Increasing Recycling Behaviors through User-Centered Design

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Abstract

Recycling bins are grossly underutilized products as well as being often misused. The EPA estimates that while 75 percent of Americans trash contents can be recycled, only 25 percent actually is [3]. In addition, contamination of recyclables, either from food items or other non-recyclables, is a widespread problem. In Washington University, for example, almost 70 percent of material contents in recycling bins are deemed unusable due to contamination [6].

Three factors that greatly affect recycling behaviors are awareness, convenience, and opportunity. Using observational and interview data, and informed by the literature, we present here our preliminary findings regarding user recycling behaviors. From this data we have developed a holistic solution to help increase purposeful recycling behaviors on a college campus.

Keywords

User-Centered Design / Human-Centered Design, Ethnography, Experience Strategy, Education, Recycling Behaviors, Experience, Cognitive Design

Problem Statement

The majority of recycling bins do little to promote frequent use [8], nor do they discourage improper contents or prohibit the discarding of non-recyclable products.

Americans throw away 25,000,000 beverage bottles every hour. According to the EPA, recycling a pound of PET plastics (approx. five 3-liter bottles) saves approximately 12,000 BTUs [3]. Given the amount of available recyclable content and the energy-saving benefits or recycling, we were motivated to explore how we could better support and encourage individuals to actively participate in the recycling process.

This design research focuses on methods to redesign the utilitarian recycling bin as a catalyst for behavior modification that promotes usage as well as reduce the error rate while maintaining the desired behavior.

For the purposes of our investigation, we selected a heavily trafficked area on a large university campus. Despite the presence of recycling bins throughout this campus, plastic beverage containers and other recyclables were frequently observed in regular garbage cans in various locations (see Figure 1). This paper describes our exploration on this topic, as well as the actionable insights that emerge from the research. We present a design implementation that aims to educate consumers on the importance of purposeful and frequent recycling.. This change in behavior can make an impact on several scales : personal, campus-wide, regional, and eventually global. It also has the added benefit of making a positive change in both an ecological as well as an economical standpoint as the increase in recycling is inversely proportioned to the amount of garbage processed.

Background

- Melissa Zlatow, design researcher, MSD candidate
- Project dates and duration: 4 weeks
- Class project, Design for Healing, research methods

Approach

An outdoor rest area on the campus of Arizona State University nicknamed "The Fountains" was identified as the pilot site because of its proximity to a large cluster of popular campus shops and restaurants. This location is a high pedestrian traffic area usually bustling with faculty and students throughout the day, with a significant peak during the prime lunch hours of 12 and 2 PM.

Data was gathered by direct observation, surveys, semi-structured interviews and secondary research.

Findings

All 23 participants interviewed during peak hours at the research site agreed that recycling was necessary. However, of those interviewed who were actually carrying recyclable material, the majority stated their lack of intention to actually recycle as they were unaware of the location of recycling facilities.

Upon closer inspection at the site, we discovered that even though the garbage containers and the recycling bins were less than ten feet apart, their contents were nearly identical. Trash cans contained just as much aluminum and plastic as the recycling bins did left over food items. This was hypothesized to be due to the almost identical nature of these bins; the sole distinction was a blue lid marked 'recycling'. Despite their proximity from the receptacles (<30 feet), interviewees were usually unable to locate the closest recycling bin, but were able to easily identify where the

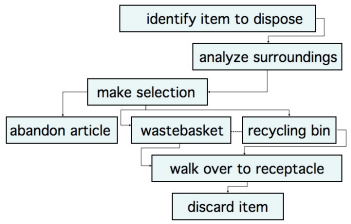

Figure 4. User activity web

closest trash can was (or what they thought was a trash can) [10].

Three main user groups were identified and categorized in the target area: *conscientious casters, distracted disposers,* and *fickle flingers (see appendix 1)*.

Conscientious casters are characterized by individuals who walk directly to the recycling bins with appropriate items to discard. This group consists of habitual recyclers who target the bins before continuing on their path.

Distracted disposers are those found deeply involved in other activities such as talking on their cell phones, reading, or conversing with others. Disposal appears to be a secondary activity. It was also noted that this group was the most likely to place items in inappropriate receptacles (i.e. trash in the recycling bins and vice versa).

Fickle flingers form the final and most commonly observed type of user group. This group is focused on finding an acceptable site to discard their items. When made aware of recycling bins within a comparable distance, they will usually choose this alternative.

Implications

Based on our observations and interviews, the majority of the people we encountered (fickle flingers) would increase their recycling behaviors as well as improve their accuracy if bins were not only readily available, but also convenient and clearly marked. Background research also indicates that education and experiencing positive relationships with products can play a key role in increasing future interactions [2,9].

Challenge

One of the main limitations in this project was the lack of a formalized method to follow up on a particular set of participants, as opposed to relying on the dynamic influx of students and faculty casually entering the research site. In retrospect, it may have provided additional insights to have the same group of participants initially observed at the site also participate in the participatory design phase of the project.

Solution

A. Process

The analysis of the data collected through direct observation has lead to the identification of several features that will be integral to the enhancement of the recycling experience.

Accepted frameworks of defining experience [5] helped identify appropriate design opportunities to promote change in monotonous and deeply entrenched behavior. Discarding items, whether it is trash or recyclables, is a well learned activity that can easily fall under the subconscious radar. Consequently, this near-automatic response, when encountered by an unfamiliar context can cause an individual to shift to a cognitive framework. In this scenario, the user is forced to focus on the task at hand, which can result in either new knowledge or confusion, depending on the product design [2].

Other best practices we would have liked to incorporate are the inclusion of automatic compactors inside the bins as well as advanced technological solutions, such as interactive robots or one-of-a-kind masterpieces created entirely out of the corresponding materials (i.e.

a thousand pull tabs adorning the aluminum recycling bin. However, given the scope of our current research and budget constraints, we decided to focus initially on low-cost, localized design improvements.

B. Solution details

AWARENESS

Due to the fact that most individuals interviewed were unable to properly identify the location of the closest recycling bin [10], visibility is addressed by clearly labeling bins at eye level as well as strategically placing information signage indicating locations of recycling bins. By indicating the closest locations at the point of sale, it also helps prime individuals into thinking about what to do with their products afterwards.

Another opportunity to engage users is to incorporate a way in which to translate statistical and revealing information into relevant and unexpected ways. Although one can state that 2.5 million plastic bottles are used in the US every hour, that knowledge only becomes tangible when the individual is faced with a portrait that actually encompass the entire scope of the issue at hand. A profound and though-provoking example can be seen in Chris Jordan's' work entitled, Running the Numbers: An American Portrait [7]

EASE OF USE

Clearing marked compartmentalized containers can simplify the act of segregating recyclables which currently have to be sorted by hand at another location. Semantic forms also help dictate the proper items to be placed in the proper container along with holes that require close contact (as opposed to being able to toss item from a distance), thus reducing the error rate that can lead to the contamination of the contents (see appendix 1).

FOSTERING RELATIONSHIPS

By engaging users on a deeper level, a relationship is formed between the individual and the product, and so the product rises in value and efficacy and encourages future interaction [2]. This could be achieved by several methods:

- rewards system in which the current student ID containing RFID technology automatically keeps track of the amount of recyclables deposited in order to 'trade in' for future prizes such as free music downloads
- educational material, or 'fun facts' meant to provoke thought and inspire continued recycling behavior (i.e. recycling one aluminum can could save enough energy to power your television for three hours.)

End-users interviewed at the research site were also asked to join focus groups and participate in informal brainstorming sessions. These sessions were designed to generate ideas in the initial phase of the project, while participatory design strategies were later employed to to aid in refining the initial design solution. The design achieved focuses on transforming the mundane act of recycling into a pleasurable and convenient experience.

Some of the constraints in this solution rely in the number of products that can be manufactured and implemented based on cost per item. Production will be an important factor when considering the final design, so moving parts should be limited, as should custom sizes in order to be able to utilize existing container sizes. This will help reduce the cost as well as make it easier for the users who have the task of emptying the containers and replacing the plastic liners.

This design concept will also affect business by reducing the frequency of trash pickup, as well as encourage the formation of a cultural norm in which recycling is almost second nature, such as those established in cities such as Portland or Austin.

Because end users are engaged from inception to evaluation, their input was constantly received. The overall responses have been positive, addressing all voiced concerns.

C. Projected Results

The assumption is that after implementation, the redesigned recycling bins, along with the educational component, will initially increase recycling behaviors on the ASU campus, but will also perpetuate the change in behavior in other locations providing the convenience and awareness of proper disposal units are consistent.

Success can be measured quantitatively by weighing the amount of items recycled, as well as qualitatively with post-test interviews and observations. The intention is that the impact not only affects the users who come into contact with the product, but that those users in turn also continue to propagate the behavior by educating their peers and family members.

In addition, success can also be measured by adoption of this approach on other campuses and locations.

Some insights that we have gained in working on this project are the importance of accounting for human behavior and motivations in your final design. A successful design can change its form multiple times through an iterative process of design, testing and evaluation. However the underlying research motivation focused on human behavior remains stable and consistent.

The methodologies applied in this project are conducted in a way that allows for replication. While the actual participants would change, the demographics would remain the same, and we would expect largely similar results. One aspect that we would like to explore further is investigating the process of recycling from another perspective, such as that of building supervisors or of the people who have to empty them out. For example, currently the ASU recycling staff do not have a set schedule for pickup, so they rely solely on visual cues or prompts from building managers in order to come and empty out the containers. By embedding wireless sensors, or even simply adding clear windows near the top of the containers to indicate capacity could save time, money and reduce the visual blight of overflowing containers.

Future directions

Some aspects of this project we would like to pursue in the future include integrating a gaming aspect to the product itself. Much like a ping pong table creates a different experience than that of a pinball machine, involving multiple users may also be a way to encourage a relationship with the product through meaningful and engaging co-experience [1].

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Appendix 1 : User groups and design implications

Figure 5a.

Conscientious Casters - individuals who walk directly to the recycling bins with appropriate items to discard.

This group consists of habitual recyclers who target the bins before continuing on their path.

Figure 5b.

Fickle Flingers –

Main task is locating an acceptable dump site. Individuals in this category are in search for a place to discard their items. This group made up the majority of the users.

Figure 5c.

Distracted Disposers - Found deeply involved in activities such as talking on cell phones, reading, or conversing with others. Disposal seems to be a secondary activity.