasons for Using and Not Using

We asked those who did use devices to specify the reasons for choosing to do their tasks in the restroom. Survey options included ease of use, the subtlety of the task, boredom, urgency, and an "other" category, with respondents being allowed to choose more than one reason. Ease of use was the most popular reason (33%), followed by boredom (26%), the urgency of the task (22%), the subtlety of the task (9%), and other (10%). Other responses included needing privacy, continuing a task in progress, responding to an event that happened within the restroom (*e.g.,* receiving text

message or phone call), making productive use of time, and satisfying a need or curiosity.

We also asked respondents who reported using devices within the bathroom what influenced their decision to do the task or not. Reasons people chose included whether other people are around (19%), subtlety of task (9%), boredom (17%), current level of busyness (9%), the time you were planning to spend in the restroom (11%), the urgency of the task (19%), and receipt of phone call, text message, or email (18%). Some reasons were social in nature, including "*I needed a break from my family and relatives, so I retreated to the bathroom, and when I was sure nobody was there, I called a friend to complain about them for a few minutes and vent,*" "*I was on a date at a restaurant, and when I went to the bathroom, I sent my BFF* [best friends forever] *a text from my cell phone about how the date was going*," and "*I was speaking with a friend on the phone, and they really needed to talk. However, I really had to go to the bathroom. But I didn't want to interrupt. So I held my finger over the mouthpiece and sat on the toilet listening. I think they didn't hear, I hope.*" This exemplifies instances when mobile technology is used in restrooms in order to remain socially courteous to others.

We asked all survey respondents to state reasons why they would not use their mobile computing devices within a restroom. The reasons were fairly split, with the most popular being social ones: they did not want to bother others (19%) or that it was impolite (18%). The other reasons were sanitary concerns (18%), inconvenient to use (13%), afraid of damaging the device (e.g., water, humidity) (13%), and not enough time (10%). We provided an "other" option, but only a few responded. Those reasons included time ("*just don't have a need to*," and "*I'm not that crunched for time that I have to use a computing device while I'm in the bathroom*"), concerns about how they might be perceived by others ("*don't want to look like an idiot in the public restroom*"), and privacy ("*inadvertent eavesdropping by others*").

Social Acceptance and Etiquette

We asked all survey respondents to discuss aspects of social acceptability and appropriate uses and to describe experiences observing others using devices within a restroom. The primary acceptable use themes for public restrooms that emerged from our coding were emergency calls or else tasks done discreetly and silently, did not interfere with others using the restroom, did not invade others' privacy, and that required smaller devices (*e.g.,* not laptops). Comments included, *"Any use that does not block people walking into or out of the restroom. Any use that is not loud. Any use that does not result in spending a long time in the restroom," "Again, as long as you aren't being rude to the person on the other end, I see no harm in it. Also, keeping the other people in the restroom in mind is key, you don't want to be too loud or obnoxious, or talk about things that are incredibly personal or could be offensive to other people,"* and *"only to be used in an emergency due to health risks."* Still, there were at least 50 respondents (24.5%) who considered nothing to be acceptable use in public restrooms, saying things such as *"it's weird and unsanitary"* and *"in my opinion, there is no acceptable use of any type of computing device in a public restroom."* There were a few who thought it was okay if the person was using it not in the toilet stalls, such as in a lounge area.

For private restrooms, however, nearly half of all respondents (98) felt that anything that was done there was acceptable. Others still did not find it acceptable due to sanitary reasons, while some thought that it would be tacky to speak on the phone to someone though other use was acceptable. Comments included, *"Whatever you are comfortable with especially if the other party cannot tell where you are or what you are doing"* and *"anything and everything within reason, really."* For unacceptable use, the themes that emerged were mostly the opposite of acceptable uses, such as phone calls, taking photos or videos, occupying a stall while others are waiting, or things that invaded others' privacy or comfort.

Discussion

A surprisingly large number of respondents reported using mobile computing devices in the restroom. Our findings indicate much higher use than a recent telephone marketing survey that indicated 40% of people use mobile phones in the restroom [3], though similar to a more recent market research study on IT use in the restroom [1]. Our completely anonymous method may have accounted for this difference, as the Harris survey also reports respondents seeing many others conducting "bad phone behaviors" but only one in five admitting to doing the behaviors themselves. Another possibility is the more technically savvy MTurk population we studied. Interestingly, several respondents commented that they thought they were alone in their use of technologies in restrooms and were relieved to see our survey because it meant use may be more widespread than they imagined. This leads us to believe that computing behavior in restrooms may be an "everybody does it, but nobody talks about it" phenomena. Social reasons seemed to be the biggest concern surrounding use of mobile computing devices within the restroom, with many feeling the practice was acceptable as long as it was discreet and did not interfere with others. Others commented that they often did not witness others using mobile computing devices within restrooms, so it appears as though people are already discreet. This raises some possible privacy issues, because a surprisingly large number of users reported using cameras in public restrooms. Perhaps policies on restroom mobile computing use may be needed. If it is difficult to enforce, technologies that block cell phone signals or camera recording [13] could be used. In addition, because users in a public restroom may not know that someone else is waiting, a signal if someone needs to use the restroom may help eliminate excessive use. Some of the reasons for why people used mobile devices in the restroom were because they felt that they did have more of a sense of privacy there, and thus there may need to be measures to discourage recording.

With regard to application design, many people conducted short tasks while in the restroom, which lasted from a few seconds to up to 1 hour, with an average of 5 minutes. The HCI community has become interested in the concept of these short bursts of interaction [12],[19], such as checking email or web surfing while on a bus, waiting at the post office, or while in the kitchen. Several have suggested these short bursts can be used for productivity or utilizing otherwise downtime [8],[9]. By understanding the context and character of these short bursts of activity, we now know that application designers may take advantage of this time, as long as the user is comfortable with using their device in the restroom and

designers minimize any potential disruption. Applications that might be designed for use in restrooms should be silent and require short interactions, such as the approach taken by QuietCalls [11]. There also seems to be a concern surrounding the sanitary nature of using mobile phones in restrooms. Perhaps more ways of allowing hands-free interactions or providing sanitary wipes for electronic devices may be needed in the future. Applications that may be used one-handed [20] or hands-free [16] could also be desirable. Without the use of speech or other non-discreet interactions, it may be difficult to find a balance. Gestures may be appropriate as long as they are not within view of others. In general, we would discourage use of recording devices of any kind.

The prolific use of mobile computing devices in restrooms seems to be reflective of an increasing culture of busyness, which has been the recent focus of study among human-computer interaction researchers [6]. The fact that people are willing to take and use their mobile devices may indicate that this culture is strong and perhaps somewhat addictive. Future research that helps people to more easily disconnect from their technology is needed.

Finally, there is some future work that may be needed surrounding the use of methods for recording discreet technology use. In this work, we discussed numerous strategies for collecting data on mobile device usage in restrooms. For obvious reasons, direct observation would be difficult and perhaps unethical, as even public restrooms are places where people expect some manner of privacy. We did consider more indirect observational techniques, such as logs or diary studies, but these methods often place a high burden on the participants and require some sort of respondent compensation. Because we wanted to ensure the full anonymity of respondents, we had to compromise and use self-reported data. Tools that can allow for more anonymized approaches to observational techniques of technology use may be useful for sensitive data collection situations.

Conclusion

In conclusion, this study helped characterize the nature of mobile computing use within both public and private restrooms through a survey with over 200 respondents. The practice appears to be fairly widespread, stemming primarily from it being easy to do and boredom. The trend of using technology within restrooms appears to depend on the user's age, gender, and affinity with mobile technology. Young men who have data plans on their cell phones and text message were significantly more likely to use mobile phones in restrooms. This could signal a shift in attitudes among the younger, more technology-savvy generations. We also analyzed the results to understand the etiquette surrounding mobile computing use and discovered people are fairly polarized in their views of acceptability, with approximately three quarters finding the practice to be socially acceptable if it is short and discreet, and the remaining quarter being strongly against its use.

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