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Undergraduate

Continual Growth Towards Sustainability Education

Andrew John De Los Santos

Abstract

The main purpose of this paper is to propose the creation of a sustainability session in the annual ASCEND New Student Conference for incoming freshmen and transfer students. Although I strongly urge to make the session mandatory, it can also be offered as an optional workshop. As a continuation for educating students on sustainability, I propose to offer “Triple Zero” workshops to all students every semester. These workshops will teach students how to make changes in their daily lifestyle in accordance with the three goals of the commitment. These collaborative efforts in sustainability education will improve student’s behaviors towards sustainability and support UC Merced’s mission to achieve its Triple Zero Commitment by the year 2020.

Introduction

I. Credibility

I have been working at this university as a Recycling and Composting Intern for Facilities Management since October 2014. My main responsibility is to help implement UC Merced’s Zero Waste Program on campus. I work with a team of 11 other students in collecting, dumping, and sorting recyclable and compostable materials in order to reduce our waste stream and increase our waste diversion rate. Through my many months of experience and observations, I have gained a greater understanding of the effectiveness of certain waste management strategies and initiatives. Additionally, I have witnessed the behaviors of students, parents, and faculty regarding waste disposal.

II. Background

As a leader in sustainability and environmental design, our beautiful university excels in being eco-friendly. Incredibly, UC Merced made it on the 2015 Princeton Review Guide to 365 Green Colleges (“Princeton Review Lists Campus Among Greenest Schools”). However, aesthetics only scratch the surface. The UC Merced community needs to be educated on how to live out their daily activities more sustainably, especially on proper waste management. UC Merced has a Triple Zero Commitment that we hope to achieve by the year 2020. This is our

Importance of Improving Communication

sustainable pledge to consume zero net energy, produce zero net greenhouse gas (GHG) emissions, and produce zero landfill waste ("Triple Zero Commitment"). Despite our university's accomplishments towards zero net energy and zero net GHG emissions, we are not advancing enough towards achieving zero landfill waste.

According to a lecture by Senior Analyst Breeana Sylvas, UC Merced has been increasing its renewable energy production to reach net zero energy. The 1 megawatt (MW) solar array on campus generates about two million kilowatt hours (kWh) per year. UC Merced is undergoing the "2020 Project", which will double the size of the campus to support an increase in enrollment. After analyzing past, present, and future energy yields, Ms. Sylvas concluded that for a fully built 2020 campus, "this campus would need about 40 million kWh of electricity to reach net zero". In addition to the current solar array, the campus will be installing a rooftop solar system in 2017 that will generate another 2 million kWh annually. We are currently in a contract for an 80 MW system, and we are also in the process of procuring energy from the wholesale governing board. In addition, we have received many awards and acknowledgements for our LEED certified buildings and energy savings accomplishments. Through these continued efforts, I believe that UC Merced can procure enough renewable energy to eventually become a zero net energy campus by 2020 (McCormick).

Like our efforts towards zero net energy, this campus is also progressing towards zero greenhouse gas emissions by 2020. According to the 2014 Annual Report on Sustainable Practices, energy consumption from buildings is the largest source of campus GHG emissions (17). With environmental design in mind, this university has designed buildings to 50-65% of the benchmark energy use (60). Transportation ranks as the second largest sources of GHG emissions. Our campus currently provides electric vehicle charging stations, which is mostly used for the electric carts used by students and staff. Additionally, we have partnered with Nissan to purchase the new LEAF electric vehicles. According to an article by a UC Newsroom writer, "The University of California could improve the energy efficiency of its buildings by as much as 50 percent through one of its new projects designed to accelerate the reduction of greenhouse gas emissions across UC". That said, 20 research and outreach projects have been approved to support UC President Janet Napolitano's Carbon Neutrality Initiative (Mok). Through energy efficiency, environmental design, climate-action, and other sustainable practices, we are progressing towards our goal of zero net greenhouse gas emissions.

Despite our accomplishments towards two of our triple-legged stool (representing the Triple Zero Commitment), we are still wobbly due to the slow progress being made towards zero landfill waste. Although we have significantly improved our waste diversion rates with the introduction of our new sorting line conveyer system last summer in 2014, we are still behind in our waste diversion goals. One of the goals of the University of California Sustainability Practices Policy for diverting municipal solid waste from landfills is to reach 75% diversion rate by June 2012 (Sustainable Practices Policy 7). Only UC Irvine was able to maintain this interim target. Based on our 2014 waste audits, we are currently at 66% diversion (Waste Diversion Plan 2015) (See Figure 1). The recycling and composting team is limited on funding and time. Presently, we pick-up and sort the waste generated on upper campus (all the buildings above the bridge with the exception of two buildings). If the UC Merced community were to properly sort their waste, our team would have time to sort lower campus, which includes housing. Since the majority of waste from housing are recyclable and compostable materials, we would be able to

increase our diversion rate if we had the time to reach lower campus. However, due to the volume of daily waste generated and the poor participation of individuals in terms of proper waste disposal, we are restricted to upper campus waste management.

UC Merced has a few educational programs that encourages sustainability, but the amount of people that it reaches doesn't suffice. Once a semester, UC Merced Recycles, along with other sustainable leaders, gives a CORE Friday lecture for first and second year undergraduate students. This is one of many optional lectures that CORE students can attend. Waste Reduction/Recycle Coordinator, Matthew Hirota, gives an excellent lecture on proper waste disposal to the students. Unfortunately, this is only given to a small pool of first and second year students. Another educational program we offer is to UC Merced employees. New employees must attend a mandatory orientation session after being hired. This gives our Recycling team the opportunity to educate them about sustainable practices. Despite these educational initiatives, our team does not see a significant change in the community's behaviors in proper waste management.

The lack of participation among individuals in this university poses a difficult challenge. This campus has already improved the aesthetics side of recycling through the purchasing and maintenance of various recycling receptacles. This includes the new solar-powered Big Belly trashcans that were introduced last year. Now that we have supplied the necessary equipment for sorting waste, we need to place more emphasis on educating this community on how to dispose of their waste correctly.

Survey

I conducted an online survey that consisted of about 60 undergraduate students. About 64% of students said that UC Merced needs to improve its sustainability efforts in terms of recycling and composting (See Figure 2). This campus has been slowly making changes towards reducing its waste. For example, this semester the Lantern Café replaced its plastic coffee lids with fully compostable coffee lids. Starting this summer, the campus will then introduce compostable wooden utensils to replace the plastic ones that end up in the landfill. In the survey, when I asked students how much time they were willing to spend to stop and read the signage above the recycling receptacles before throwing away their trash, 52% said they would spend as much time as they need (See Figure 3). In a follow-up question, I discovered that only 10% of the participants felt extremely confident in knowing what goes in the appropriate bins, with the plurality of the answer (42%) being moderately confident (See Figure 4). Based on these results, no participant said that they refused to spend time to figure out how to properly sort their waste, nor did any participant feel as if they had no confidence in knowing where their waste goes. Lastly, about 56% of participants felt that this university needs to improve education in proper waste disposal (See Figure 5). Based on this survey, I concluded that all students have a basic knowledge of what goes into recycle, compost, and landfill. However, they still require supplemental education to increase their confidence in knowing how to properly sort their waste.

Project Phases

In order to create a long-term behavioral change in students, this requires sustained incremental change. Students won't be able to absorb information when trying to learn important information in a short time period. These phases will parse sustainability-related information in order for it to be more digestible. Although Phase 1 and 2 are only for freshmen and transfer students, Phase 3 can apply to all students. Freshmen are the targeted audience, since it's easier to ingrain correct recycling behaviors early on before they adopt wrong behaviors.

Phase 1: Move-In Day (Introducing Sustainability in Context)

The first phase is to establish an initial point of contact between incoming freshmen and our mission to sustainability. One of the sustainability organizations (PowerSave, UCM Recycles, ASUCM, Rufus Recycles, etc.) can have representatives at every residence building during the start of move-in day. The moment students set foot in their new residence hall, they can be greeted by one of our "Sustainability Reps" and be given instructions on where to properly dispose of any cardboard, styrofoam, and other packaging material. Since move-in day is a very emotional time for students, they only need to be taught what they absolutely need to know at that moment. I believe that recycling is the face of sustainability, so if students are taught at day one about recycling, they might feel more inclined to follow the social norm to recycle like the rest of campus. The first phase is simply to advertise our sustainability message. From my experience teaching the community how to properly recycle, I have learned that in-person communication is more effective than information from signage.

Phase Two: ASCEND Conference (Promotion of Sustainable Behaviors)

Although this is the middle phase, I believe this is the most important out of the three-phase program. I propose to add a sustainability session to the annual ASCEND New Student Success Conference that incoming freshmen and transfer students must, or can, attend. Although I would like to make this mandatory, I understand that it might take time to integrate such a profound, impactful session to the ASCEND Conference, especially since it has not been done before. Looking at the 2014 ASCEND brochure, there wasn't a single workshop on sustainability. I believe that this annual gathering of first-year and transfer students is the perfect opportunity to promote our green campus and establish strong behaviors in sustainability. This idea also goes hand-in-hand with our university's mission to impart sustainability skills and graduate thought leaders. Given before the semester starts, this session can imprint positive recycling behavior on students early in their college career. Furthermore, those behaviors would likely to carry with them even after graduation. Below is an outline of what would be presented during this sustainability session:

Outline of a Sustainability Session:

- a. Broad-Scale
 - i. Start with the environment at large/global warming/tie with recycling and waste management
- b. UC System (Our commitment to Sustainability)
 - i. Triple Zero Commitment/Diversion Goals
- c. Reuse and Reduce (Definitions and examples)
 - i. Ex of Reduce: Mugs instead of paper cups, emails instead of faxes, bring your lunch in a Tupperware container

- ii. Ex of Reuse: Double-sided print, using unwanted paper as scrap paper, rechargeable batteries, donate items you no longer need
- d. How UC Merced recycles
 - i. Single-stream system
 - ii. Team of Student Interns
 - iii. Sorting line
- e. Where the audience recycles
 - i. Common areas, grounds, building entrances
- f. What is recyclable vs. non-recyclable (explanations included)
 - i. Show information signage that is displayed above the recycling receptacles
 - ii. Non-recyclable: pizza, styrofoam (anything in compost or landfill)
- g. Additional items recycled at UC Merced (hazardous & universal waste)
 - i. EH&S coordinates the collection of batteries, electronics, computers, light bulbs, hazardous waste
 - ii. Battery collection containers
- h. The audience is part of the solution (Remind them of their importance)
 - i. We have put a great deal of effort into reducing waste through a variety of operational strategies, but these efforts can only succeed with the participation of the UC Merced Community
 - ii. Want the audience to feel a sense of purpose around the importance of the environment
- i. How to reach us/ learn more
 - i. recycle.ucmerced.edu/ Facebook/Instagram/Twitter

My boss, and Waste Reduction/Recycling Coordinator, Matthew Hirota, has already agreed to be the speaker if this idea becomes a reality. He has spoken at many Core Friday lectures, and has high credibility due to his abilities to produce fun, effective, and engaging presentations. Although I am emphasizing the waste management branch of sustainability, there is an opportunity to expand this phase to include other branches, such as energy, greenhouse-gas emissions, or water conservation. Improving the community's behavior towards the environment is a solution to combat many predisposed ideas and attitudes that many people might have regarding sustainability. The goal of this phase is to showcase UC Merced as a living laboratory of sustainability, and to remind students that they can make a positive impact.

Phase 3: Triple Zero Workshops (Encouraging individual behavior change)

In order to establish a lasting impression after the first two phases, the final phase is to host Triple Zero workshops each semester for all students. There will be 3 workshops each month, and 3 months each semester. The goal is to educate students on our Triple Zero Commitment and provide them with Triple Zero Certificates to award them for their dedication to sustainability. To introduce these workshops to the students, there will be a Kick-off event (Calendar of an average month is shown in figure 6). Each goal of the Triple Zero Commitment will be a workshop: Zero Net Energy, Zero Landfill Waste, and Zero Greenhouse Gas Emissions. Each student will be given a "postcard" (See Figure 7) that they must bring to each workshop. At the end of each workshop, students will write down something they can change in their daily lives in order to live more sustainably. After they show their postcard to the presenter, the presenter will sign their name next to the name of that workshop. If students get 3 total

signatures from all the workshops, then they will be given a “Triple Zero” certificate that shows their commitment to sustainability. This is a great incentive for students because they will be able to list it on their resume. In addition, each workshop will provide a zero waste lunch. The times, days, and locations are all tentative.

- Kick-Off Event
 - When: 12pm on September 7, 2015
 - Where: California Room
 - Presenter: Sustainability representatives (can be from organizations such as PowerSave, ASUCM, UCM Recycles, Rufus Recycles, etc.).
 - Purpose: To introduce the Triple Zero Workshops.
- Zero Net Energy Workshop
 - When: 12pm on the first Monday of every month
 - Where: California Room
 - Presenter: Sustainability representatives (can be from organizations such as PowerSave, ASUCM, UCM Recycles, Rufus Recycles, etc.). It can also be a faculty member with an expertise on energy, such as Senior Analyst Breeana Sylvas.
 - Outline:
 - Introduction: Define Zero Net Energy
 - Campus: What do we do on campus to reduce energy consumption?
 - Audience: What do you do to reduce your energy usage?
 - Interactive Game: Guess Your Energy Footprint
 - Mix and match the energy usage to the electronic.
- Zero Landfill Waste Workshop
 - When: 12pm on the second Monday of every month
 - Where: California Room
 - Presenter: Waste Reduction/Recycle Coordinator Matthew Hirota or Recycling/Composting Interns
 - Outline:
 - Introduction: Define Zero Landfill waste
 - Campus: What do we do on campus to reduce our waste?
 - Audience: What do you do to recycle and compost?
 - Interactive Basketball Game: Toss the given items (ex: water bottle, paper cup, chip bag) into the appropriate bins according to landfill, recycle, and compost.
- Zero Net Greenhouse Gas Emissions Workshop
 - When: 12pm on the third Monday of every month
 - Where: California Room
 - Presenter: Sustainability representatives (can be from organizations such as PowerSave, ASUCM, UCM Recycles, Rufus Recycles, etc.). It can also be a faculty member with an expertise on greenhouse gas emissions, such as Director of Sustainability, Colleen McCormick.
 - Outline:
 - Introduction: Define Zero Net Greenhouse Gas (GHG) Emissions
 - Campus: What do we do on campus to reduce GHG emissions?
 - Audience: What do you do to reduce your GHG emissions?

- Interactive Game: Guess Your Carbon Footprint
 - Mix and match the amount of greenhouse gases generated for each item (or activity) listed.

Cost

<u>Food, drinks, napkins, compostable plate, and compostable cups (<i>Estimated</i>).</u>	\$50 per event x 3 events per month x 3 months per semester = \$150
<u>Certificate Paper (50% Recycled, 30% post-consumer material. <i>Source: Amazon</i>)</u>	Assuming that 50 students go to all 3 workshops in one month: \$7.48 per 50 count x 3 = \$150
<u>Total Cost:</u>	\$300

Conclusion

The University of California, Merced has excelled at its achievements towards zero net energy and zero net greenhouse gas emissions. However, we cannot reach zero landfill waste at the rate at which we are educating the UC Merced community regarding proper waste disposal. In order to improve sustainability education on campus, I propose a three-phase program that will be geared towards undergraduate students. The first phase will introduce freshmen to sustainability by having “Sustainability Representatives” interact with freshmen on move-in day. The second phase will promote sustainable behaviors by adding a sustainability session to the annual ASCEND New Student Conference that all incoming freshmen and transfer students must, or can, attend. The third phase will encourage individual behavior change by offering optional Triple Zero Workshops that all undergraduate students can attend in order to earn a “Triple Zero” certificate to show their commitment to sustainability. I emphasize waste management as part of this proposal because I believe that recycling is the public face of sustainability. If students (and staff) were able to sort their waste properly, this can allow for recycling and composting interns like myself to sort better and faster. Additionally, this can allow our team more time to sort the waste generated at housing, which can increase our overall diversion rate. The community of UC Merced should take more action on sustainability education on campus in order to improve student behaviors towards the environment and push us closer in reaching our Triple Zero Commitment by 2020.

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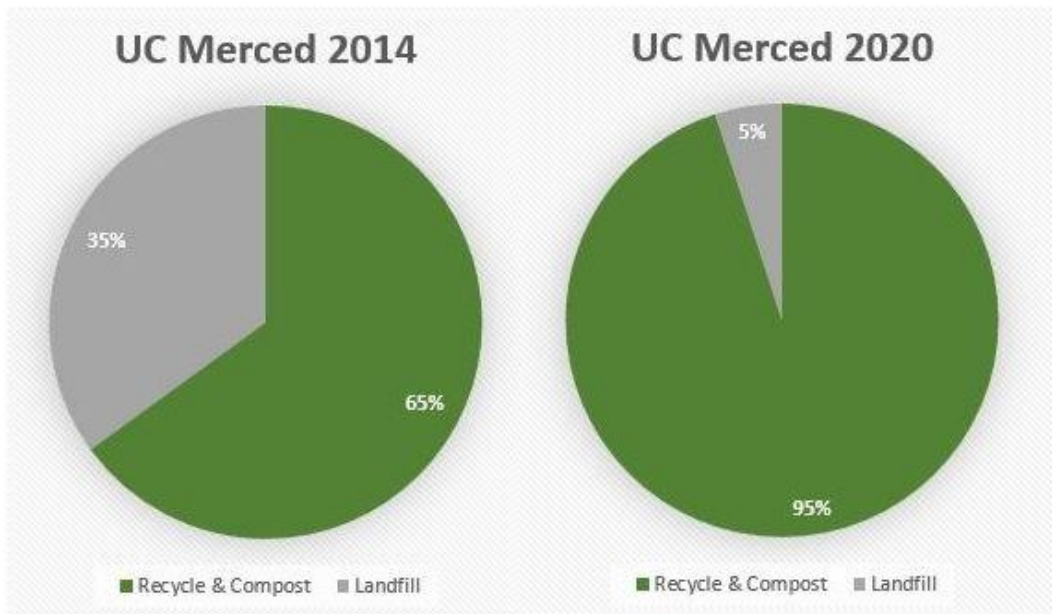


Figure 1: LEFT: UC Merced's 2014 waste diversion rate. RIGHT: UC Merced's 2020 waste diversion rate goal

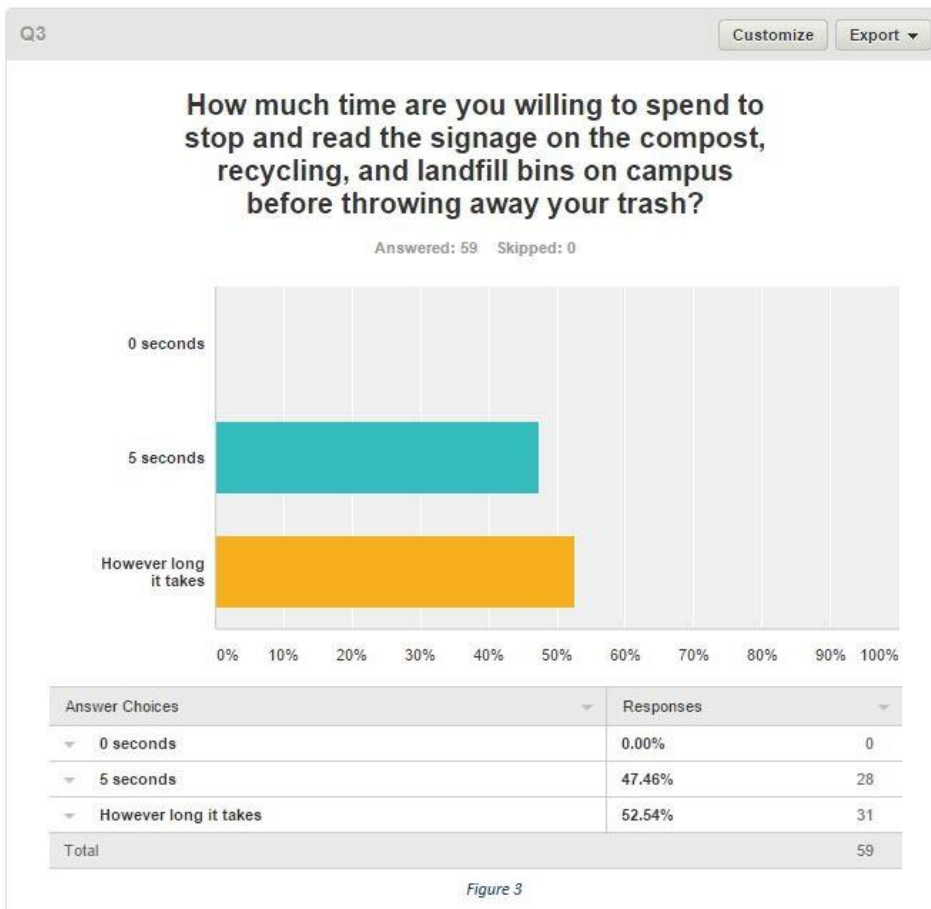
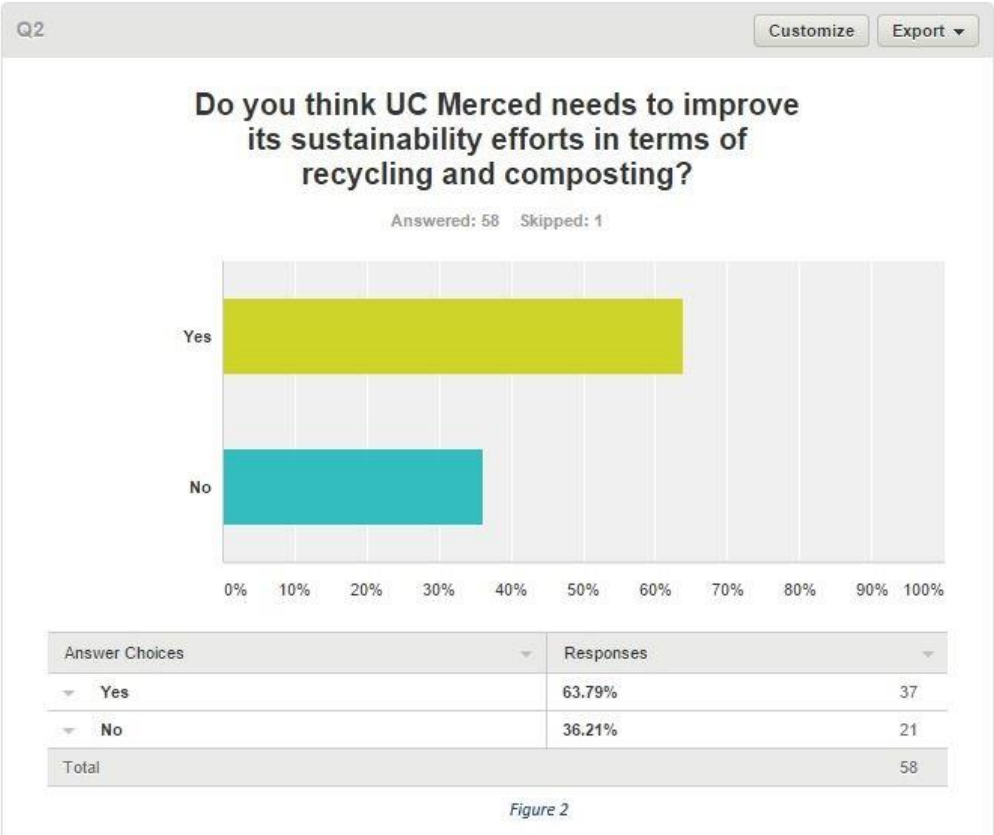


Figure 3

Appendix



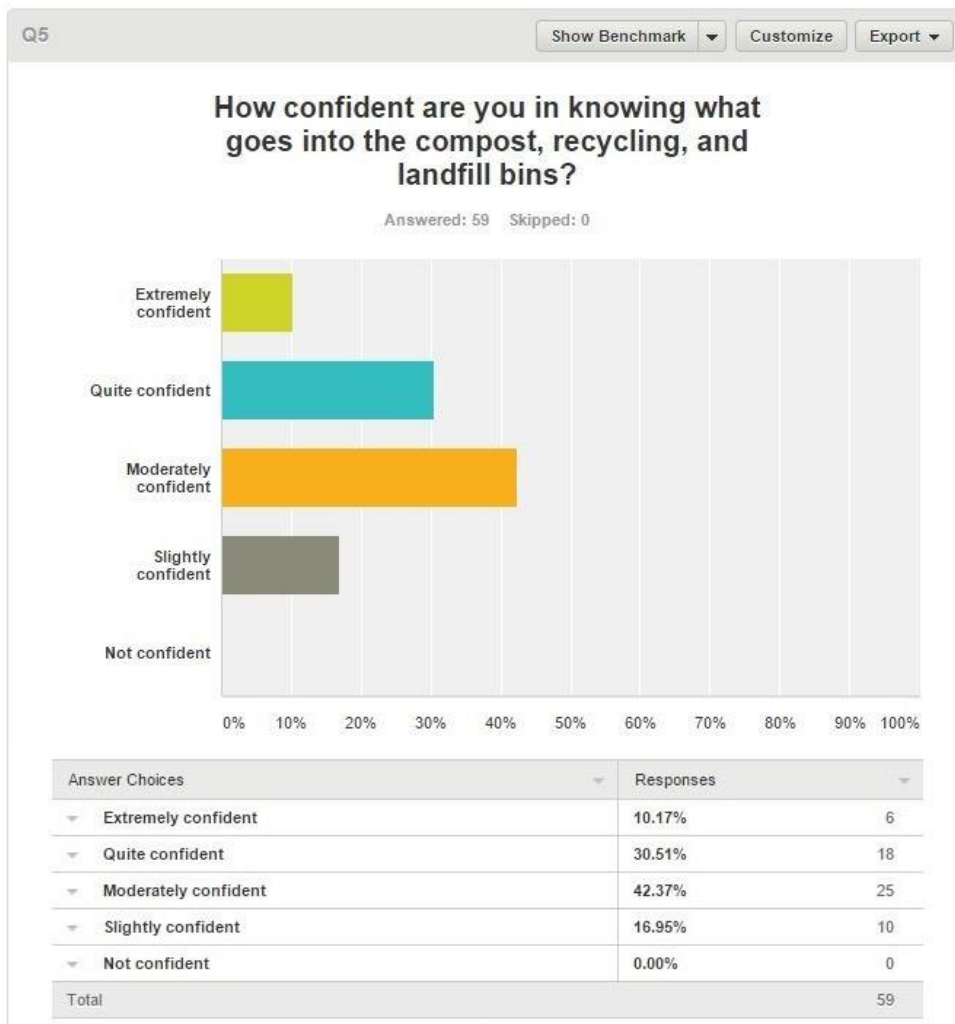
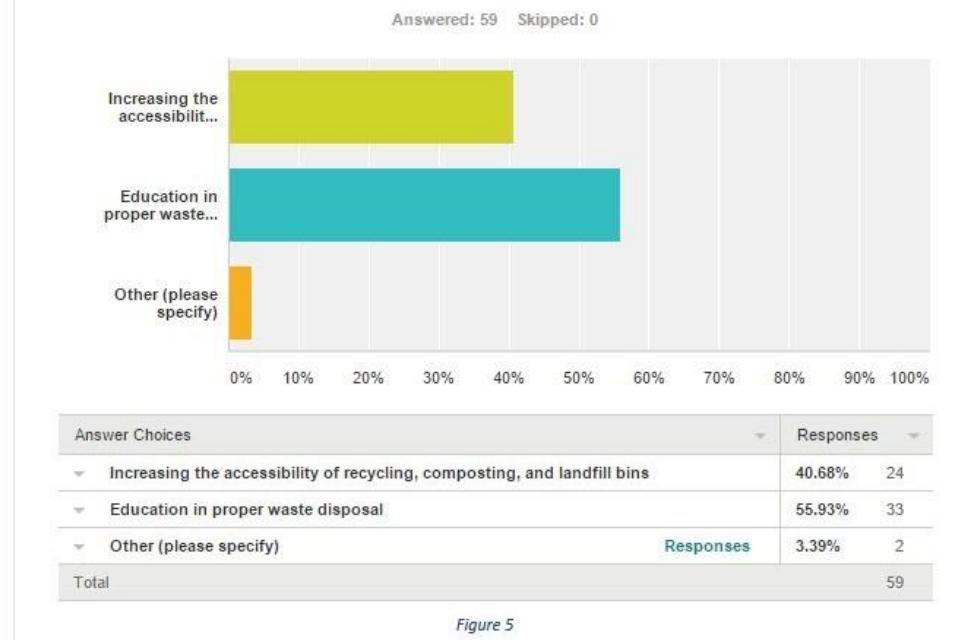


Figure 4
campus community's recycling and composting habits?



Importance of Improving Communication

~ September 2015 ~						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4 KICK-OFF!! 12pm CA Room	5
6	7 Zero Net Energy 12pm CA Room	8	9	10	11	12
13	14 Zero Landfill Waste 12pm CA Room	15	16	17	18	19
20	21 Zero Net GHG 12pm CA Room	22	23	24	25	26
27	28	29	30	Notes:		

Figure 6



I Pledge to be
triplezero

by making these
changes in my lifestyle:

zero net energy.

Unplug my charger when done

zero landfill waste.

Recycling and composting

zero net greenhouse
gas emissions.

Carpooling to buy groceries



After you have participated in 3 Triple
Zero Workshops, present this postcard
to receive a **TRIPLE ZERO CERTIFICATE!!!**

Name: Jane Doe

Student ID: 100195343

Figure 7



Biography

Andrew John De Los Santos is pursuing a B.S in Mechanical Engineering at the University of California, Merced. He will be graduating spring 2017. Coming from the San Fernando Valley, he decided to attend UC Merced because he saw the opportunity to make a real change. He continues to apply his leadership skills and academic knowledge to create long-lasting impacts in the UC Merced community.

Andrew John has been working as a Recycling/Composting Intern for Facilities Management since October 2014. He works to reduce campus waste through recycling and composting, as part of UC Merced's Triple Zero Commitment. He has conducted group tours, trained new employees, organized events, and worked with various stakeholders. As the 1st place winner of UC Merced's first annual Sustainability Writing Contest during spring 2015, Andrew John has used his opportunity to work alongside sustainability educators to promote sustainability education throughout campus. He would like to thank his Writing 10 instructor, Andrea Mele, for giving him the opportunity and guidance to turn idea into an award-winning proposal.