Introduction/Abstract

Over the past year, Eco-Reps Samantha Friskey and Hope Lu collaborated with the School of Social Policy and Practice (SP2) Green Team with the objective of improving recycling efforts and overall sustainability practices at both buildings at the Caster Building and the Center for High Impact Philanthropy. SP2 approached the Eco-Reps with three main areas of interest: 1) reducing dependency on plastic plates and utensils, 2) reducing food waste production, and 3) standardizing signage hung above waste and recycling bins. While we did touch on all three objectives, we centralized our efforts around signage and education throughout the buildings. We began our semester studying the current waste habits, utensil usage, and food waste practices in both buildings, then, surveyed the SP2 occupants (students/faculty) to assess their previous recycling knowledge and to better understand occupants’ waste disposal habits. Using this information, we consulted the SP2 Green Team on how to improve in these areas of concern and decided to focus on improving recycling and waste practices, while making some general recommendations regarding plastic dependency and food waste production.

Project Goals

The overall goal was to improve SP2’s sustainability practices by addressing plastic usage, reducing food waste, and improving waste and recycling practices in both buildings. In order to reduce plastic usage and food waste, we identified alternatives to mass orders of plastic utensils and attempted to quantify the amount of waste generated from over-ordering at office meetings and events.

We aimed to reduce cross-contamination in trash and recycling bins by clarifying for users where they should be placing waste and what items are recyclable. We wanted to do this through the standardization of their recycling and landfill signs and by running a sustainability campaign. We wanted to encourage individuals to consciously think about their habits and improve overall diversion rates. Again, the first two objectives have primarily been addressed through a preliminary quantification and are objectives that Social Policy & Practice should focus on in the future with other Eco-Representatives if possible. The third objective of improving the waste stream of the two buildings was accomplished through the standardization of signs and campaigning. The effectiveness of the project was evaluated primarily through the metrics of real recycling rate and contamination rate (from waste audits) and a pre/post-campaign survey.
Other rates were also included for the sake of analysis. The real recycling rate measures the amount of waste that is properly recycled. The contamination rate measures the percent of incorrectly placed waste, for instance, waste found in the recycling bins.

**Research Findings**

With respect to the objective of reducing their plastic utensil and plate usage, we looked into Preserve products. Their Everyday product line which is made of 100% recycled-content plastic, BPA- and melamine-free and are designed to be used indefinitely. We chose these products due to their sustainability qualities, durability, and appealing aesthetic. Preserve also offers packages with reusable utensils and cups. We eventually recommended a specific package: The Everyday Tableware Pack of 20. Beyond these findings, we also considered other reusable products, such as ceramic plates and glass cups, which are not optimal for SP2 due to portability. Preserve products are lightweight and unlikely to shatter if dropped. We determined that these would sufficient in reducing SP2’s single-use plastics. However, until SP2 invests in a dishwasher, these items were not considered practical.

<table>
<thead>
<tr>
<th></th>
<th>Preserve Product-Everyday Tableware Pack</th>
<th>Ceramic Amazon Basics (separate purchase of silverware and plastic cups)</th>
<th>World Centric's Biodegradable and Compostable Wheat Straw 9&quot; Plates</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost</strong></td>
<td>$120</td>
<td>~$95</td>
<td>$38/ 200 plates</td>
</tr>
<tr>
<td><strong>Portability</strong></td>
<td>Portable, not easily shattered because of melamine material</td>
<td>Easy to shatter, best utilized in single location</td>
<td>Portable</td>
</tr>
<tr>
<td><strong>Durability</strong></td>
<td>Designed to last</td>
<td>Can withstand higher temperatures, also designed to last</td>
<td>One-time use</td>
</tr>
</tbody>
</table>

For our food waste reduction objectives, SP2’s Green Team intended to assist us in assessing how much food waste they produce by providing photos of meetings and events. However, it was difficult to quantify the amount of food waste visually without any substantive weights. This objective is another one SP2 could continue to work on in an upcoming semester and do
more research on how to reduce food waste in both buildings. These images provide a few examples of
the pictures that SP2 Green Team were able to provide us.

To gain an initial understanding of the waste stream in the Caster Building and the Center for High
Impact Philanthropy, we audited the containers on each
floor and analyzed the main areas of improvement. We
noticed that most of the bins were not consistent in terms
of signage. Some had black and white signs of the
standardized recycling signs but not of the trash signs.
Other locations lacked signs altogether, and/or signs were
placed on the bins themselves in non-visible locations.
The three main issues with the signage were:
  - Placement
  - Protection (no lamination)
  - Consistency (lack of signs, different signs used)

Aside from signage, location of the bins was another consideration. Most of the bins were adequately
located but a few were in areas of low traffic (low amounts of total waste found). For the bins that were in
areas of low traffic, we moved them to nearby areas of higher traffic.

Signage placed on side of bin  No Bin in high-waste area  Inefficient placement (too close together)

**Methodology**

After our initial meetings with the SP2 Green Team, we decided to conduct a series of waste audits at
both buildings. We completed three waste audits in total at each of the two buildings, each time assessing
the same pairs of recycling and trash receptacles.

During our first waste audit, we hung informational signs created by the Penn’s Sustainability Office that
clearly described what can and cannot not be recycled over all of the waste and recycling receptacles. The
first audit served as baseline data; the preceding two audits intended to assess whether or not our signage intervention affected any changes in the waste disposal habits of SP2 visitors/students/faculty.

**Part I: Campaign**

After our initial waste audit, we determined the contamination rates of both buildings were relatively low (average rate of 11.46% at Caster and an average of 10.92% at the Center for High Impact Philanthropy), so we focused our first set of educational posters for our campaign on reducing overall waste (pictured right). Along with hanging these posters in both the Locust and Walnut buildings, we designed a PowerPoint slide to educate those who entered SP2, which was featured on the plasma screen in the lobby of the Caster building.

During our second audit, we noticed a substantial amount of coffee cups, many of which were improperly disposed in the recycling. We decided to tailor our campaign materials to target both the amount of disposable coffee cups used (pictured right) and to promote a better understanding of which parts of a coffee cup could/could not be recycled.

**Part II: Survey**

After our first waste audit, we sent out a survey to the students of SP2 to assess their experiences with waste disposal and to test their knowledge of what can and cannot be recycled. The survey can be accessed here: [https://docs.google.com/forms/d/e/1FAIpQLSertfFybfqKvVtachyXEEniQzWnR18UNIEhYTXe9DRrChRIuYA/viewform?c=0&w=1&usp=mail_form_link](https://docs.google.com/forms/d/e/1FAIpQLSertfFybfqKvVtachyXEEniQzWnR18UNIEhYTXe9DRrChRIuYA/viewform?c=0&w=1&usp=mail_form_link)

**Results and Evaluation:**

From our sixty-nine survey responses, we discovered that the majority of students found the waste and recycling receptacles easily accessible (85.5%). We also found that a over a fifth of students (23.2 %) found the receptacles to be poorly labeled. This response from students reinforced our hanging of signs during the first audit.

From our survey, we also determined that 39.4% of students wrongly believed that disposable coffee cups were recyclable, leading us to hang up new signage that addressed this misconception. While we did not have time to definitively measure the amount of coffee cups during this second and third audit, we are hopeful that the campaign was effective in improving coffee cup disposal habits.

Our most promising finding is that by the end of the third waste audit, average contamination rates at both locations were lower than the baseline data from the first waste audit. The contamination rate at the Caster building lowered to 8.76% (a 23.56% decrease), and the contamination rate at the Center for High Impact
Philanthropy lowered to 7.82% (a 23.28% decrease.) These results suggest that proper signage over receptacles can lower contamination rates and was an effective intervention.

**Recommendations for Future Projects:**

Based off of our results, we recommend SP2 continue to use the standard signs designed by Penn’s Sustainability Office. If at all possible, we recommend SP2 standardize the actual receptacles (standardize bin size / color / etc.)

Moreover, although the Preserve products are a potential solution to reducing single-use plastics, we recommend SP2 considers investing in a dishwasher, so students.faculty don’t leave unwashed dishes, which was a significant concern. If in the next semesters, Eco-Reps are not able to run a pilot of the Preserve products, future Eco-Reps should consider testing out whether or not the products reduce the usage of plastic utensils, and whether or not the lack of a dishwasher is a significant roadblock to proper use of the products. As of now, purchasing new bins or Preserve products is bound by the budgeting of SP2.

In terms of food waste, future Eco-Reps may wish to continue conducting occasional waste audits, specifying the amount of food waste that is produced. They may also consider solutions to the food waste by introducing a compost bin (if permitted by housekeeping) or introduce new signage that directly talks about food waste. The development of this signage may have to go through design professionals.

For SP2’s waste stream, it may be effective to do monthly campaigns that focus on reminding faculty and students to be aware of what they are throwing away. For example, we consistently found non-recyclable components of coffee cups in recycling bins, so we asked SP2’s Green Team to send out a coffee infographic on our behalf. SP2 also has flat screen TVs and other methods of communicating methods/events that should be further utilized.

For waste audits, it may be more effective to conduct them after a few days of waste collection. This may require coordination with the housekeeping of the buildings, but in a few of the locations, there was not significant waste to and the associated numbers would have been more accurate had there been more waste to measure overall.