ZERO WASTE FINAL REPORT

Delivering tangible initiatives to mitigate contamination in tri-stream bins at UCLA

UCLA Sustainability Action Research

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ABSTRACT

The 2022 Sustainability Action Research (SAR) Zero Waste team focused on campus-wide contamination, based on feedback from the entire student body and waste data from three distinct buildings: Kaplan, Boelter, and Public Affairs. This approach was in contrast to previous Zero Waste teams, which have honed in on waste management at particular locations, such as the Charles E. Young Library. As a result, the 2022 team sought to identify contamination trends and their origins within the entire centralized tri-waste system. Addressing this knowledge gap is a critical step in reducing contamination which will ultimately support The University of California, Los Angeles' (UCLA) progress towards its sustainability goals and limit environmental harms. To answer these questions, the Zero Waste team conducted informational interviews with the building managers of each audited building to gain insights into waste management practices. Secondly, visual waste audits were conducted at each building during the winter and spring quarters. During the audits, the extent of fullness and contamination for each waste stream (compost, recycling, and landfill) was quantified and commonly contaminated items were recorded. Lastly, a survey was sent out to the student body assessing current sorting knowledge, barriers to proper sorting, and ideas for zero waste initiatives and resources. Interview results indicated that managers may need department-wide training and clearer instructions for handling unique waste. The waste audits demonstrated a direct correlation between building usage and fullness. On average, the landfill stream contained the most contamination, the majority of which was compostable soiled paper materials. The survey suggested that students are most confused by how clean recyclables need to be and how to sort items of mixed materials. Lastly, many students hold sorting misconceptions related to Styrofoam, plastic films, plastic cutlery, bioplastics, and animal-based foods. Through the lens of equity, diversity, and inclusion (EDI), these research findings will be translated into resources and recommendations that promote greater accessibility to zero waste information and initiatives, ultimately fostering UCLA's sustainability goals.

MEET THE TEAM

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BACKGROUND

In Los Angeles, California, "Zero Waste" is defined as maximizing diversion from landfills and reducing waste at the source (EPA, n.d.a). As outlined in the most-recent 2022 Sustainability Plan, UCLA's policy goals include waste reduction and 90% diversion of municipal solid waste by 2024 and 2025, respectively (UCLA, 2022). In this case, reduction is any method that limits the amount of waste produced, including reusing, food recovery, or preventing unnecessary waste generation. Diversion refers to the process of sending waste to recycling or compost instead of the landfill. This goal, however, can be subverted when waste items are improperly sorted, especially if items that can be recycled or composted end up in the landfill. Improper sorting results in waste being placed in streams for which they do not belong, a phenomenon known as contamination. Considering that food items and recyclable paper material made up 24% and 12% of the total landfill waste in the U.S. in 2018, respectively, contamination is a relevant issue nationwide (EPA, n.d.b). The failure to divert compostable and recyclable materials has vast consequences, such as exacerbated climate change as decomposing organic matter releases methane, a potent greenhouse gas. (Vaverková, 2019). Therefore, it is critical that UCLA take concrete actions towards reaching its Zero Waste goals.

INTRODUCTION

PURPOSE

Recently, UCLA transitioned to a centralized waste system with three streams (compost, recycling, and landfill). Large, three-stream containers with informational signs are now spaced throughout facilities and have replaced small personal waste baskets (UCLA Sustainability, n.d.). Given the recency, there is a lack of data on how effective the new system is at diverting waste and decreasing contamination. Thus, there exists knowledge gaps related to the extent of contamination as well as how and why contamination arises. Therefore, UCLA's SAR Zero Waste team is seeking to identify contamination trends and their sources which will ultimately inform initiatives to promote UCLA's goals of diversion. While previous Zero Waste research has focused on particular buildings, such as the Charles E. Young Library, the 2022 team is assessing waste on the campus-level. By ascertaining information about campus-wide waste systems and patterns, holistic tools, resources, and initiatives can be implemented. These efforts will then increase access to zero waste information and forms of involvement, which will foster broad sustainability impacts. Ultimately, the team strives to identify ways to improve the UCLA waste management system by understanding the patterns and causes of contamination, aiming to reduce UCLA's contribution to landfill emissions and pollution.

"...to identify ways to *improve* the UCLA waste management system by *understanding* the patterns and causes of *contamination*..."

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To reach these objectives, the Zero Waste team has interviewed building managers, conducted two rounds of visual waste audits, and sent out a survey to students. The informational interviews provided insights into building waste management successes, experience with unique waste, and opportunities for improved practices. Secondly, audits were performed during both quarters at an array of buildings on campus, each of which host different departments to ensure that the waste data represented students of diverse interests and backgrounds. Primary variables included the percentage of contamination and fullness of each stream as well as specific items frequently contributing to contamination. These data will therefore indicate actual waste diversion and contamination rates. Finally, the survey's aim was to gauge student's current sorting knowledge, identify misconceptions or sources of confusion while sorting, and extract suggestions for improved waste management processes and resources. Primary metrics included assessing students' ability to correctly identify the stream in which an item belonged and what factors prevented proper sorting. The compiled research findings will lead to the development of an informational sorting video, "table tent" infographics, a quick response (QR) code with additional sorting resources on all tri-stream bins, and a sustainability section on the UCLA mobile app. These deliverables aim to foster a more inclusive sustainability space by providing user-friendly, broadly-available zero waste information, resources, and ways to get involved. All of which will work towards accomplishing reduced contamination rates within the entire campus, supporting UCLA's sustainability goals.

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WASTE AUDITS

Over the past two quarters, the Zero Waste team conducted visual waste audits to illustrate the extent of waste generation and waste contamination on campus. The team chose to conduct visual audits, as opposed to complete waste audits, because they take less time and are more COVID-safe. To ensure that the data incorporated the habits of students from a diverse range of academic fields and socioeconomic, ethnic, racial, religious, gender and sexual identity-based backgrounds, three buildings housing distinct departments were audited. Public Affairs holds social science, humanity, and Science, Technology, Engineering, and Mathematics (STEM) classes, Boelter is specific to STEM, and Kaplan hosts classes ranging from mathematics to writing to gender studies.

The team conducted two rounds of waste audits where each of the three buildings were audited once in Winter quarter and once in Spring quarter. This replication was to obtain a greater quantity of data, increasing the reliability of findings, and to assess any potential differences between the quarters given that the Winter was largely hybrid while the Spring was fully in-person. These audits were conducted once a week for approximately two hours at a time. Prior to each audit, Kikei Wong, the Zero Waste manager and team's stakeholder, notified custodial staff to not empty the tri-stream bins.

To efficiently distribute the workload, each team member was designated a specific role during the audit process (see Appendix Table A1). The mapper's role was to denote the location of bins on the master floor plan of each building which was either downloaded on a tablet or printed out. The mapper noted any bins in the wrong location, missing, or in excess as well as any single-stream bins. The photographer documented the tri-stream bin's contents by taking photos and labeling them with their proper bin numbers with a phone or tablet. Using a laptop, the notetaker assigned

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the appropriate fullness and contamination values indicated by the auditor to the correct bin number in Google Sheets. The auditor was equipped with personal protective equipment (PPE), specifically gloves and a grabber, to aid in hygienically removing the bin's lid and sifting through the contents. The auditor assessed and noted the percent fullness and contamination of each stream after the team came to a consensus on a value that seemed reasonable. The items contributing to contamination were identified to track improperly sorted waste. The same procedures were followed for each bin, floor, and building. To reduce subjectivity and bias, two different people worked as the auditors for each building. Further, each building was audited by the same two members to keep assessment styles consistent.

Image description:
From left to right, Mo, Hennessy, Madeline, Taylor, and Jinsuh standing next to a tri-stream waste bin after their waste audit in Kaplan Hall.

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All six audits were performed by members of the SAR Zero Waste team with the exception of the Winter quarter audit at Boelter. Due to the large number of bins and floors as well as Boelter's high capacity, Kikei recommended that the team enlist the aid of other students in order to finish the entire building on time. The on-campus sustainability club, Ecology, Economy, and Equity (E3), had reached out to Kikei prior, inquiring about participating in waste audits. Therefore, the team contacted E3 to see if they would be interested in supporting a visual waste audit, and two members agreed to act as a photographer and mapper. E3's assistance permitted the team to separate into two groups, increasing the efficiency of the audit.

Image description:
Bird's eye view photo taken of a tri-stream waste bin during a waste audit.

INFORMATIONAL INTERVIEWS

To supplement the information obtained from each waste audit, one-hour virtual informational interviews were conducted with the buildings managers of Public

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Affairs, Kaplan, and Boelter. Given that building managers interact with waste logistics on a day-to-day basis, their responses provided valuable insights that could not be determined from audit data. During these interviews, each interviewee was asked about commonly discarded items, current initiatives to lessen waste, unique wastes or management challenges, and what has been working well in terms of waste management strategies. The results of these interviews indicated how each audited building is doing relative to UCLA's Zero Waste goals and how they can be better supported.

STUDENT SURVEY

Lastly, the Zero Waste team created a survey to be sent out to the UCLA student body to gauge their current knowledge on waste sorting, to identify barriers to proper sorting, and to hear student suggestions for better waste management. The survey was anonymous, written to take less than ten minutes, and incentivized by a raffle for a reusable stasher bag prize. The "Demographics" section was intended to provide context on the respondents to potentially inform trends while "Sorting Thoughts and Behaviors" assessed students' perceived sorting confidence. "Knowledge Assessment" asked specific questions about what can be sorted in specific streams to indicate the average baseline understanding. Finally, "Additional Questions," included both open-ended and multiple-choice questions to convey how COVID-19 has impacted personal waste management, to gauge students' interest in proposed initiatives, and to obtain suggestions and critiques. To prevent bias, each question was worded objectively, and to incorporate EDI, it was distributed to a master list of clubs, organizations, academic departments, and friends/acquaintances of team members to reach students of all backgrounds, not just those involved in sustainability! The methods of communication for survey distribution included email and Instagram direct messages and posts.

CHALLENGES

The biggest limitation the team faced this year was COVID-19 protocols and restrictions, especially when there were unexpected outbreaks and surges that resulted in major delays. From the start of the SAR program, the waste audits had to be put on hold until it was safe enough for everyone to return back on campus. The team was still able to focus on virtually-accessible tasks, such as the developing the student survey and conducting the building manager interviews. By mid-Winter quarter, the team was finally able to begin waste audits but was limited to visual audits given the limited time left in the quarter and to mitigate COVID risks. This was unlike past SAR teams who conducted traditional waste audits, which entails sorting and examining trash by hand from a large, movable waste container. This prevented the team from examining the waste as thoroughly, which limited the accuracy of the data. However, given the lower time commitment per audit, the team was able to conduct one each quarter at three distinct buildings. The team was then able to generate building- and floor-specific data, which provided more insight into how department signage and waste management influences waste generation and contamination. This also ensured that the data was reflective of the entire student body because each building represented a diverse cross-section of departments.

While these visual audits permitted COVID-safe data collection, there was a lack of waste data available during certain audits.

Image description:
Empty tri-stream bin during a visual waste audit.

CHALLENGES

Particularly, when the team audited the Public Affairs building during Winter quarter, there was little to no waste found in the majority of the bins. This was likely due to reduced traffic on campus since the majority of UCLA's classes were remaining virtual and/or hybrid. There was also a long-term construction project within Public Affairs that made a portion of the building inaccessible, which limited the number of bins that the team was able to audit. Subsequently, the data did not fully represent students' waste habits. However, to combat this setback, the team conducted another round of waste audits in the Spring quarter to increase the sample size and augment accuracy and reliability. While Public Affairs was still under construction, there was generally more waste, likely since most classes either offered or required in-person attendance.

Despite greater traffic and waste during the Spring quarter, there was a degree of miscommunication between the team and custodial staff regarding the Boelter waste audit. Kikei Wong requested that the bins not be emptied the night prior to our audit; however, there were about two floors with nearly all empty bins. Despite this lack of complete data, the team had collected enough results in total to find correlations and contamination trends by auditing each building twice and assessing multiple floors.

Beyond the audits, the team faced difficulties when the interviews were conducted with administrators and building managers. The main challenge was to set up interviews with relevant representatives who could provide well-informed, building-specific feedback on waste management. Some interviewees, such as the representative for Murphy Hall, were only able to offer broad, departmental information, which did not address the building's particular waste management practices. This led to a prolonged interview process whereby the team repeatedly sought out potential representatives, delaying progress on audits. The team adapted by replacing Murphy Hall, which was originally the third building to be audited and assessed, with Kaplan Hall instead to ensure that complete information could be obtained on waste management.

CHALLENGES

When trying to produce the team's deliverables, particularly the Table Tents, significant misconceptions arose over which items are accepted by UCLA's waste hauler, Athens Services For instance, Athens accepts items that typically cannot be composted, such as plastic-lined paper cups, due to a special agreement with UCLA and their industrial composting methods. Therefore, many conversations were had between the team and stakeholder to clarify exactly which items go where to ensure that the final deliverables presented accurate information. Though there were sorting protocols that the team disagreed with, they recognized that these issues would require changes to Athens's infrastructure: a task beyond their current scope.

Internally, the team faced scheduling challenges during the Spring quarter, inhibiting full participation at all meetings and audits. Despite creating a When-to-Meet open from 7AM to 10PM, the team struggled to find a time that every member was available. This was likely due to the increased time commitment of in-person classes. Engagement was also suboptimal due to each member's many other responsibilities and fatigue after the first two quarters. The team responded to these challenges by adjusting meeting time as members' schedules changed. Moreover, the co-leads reached out to members directly to check-in, a "To-Do" document was created to clarify each member's responsibilities, and the co-leads created an attendance document to increase accountability and remind members that attendance is mandatory. Overall, each member was dedicated to SAR's and the Zero Waste team's mission, so goals were ultimately accomplished.

These obstacles gave the team opportunities to adapt and work together collaboratively. By strengthening communication and organization, the team was able to reach compromises and find solutions. In the end, all members learned how to remain resilient during times of unexpected changes and delays.

RESULTS

INFORMATIONAL INTERVIEWS

Starting in the Winter quarter, the Zero Waste team conducted four interviews with the building managers of Student Affairs, Public Affairs, Kaplan Hall, and Boelter Hall to assess the current state of waste management. A common trend identified was a desire from the managers to increase sustainability, but they lacked the proper information, education, funding, or administrative jurisdiction to execute initiatives. For instance, one manager found it difficult to donate office furniture due to certain policy restrictions, resulting in additional bulky, landfill waste. Another frequent finding has been management's prioritization of health due to COVID safety concerns, especially regarding food, events, and personal protective equipment. As a result, management has noticed an increase in single-use food wrappers and face masks. The pandemic also brought about a shift in labor, leading to new custodial staff who are less familiar with UCLA's waste management procedures, making sustainability improvements difficult to implement. The interviews also elucidated gaps for improvement, such as greater awareness for how to properly dispose of E-waste and sustainability-focused protocols for managers when making purchasing and vendor decisions. These results were relayed to Kikei Wong, the Zero Waste Manager, so that Facilities Management can improve their support of building managers and promote sustainability.

WASTE AUDITS

Throughout the Winter and Spring quarters, two visual waste audits were conducted at each of the following buildings: Public Affairs, Kaplan Hall, and Boelter Hall.

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Initial results in Winter quarter indicated minimally used bins in Kaplan and Public Affairs; whereas, Boelter generated higher percentages of bin fullness (see Appendix Figure A1). In the Spring, the usage of the tri-stream bins increased in both Public Affairs and Kaplan, which aligns with the return to in-person classes for the majority of classes. For instance, average fullness increased from 0.47% to 7.53% in Public Affairs and 0.6% to 1.03% in Kaplan (see Appendix Figure A1). However, the opposite trend was seen in Boelter which had average fullness levels drop from 7.33% to 2.2% (see Appendix Figure A1). This may be attributed to custodial management emptying the bins before the audit or differences in measurement.

When presenting the results, it is important to consider limitations that may have influenced trends. For instance, since only one waste audit per building was conducted each quarter, usage and contamination were largely dependent on the particular week of the quarter and day. Both of these variables may have influenced on-campus traffic and waste generation. Secondly, there was reduced occupancy in Public Affairs during both quarters due to construction, which resulted in about a third of the building being closed off. It should also be noted that single-stream bins (e.g. stand-alone recycling) existed in all of the buildings despite efforts to phase them out. The waste within these bins was not included within the audit data, resulting in potential unidentified trends. Furthermore, during the audits, the team discovered many empty bins which had zero percent contamination recorded, potentially skewing the results. Finally, in Boelter, it was found that multiple waste bins had the colored bags incorrectly organized (e.g., the green compost bag was in the tan-colored landfill position). This was likely due to human error, possibly improper custodial training and/or oversight. This may have confused users when discarding their waste, resulting in unintended contamination.

To gain a holistic understanding of contamination trends, the percent of contamination in each stream was averaged across the three buildings and commonly

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missorted items were recorded. When comparing contamination between buildings in the Winter, it was found that the percentage of contamination in the landfill stream was highest in Boelter (46.74%), followed by Public Affairs (32.41%) and then Kaplan (29.61%), potentially indicating different levels of sorting knowledge, signage, or ambiguous waste items (see Appendix Figure A2.1). For recycling and compost, the percentages were significantly lower compared to their landfill counterparts (see Appendix Figure A2.1). Evaluating the Spring audits, the data showed a similar pattern where landfill streams had the most observed average contamination, but the relative difference compared to contamination in recycling and compost was not as extreme (see Appendix Figure A2.2). The stark variation in levels of contamination between streams seen in the Winter can likely be explained by the low bin fullness, resulting in zero percent contamination. Therefore, data taken during periods of high usage, offered more realistic values that prevent large skews in results. Moreover, the finding that landfill typically contains the most contamination suggests that the landfill stream may be acting as a “catch-all” for people unsure about where to deposit their waste.

"...*soiled paper products* made up 80% of the contamination in the landfill and 50% of the contamination in the recycling."

Throughout all the audits, hot coffee cups, paper towels, food waste, and plastic films represented the items most frequently contributing to contamination. For instance, hot coffee cups are made of paper lined with plastic, which UCLA uniquely accepts as compost, but this may be confusing for students accustomed to other waste management procedures. Hot coffee cups are also made of multiple materials, requiring the individual to discard the lid and sleeve separately from the cup and any remaining liquid. Aligned with the visual conclusions made by the team during audits, the compiled data indicated that, on average, soiled paper products made up 80% of the contamination in the landfill and 50% of the contamination in recycling.

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Therefore, broad misconceptions around paper towels and napkins exist within the UCLA community. Additionally, a few notable ambiguous plastics included plastic packaging, plastic wrappers, and differing types of cup lids. Lastly, food waste was frequently discarded in the landfill, along with its container, especially animal-based products. Therefore it is likely that misconceptions exist around composting non-plant-based foods as well as individually discarding each element of waste.

STUDENT SURVEY

During the Spring quarter, the Zero Waste team finalized the student survey and appropriately distributed the google form through social media, email, and word of mouth (see Appendix Image A12). The survey results indicated that UCLA students are confused about sorting items of mixed media and how clean recycled items need to be. With a total of 119 respondents, these two options were selected by 90 (75.6%) and 93 (78.1%) students, respectively. When asked about why they don't sort their waste properly, nearly half (49.1%) indicated uncertainty as the cause (see Appendix Figure A3). This finding suggests that an increase in knowledge of sorting techniques has the potential to significantly reduce contamination.

~50%
of students, cited *uncertainty* as the cause of improper sorting

The survey also elucidated various misconceptions related to recycling and compost. For instance, 14.3%, 39.5%, and 61.5% of respondents indicated that Styrofoam, plastic film, and plastic cutlery can be recycled, respectively (see Appendix Figure A4). However, all of these items should be placed in the landfill, indicating wide-spread misunderstandings. Regarding compost, most students were aware that plant-based foods, such as a banana peel, can be composted. However, 47% of students did not consider animal-based foods as compostable. This is likely because Athens Services is able to accept all food waste due to their industrial compost process while individual "backyard" composting typically

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omits meat, milk, and other animal-based products. Lastly, 78% of students incorrectly said that bioplastics can be compostable, representing the need to clarify this throughout the campus community. The confusion about sorting elucidated in the survey was also reflected in the results of the visual waste audits. Many common contaminants included mix-media items, plastic wrappers, and animal-based foods. Therefore, both the audits and survey suggested that a lack of knowledge related to these particular waste items frequently spurs contamination.

At the end of the survey, students were asked to weigh in on proposed initiatives for improvement. 69.7% of respondents indicated a desire for improved signage and the percentage were interested in free on-campus zero waste resources, such as a bulk store. Finally, 58% of students wanted a sustainability section to be added to the UCLA Mobile and/or the UCLA Housing app. Therefore, combining the findings from the interviews, survey, and audits, the team chose to pursue deliverables that would provide more accessible, detailed information regarding proper sorting, address misconceptions, promote broader engagement with zero waste and sustainability practices.

QR CODE STICKER ON BINS

Based on the findings from the aforementioned research, it was clear that students wanted improved access to waste sorting information and zero waste resources. Since this encompasses improving signage around waste bins, one deliverable was a prototypical QR code sticker to be placed on the front of each tri-stream bin. After experimenting with multiple shapes, sizes, color schemes, and placements, the team decided on a rectangular, white sticker with blue and black text placed on the center, front-most face of the bin (see Appendix Image A10). This design and placement were predicted to be the most visually appealing and accessible.

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Scanning the QR code link takes the user to a Linktree website page, which has the Athens "What Goes Where" page and other zero waste resources listed. On the Athens website, students can enter an item and will be given information about which waste stream is appropriate for disposal: compost, recycling, or landfill. Since Athens is UCLA's waste hauler and can change their accepted items, their site includes the most relevant and specific waste sorting resource for UCLA students. Instructions were added to the intermediate Linktree page telling the student to click "Business, Los Angeles" to mitigate any confusion because the site does not directly link to UCLA-related information. The number of clicks on the QR code can be monitored on the website where it was generated in order to gauge engagement and effectiveness of the sticker. Since UCLA may change their relationship with Athens Services, the team decided that the Linktree would prevent the QR code from becoming obsolete.

In the upcoming weeks, Kikei will continue promoting the QR code proposal to UCLA's Facilities Management. Assuming a unit sticker price of $0.60, the estimated cost of purchasing the stickers would be $0.60/bin x 2385 bins = $1431 total, excluding labor costs. According to Kikei, this seems feasible for UCLA to launch campus-wide. This added QR code will bring zero waste information directly to students and campus visitors in the crucial moments of confusion, providing accessible and specific information on sorting and involvement with sustainability. Ultimately, the aim of the QR code is to provide users with supplemental information to reduce contamination and increase engagement with UCLA's sustainability practices and initiatives.

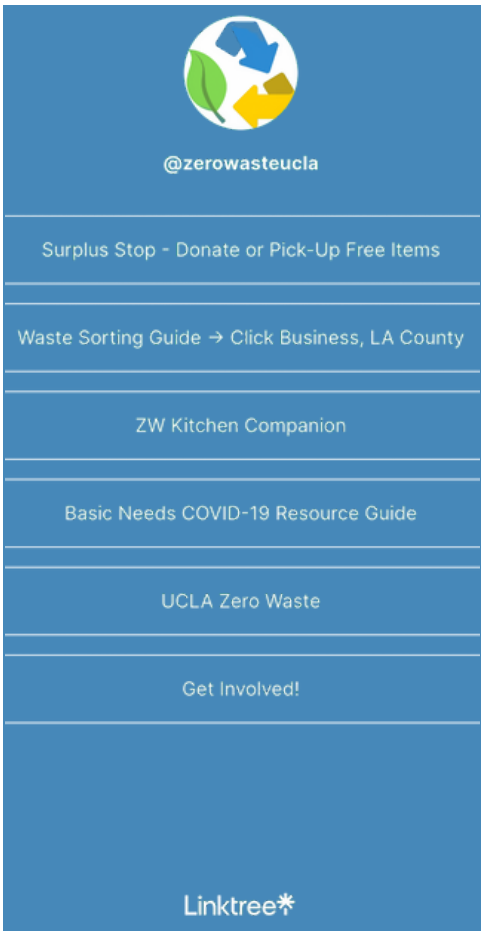

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TABLE TENTS

Another opportunity for improved signage that the Zero Waste capitalized on was creating seven Zero Waste table tent infographics inspired by the plant-based eating signs placed at dining hall tables (see Appendix Images A1-A8). These signs were printed and placed throughout Powell library because it is one of the most trafficked libraries, and students situated at tables for extended periods of time are likely to notice signage placed in their workspace. The implementation process was facilitated by Ashleigh Darby, the Access Services Lead at Powell, who the team coordinated with. The table tents will remain in Powell library throughout the summer and into the next academic year to increase the dissemination of knowledge. Moreover, the Zero Waste team plans to continue working with Ashleigh and her contacts at the Charles E. Young Research Library and Biomedical Library to implement the table tents there as well.

Each table tent focused on mitigating contamination, highlighting the tangible impacts of proper sorting, or providing ways to increase engagement. Specifically, Appendix Images A2 and A3 addressed findings from the student survey, clarifying how thoroughly recyclable items need to be cleaned and that plastic film, plastic cutlery, and Styrofoam must be discarded in the landfill. Appendix Images A4 and A5 were developed based on the common contaminants found during visual waste audits, specifically coffee cups of mixed materials and soiled paper products, respectively. Appendix Images A6 and A7 focused on highlighting the broader impacts of proper sorting by indicating how composting and recycling promote diversion and how diversion can mitigate climate change. These table tents also are meant to raise awareness around UCLA's sustainability goals, specifically 90% diversion. Lastly, Appendix Image A8 provided students with a QR code to learn more about zero waste practices and ways to get involved.

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WASTE SORTING VIDEO

The team also theorized that providing incoming freshmen with basic waste sorting training would be a strategic way to familiarize the student body with the centralized tri-waste system (See Appendix Image A11). To do this, the team coordinated with Kikei to make a zero-waste introductory video for freshmen to watch within the sustainability module presented at New Student Orientation. Due to time constraints, a full script was written and reviewed by Kikei, but only the skit portion was filmed. The team plans to resume filming and finalize the video during the fall of the next academic year. The video will begin with narration, outlining relevant UCLA's zero waste goals and demonstrating the real-world significance of proper sorting. The next section, which represents the majority of the video, is a skit. Two members are being taught by the third on how to sort items within each type of waste stream, particularly touching on examples found commonly contributing to contamination or confusion in the student survey and audits. The two learners then practice sorting waste items with misconceptions directly addressed so that differences between "rights" and "wrongs" are emphasized. One such example in the video demonstrates taking apart a boba cup to recycle the cup's body while placing the thin-film lid and straw into the landfill. The skit also mentions items that require unique or updated sorting procedures, such as bioplastics which are no longer accepted by UCLA's waste hauler. The video concludes with suggested single-use swaps to encourage the reduction of waste at its source and resources for learning more and getting further involved. Highlighted swaps include reusable bottles in place of plastic bottles or bar soap/refills in place of bottled soap. Zero Waste resources to be provided at the end include the CPO Food Closet and the Surplus Stop as destinations for donated or available food and gently used furniture/clothing, respectively. The UCLA Sustainability website will also be referred to in order to increase awareness and engagement with Zero Waste resources.

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UCLA MOBILE APP

Based on support by students who participated in the student survey, the Zero Waste team pursued the addition of a Sustainability section to the UCLA Mobile and UCLA Housing apps. These apps were chosen since students already use these platforms and are familiar with interacting with them. The proposal was sent to the UCLA Housing Communication and Outreach Manager who expressed interest after they restructure the app and update staffing.

58%

of student survey respondents would like to see a sustainability section added to the UCLA Mobile App

The original, primary objective was to add the link for the Athens waste sorting page to reduce contamination, but the proposal expanded to include other subsections beyond Zero Waste, such as Food, How to Get Involved, and Current Sustainability Goals. The proposal was initially made to Rosemary Rocchio, the Director of Mobile Web Strategies for the app, who arranged for the team to present the proposal at their UCLA Mobile Steering Committee meeting during Week 10 (see Appendix Image A9). The presentation slides began by highlighting the wide-spread uncertainty and misconceptions around proper waste sorting as well as the student's desire for this section as expressed by survey respondents. The team then illustrated how suggested features on the app would be in strong alignment with the 2022 UCLA Sustainability Plan, especially the fifth goal of Engagement which calls for "increas[ing] the breadth and continuity of sustainability engagement efforts" (UCLA, 2022). Ultimately, the UCLA Mobile app serves as an appropriate communication platform for UCLA to promote its own sustainability efforts in accordance with the 2022 Sustainability Plan and increase student engagement with these goals.

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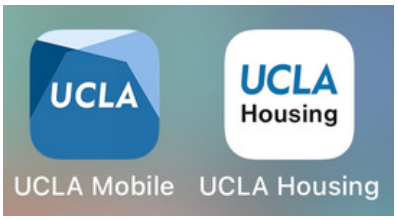
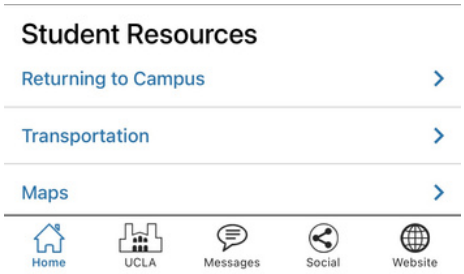


New "Sustainability" section



As of June 10th, 2022, the proposal for the new Sustainability section within the UCLA Mobile App has been approved by the steering committee with 90% in favor. The section will appear under the “Resources” heading in the app’s Home page interface for the“dashboards” of Student, Faculty, and Staff users. The content will be maintained and sponsored by the Office of Sustainability and potentially funded by TGIF if necessary and possible. The target for the proposal is for the mobile app additions to be implemented by Fall 2022 so that New Bruins can be exposed to this information when the app is promoted during New Student Orientation.

DELIVERABLE TAKEAWAYS

The aim of the deliverables is to increase access to sustainability resources from multiple avenues. The QR code addresses any waste sorting questions in real-time. The table tents in the libraries serve to reach a broad audience with digestible information that promotes ways to reduce contamination. The orientation video educates the latest cohort of students with the most updated information and works to increase their involvement with sustainability. Finally, the mobile app provides students with accessible information on UCLA’s sustainability goals and resources.

Image description:
From left to right, Jinsuh, Mo, and Taylor tabling at the annual UCLA Earth Day Fair.

DISCUSSION

INFORMATIONAL INTERVIEWS

The interviews conducted by the team with representatives from the Public Affairs Building, Kaplan Hall, and Boelter Hall allowed the team to gain insight into how well the centralized tri-stream waste bins are working, how operations have been impacted by the pandemic, and the type of assistance the building would benefit from in order to move the needle towards greater zero waste.

One overarching theme from the team's interviews was that traffic in the buildings was not at pre-pandemic levels when the interviews were conducted during the Winter quarter. Consequently, Laura Clennon, the Chief Administrative Officer at Kaplan Hall and contact for building management, observed confusion among faculty regarding the tri-stream waste system because it was implemented when most of the faculty were working remotely or in a hybrid format. Specifically, she mentioned that many faculty members were unaware that they would now be required to sort their waste at a centralized bin rather than discarding items in a personal waste basket. To address this confusion, the team recommends an in-person workshop designed to explain the new centralized tri-stream system and clarify misconceptions.

Another recurring topic was the purchasing of large, bulky furniture items. Laura was unaware that the Sustainability Plan included guidelines for purchasing furniture and wished this information had been more broadly advertised. Coupled with the overwhelming number of options in the furniture catalog, Laura suggested that departments would benefit from recommendations by vendors about which products fit best within the sustainability criteria. While the 2022 Zero Waste Team's focus was largely on waste contamination, sustainable furniture procurement could be a potential pathway for a future team to explore.

DISCUSSION

Hien McNight, director of Public Affairs Operations and Computing, spoke to the disposal of large, bulky furniture items. She observed that most people in Public Affairs dump furniture rather than repurposing it or donating it due to a perceived lack of effort. She explained that people circumvent the tedious pictures, measurements, and paperwork required to give furniture away to non-UCLA entities by dumping the furniture instead. Most individuals, including Hien, seemed to be unaware of the Surplus Stop or the Slack Channel dedicated to easy furniture exchanges on campus. Since reusing and repurposing are central components of diversion and waste reduction, the team recommends enhanced and more frequent advertisements for the Surplus Stop and the furniture exchange Slack channel.

Image description: From left to right, Hennessy, Taylor, Jinsuh, and Madeline, before sharing their final findings in a SAR presentation.

DISCUSSION

WASTE AUDITS AND STUDENT SURVEY

The waste audits and the student survey provided information of specific items frequently found in the wrong bin category as well as common misconceptions or challenges around waste sorting. The results indicated that serious misconceptions exist regarding the sorting of paper towels, animal-based food products, plastic films, and mixed media items (such as hot coffee cups. These misconceptions translate into improper waste sorting behavior and contamination in the tri-stream waste bins, and therefore is a barrier to reaching UCLA's 90% diversion from landfill policy target (UCLA, 2022). In order to help rectify these misconceptions, the team used this information of common misconceptions and challenges to inform which items or general waste sorting rules to emphasize in their educational materials. This included the table tents, sustainability section on the mobile app, new student orientation video, and QR code sticker to go on all bins. However, the sustainability section on the mobile app as well as the QR code sticker did not get implemented. Rather than ask individuals who were already overloaded amidst the current, significant staffing shortage, Kikei advised the team to draft proposals for the mobile app and the QR code sticker to send to the appropriate individuals later when morale is higher and there is greater bandwidth to take on new projects. Therefore, the team hopes that either Kikei or a future SAR team will be able to relay these proposals to the appropriate individuals next year and make sure that they are implemented. Lastly, while the team was able to film the waste sorting video, the team hopes to refilm a more professional version at the beginning of fall quarter.

DISCUSSION

"The results indicated that serious misconceptions exist regarding the sorting of paper towels, animal-based food products, plastic films, and mixed media items..."

IN CLOSING

Over the past two quarters, the team's work focused on promoting proper waste sorting practices for the UCLA community to help the campus reach its sustainability target of 90% diversion from landfills by 2025 (UCLA, 2022). The team's research consisted of informational interviews with building coordinators, visual waste audits of tri-stream bins, and a student survey focused on waste sorting behavior and confusion. The findings informed the educational graphics and videos created by the team, as well as draft proposals for a QR code sticker and a sustainability section for the UCLA mobile app intended to address common misconceptions or confusions about the sorting of certain items.

Minimizing waste contamination is a critical component in increasing diversion from landfills. However, the team acknowledges that proper waste sorting behavior alone is not sufficient to meet UCLA's ambitious 90% diversion by 2025 goal. According to the most recent UCLA waste report, the general campus had an approximately 50% diversion rate for the Winter quarter of 2022, which is 40% away from the UCLA policy target (2021-2022 FY Q2 Waste Report, 2022)! It is evident, then, that prompt and significant progress needs to be made in numerous areas to realistically reach the target within the next four years. Expanding upon the team's efforts to increase recycling and composting, efforts to foster reducing and reusing behaviors are also key components to landfill diversion.

ACKNOWLEDGEMENTS

The team would like to extend their gratitude towards their stakeholder, Kikei Wong, who has been very supportive and helpful throughout the entire process, E3 members Daria Di Blasi and Evan Swanson, who assisted the team in conducting the visual waste audits for Boelter Hall, building coordinators Laura Clennon, Anthony Reddon, Chett Miller, KC Bui, and Hien McKnight, who were gracious enough to interview with the team, Ashleigh Darby, who has helped the team set up the table tents in Powell library, and Delaney Kaugh who helped film the waste sorting video.

The team is also sincerely appreciative of the supportive, compassionate SAR community which empowered the Zero Waste team to achieve more than they thought possible. The team would like to specifically acknowledge Ruhena Randhawa and Eric Ha for creating a collaborative, welcoming environment which fostered community within and between teams. Finally, the team is incredibly grateful for the efforts of Phoebe Chiu and Maddie Wilson who provided thoughtful feedback and critical resources which significantly enhanced the Zero Waste team's efforts.

APPENDIX

	Photographer / Mapper	Notetaker	Auditor
Number of People	1-2	1	1-2
Responsibilities	Take photos of bins, label photos with appropriate bin number, label bins on the floor plan maps	Update master spreadsheet for each bin, appropriately	Use grabbers to identify and quantify waste and contamination in bins
Needed materials	1. Phone to take and label photos 2. Floor plans (either print or downloaded to ipad notetaking app like notability)	Laptop	1. Grabbers 2. Gloves
Procedures	1. Number each bin that the auditors examined. For instance, the first tri-stream bin examined would be bin 1, the second would be bin 2, and so forth. 2. Take one clear photo of **each** tri-stream bin and label it with the bin number (this can be done in photo editing or in snapchat) 3. Label bins on floor plan maps, making note of whether they moved, and whether there are additional bins (see example) 4. After audits are finished, upload photos of bins to this folder	1. Make sure to be on the correct tab of the spreadsheet before entering any data (the tabs are organized by building) 2. For each bin that the auditors examine, record the floor number, the bin number (ask **photographer** if you are unsure) 3. For each bin, enter the % fullness of each stream and % of contamination (if applicable) 4. If there are contaminants, make sure to note them in the appropriate column 5. Use notes column to make any other comments or to note when you see mini bins (include room number)	1. Lift lid of tri-stream bins 2. Let photographer take picture of bins 3. Use grabbers to go through each of the bins (landfill, recycling, and compost) and check for any waste 4. Report to notetaker the estimated percent fullness of each bin. If applicable, estimate the percent contamination per bin, and list specific items.
Notes	If there are more people, **one person** could be in charge of taking photos of bins and labeling them, and **another person** could be in charge of mapping the bins	Make sure to note ***what*** the contaminants are and the ***number*** of each contaminant Make sure to give percent contamination as **percent of bin**, not percent of waste	Make sure you know what goes into which bin before you come to the audit!!! Read FAQs and infographic

Table A1: Procedures for visual waste audits shared with the E3 team.

APPENDIX

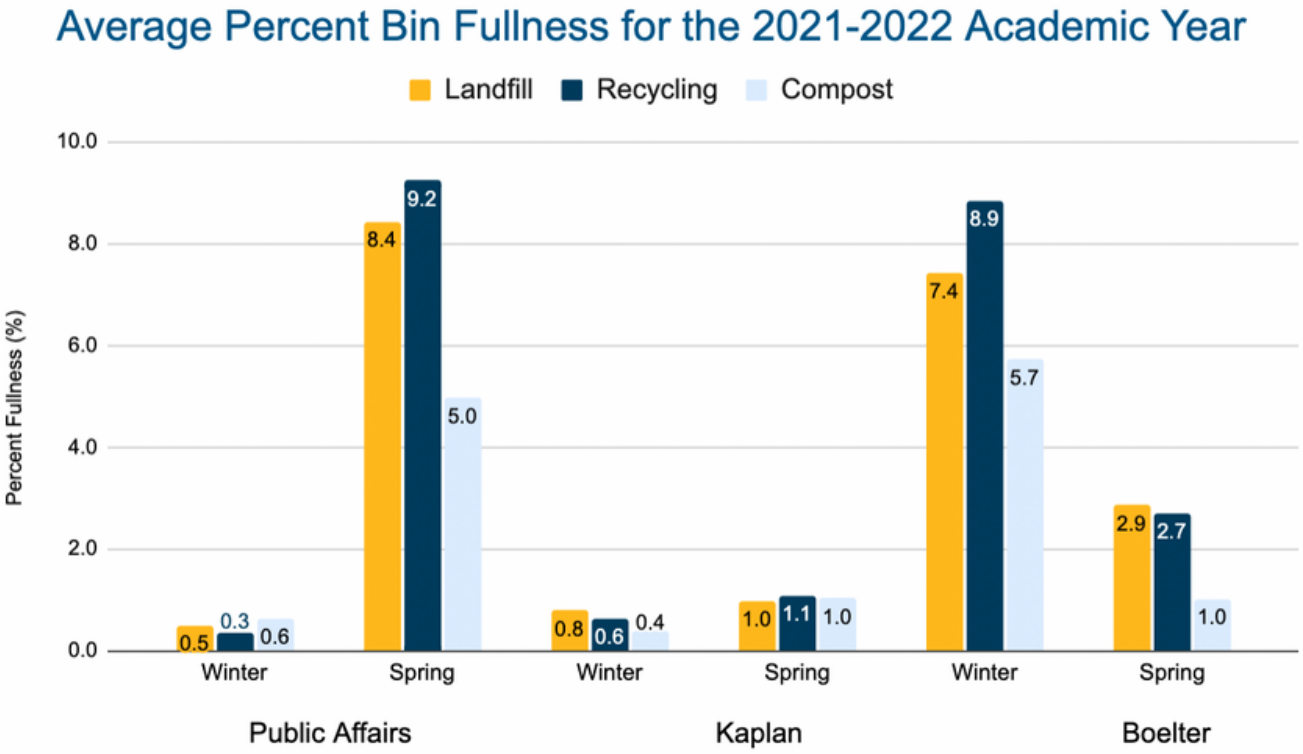


Figure A1: Bar graph detailing the visual waste audit results for both Winter and Spring Quarter with percentages of bin fullness for each waste stream (Landfill, Recycling, Compost).

APPENDIX

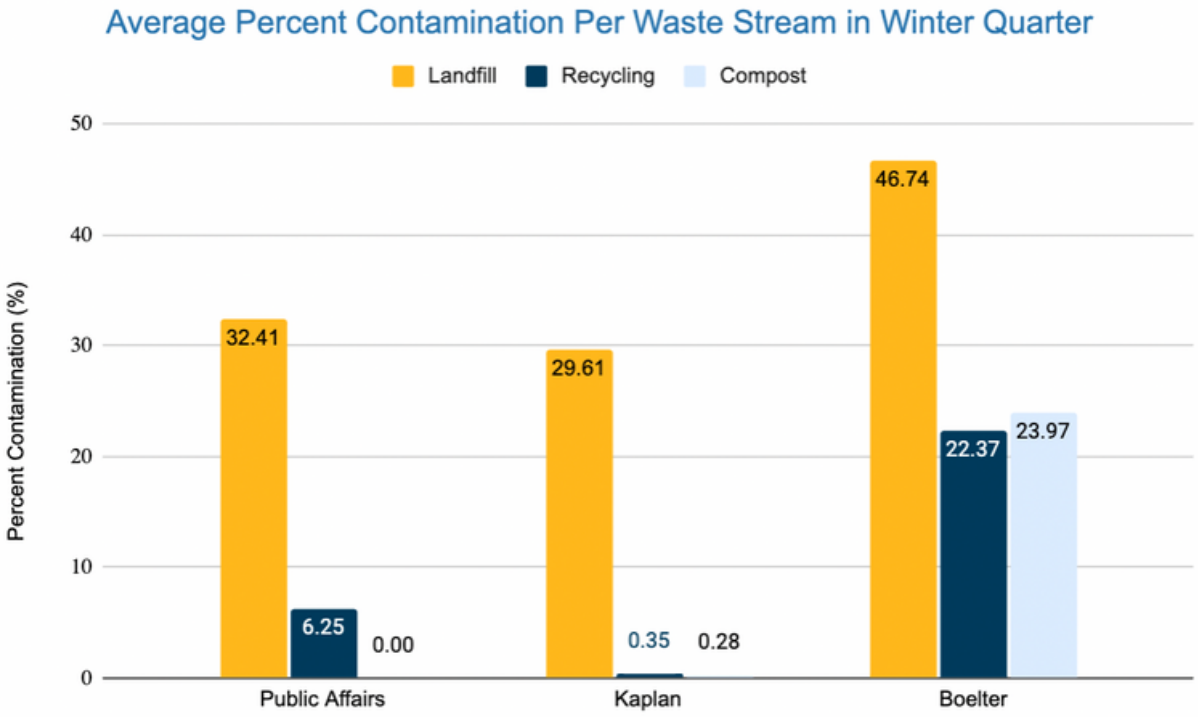


Figure A2.1: Bar graph with the percentages of detected contamination per waste stream (Landfill, Recycling, Compost) from the Winter quarter waste audits in each building.

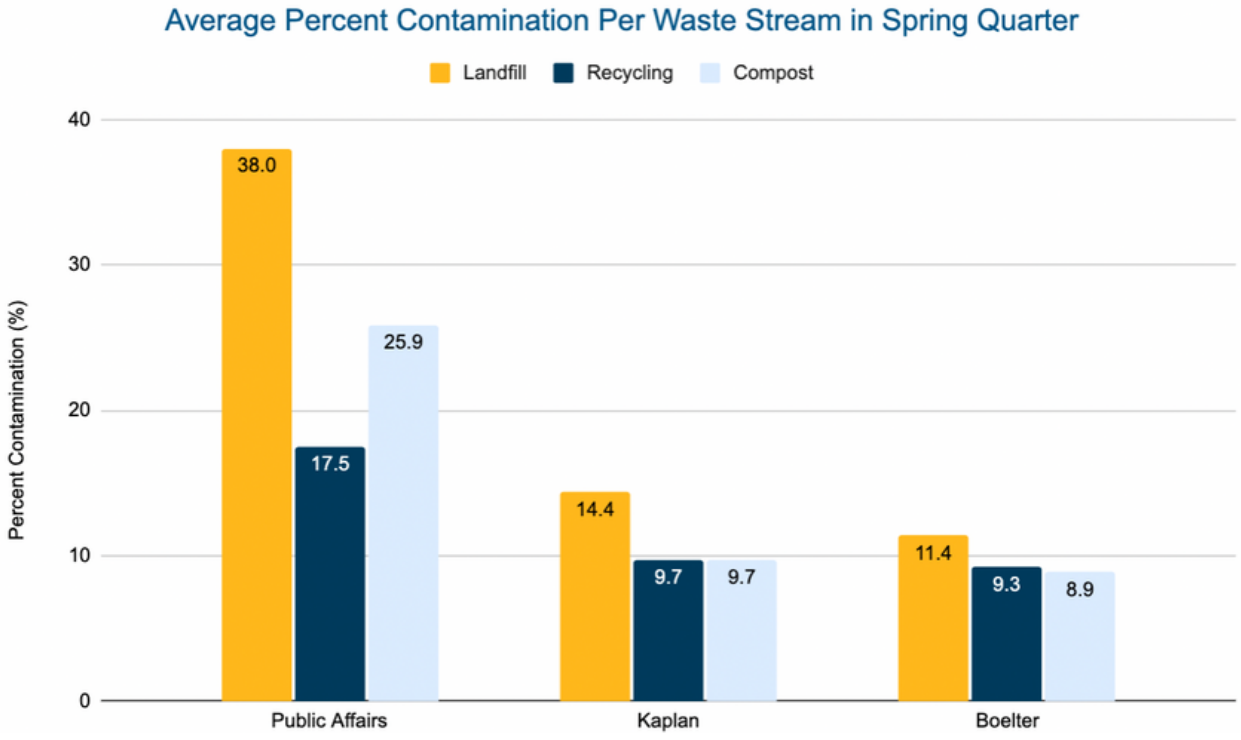


Figure A2.2: Bar graph with the percentages of detected contamination per waste stream (Landfill, Recycling, Compost) from the Spring quarter waste audits in each building.

APPENDIX

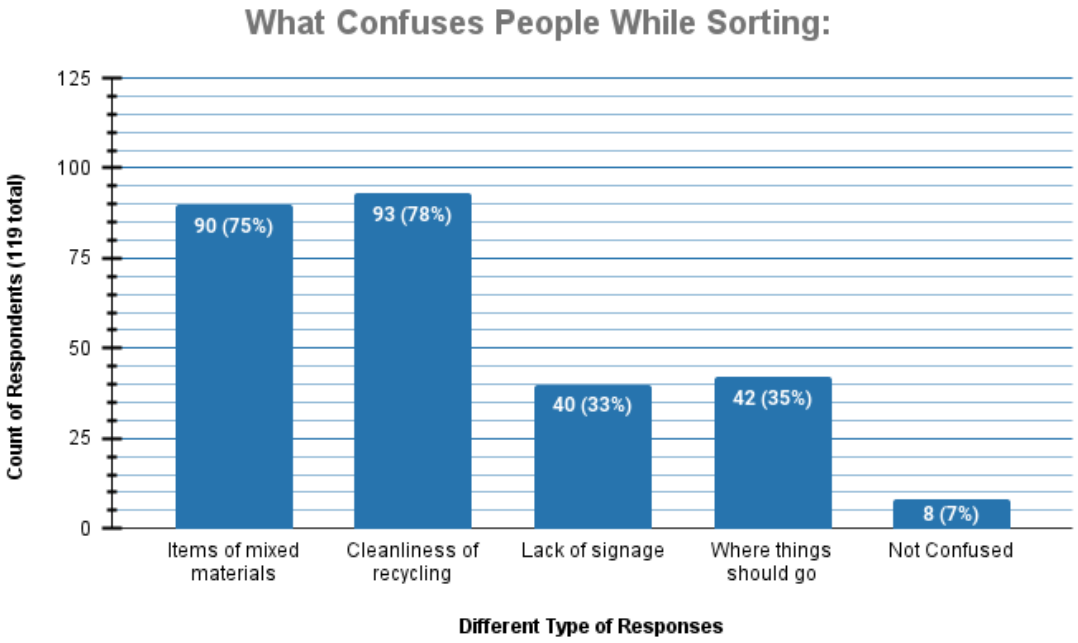


Figure A3: Bar graph displaying reasons for confusion while sorting waste based on the student survey responses.

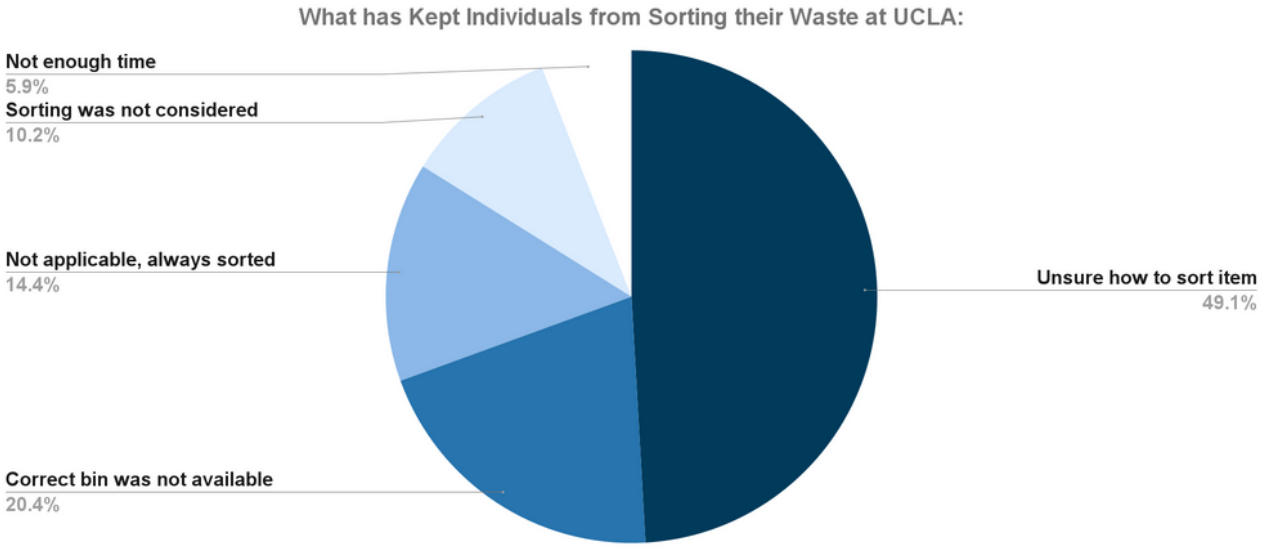


Figure A4: Pie graph detailing the specific obstacles that hinder students from sorting their waste correctly as indicated by the respondents of the student survey.

APPENDIX

Image A1. Simply Sorted table tent sign placed in Powell library addressing how clean items need to be in order to be recycled.

Image A2. Simply sorted table tent addressing how clean items need to be in order to be recycled.

Image A3. Simply sorted table tent addressing misconceptions around plastic cutlery, styrofoam, and plastic film.

Image A4. Simply sorted table tent addressing misconceptions around discarding items of mixed materials, particularly coffee cups.

APPENDIX

Image A5. Simply sorted table tent addressing misconceptions around discarding soiled paper products.

Image A6. Simply sorted table tent promoting UCLA's diversion goals through proper composting and recycling.

Image A7. Do your part table tent highlighting the real-world impacts of waste, the benefits of diversion, and how to help reach these goals.

Image A8. Table tent providing ways to get involved with and learn more about zero waste at UCLA.

APPENDIX

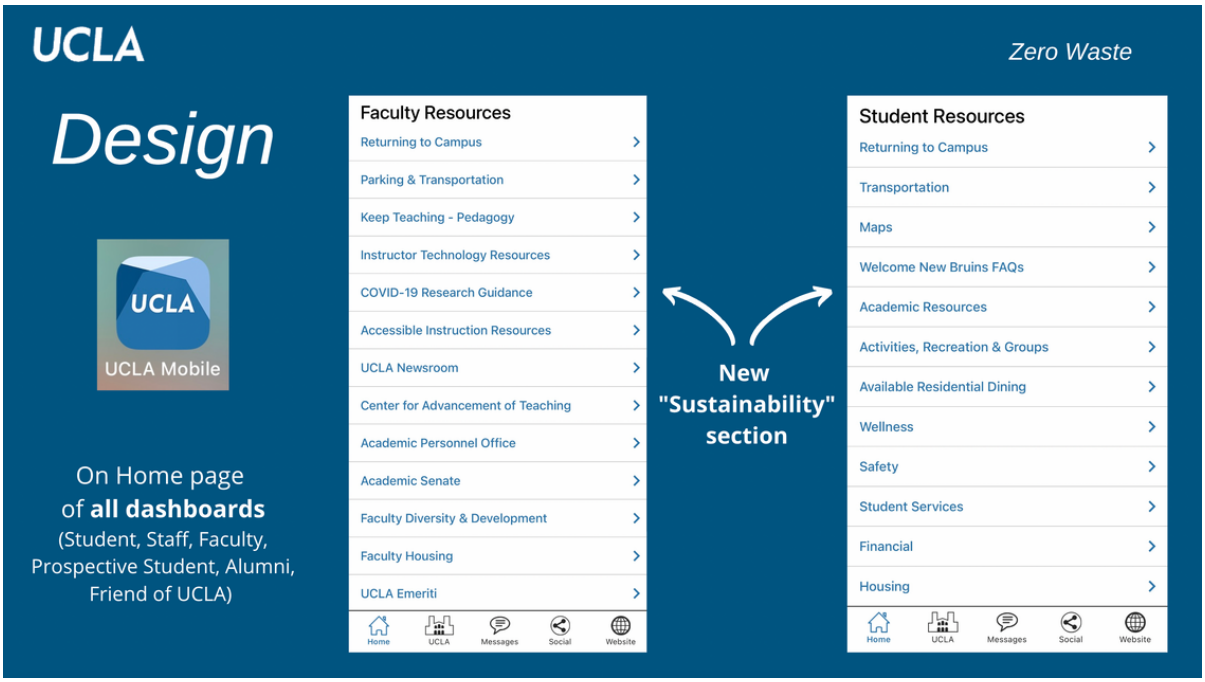


Image A9. A slide from the presentation to the UCLA Mobile Steering Committee meeting depicting where the proposed Sustainability section would be implemented.

Image A10. QR code sticker design for all tri-stream waste bins.

APPENDIX

Image A11. Screenshot from the filming process of the waste sorting video.

Image A12. Screenshot of the anonymous Google form survey sent to students to gauge their knowledge of and interactions with waste sorting.

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