CALIFORNIA STATE UNIVERSITY, SACRAMENTO

Stinger Sustainability Report

Department of Environmental Studies

List of Authors

Christiansen Agostinho
Sydney Berrios
Christina Burrows
Michael Bustamante
Jacob Callahan
Eric Cendejas
Jonny Cervantes
Heather Crabb
Shannon Dalessandri
Becki Fox
Emely Jimenez
Natalia Lopez
Andrew Lozano
Frank Mammano
Tonya Manley
Alejandra Martinez
Michael Montanus
Madiya Nagin
David Nicholas
Blakely Nordman
Breanna Phan
Henry Rabas
Roberto Ramirez
Harrison Reynolds
Azalia Rivera
Mackenna Sullivan
Elecia Vanover
Dea Wages
Chelsea Wichman
Ajay S. Singh

Source: CSUS Office of Sustainability

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Introduction

Sustainability is the practice of using environmental resources to fulfill the needs of the present without ceasing the opportunity of future generations to meeting their needs (Moran et al. 2007). Sustainable practices have been gaining popularity at university and college campuses (Hiller and Kozar 2012). These practices include, reducing carbon by relying on renewable resources, planting trees, increased environmental activism on campuses, and incorporating sustainability into curriculums (Hiller and Kozar 2012).

California State University, Sacramento (CSUS), is amongst the campuses that have taken steps towards lowering their carbon emission and becoming sustainable. Some of the ways that this campus has managed to lower its carbon emissions consist of installing solar panels on roofs, installing LED lights in buildings, and converting compost into fuel that is used to operate maintenance machinery (CSUS sustainability report, 2014). Food waste is also converted into gas which is then used by the hornet shuttles. CSUS is famous for the amount of trees there are on campus; the leaves that fall from the trees are collected and turned into compost which is later used as fertilizer to provide nutrients to the soils (CSUS sustainability report, 2014). The Well, which is a gym, contains exercise equipment that helps generate electricity for the building when used.

In efforts to become a sustainable campus, the President of California State University of Sacramento (CSUS) signed the Second Nature's Carbon Commitment which is a promise to reduce carbon emissions from our campus and eventually accomplish carbon neutrality (CSUS sustainability report, 2015). Carbon neutrality is defined as reducing carbon emissions along with generating carbon sinks so that the amount of carbon being emitted from an institution is at a net zero (Selma, 2010, Zuo et al. 2011). In order to accomplish carbon neutrality, CSUS must first measure the amount of carbon that is being produced by the campus. There are many factors that need to be measured on campus to determine its total carbon output, such as electricity used on campus that is generated from fossil fuel. Other components to consider are carbon emitted from on-campus vehicles, and vehicles used to transport goods, such as foods and school supplies. Additional sources of greenhouse gases include: machinery used by maintenance workers, infrastructure construction, food waste, and students commuting to and from campus. The student body comprises of a large portion of the campus; therefore, knowing and understanding student behaviors is important when conducting a carbon inventory.

In Fall, 2017, in collaboration with the Office of Sustainability, students in the Sustainability in the Tropics course in the Department of Environmental Studies (ENVS 144) conducted a survey of undergraduate students. The Office of Sustainability has been working diligently in assessing the institutions carbon footprint, there has not been an assessment of the student body. Students in ENVS 144 developed a survey tailored to the information needs of the office. The goal of the survey was to gauge the student body's sustainability knowledge, attitudes, and behaviors that emphasized carbon emissions and neutrality. Students play a key role in the efforts to implement and maintain initiatives put into place. Therefore, questions were asked to assist in measuring the student body attitudes towards reducing carbon emissions.

Methodology

After consulting the Office of Sustainability at CSU, Sacramento, students in ENVS 144 developed survey questions that were based on questions used by the Environmental and Social Sustainability Lab at The Ohio State

University. The survey was sent to a random sample of undergraduate students at CSU, Sacramento (N = 31,000; n = 8,480) between October 31, 2017 and November 22, 2017. The survey was administered through Qualtrics and distributed via email. Students who completed the survey were entered into a lottery to receive either a bike lock or a coffee voucher.

Of the 8,480 students who were invited to participate, 1,011 students responded to the email for a response rate of 12% (a survey sent by the Office of Institutional Research in Fall 2016 received an 11% response rate). Of the 1,011 students who responded 913 completed at least 25% of the survey and 707 completed the survey. Results can be generalized to the student body with a confidence level of 99% with a margin of error of +/- 5%.

Source: CSUS Office of Sustainability

Assessing Sustainability Knowledge

Assessing knowledge is an important aspect of sustainability on campuses because it allows the evaluation of current student understanding of sustainability and how knowledge may influence the likelihood students will engage in pro-environmental behaviors. The information deficit model assumes that a lack of information and understanding about an issue, process, or event can be linked to denial, entrenched skepticism, and lack of motivation to engage in a behavior (Sturgis and Allum 2004). The Theory of Planned Behavior measures perceived behavior, attitudes, and social norms to predict behavior (Ajzen et al., 2011). The main concern about these models is that they do not measure knowledge (Heeren et al., 2015). This report focuses on measuring sustainability knowledge of students. The questions used in this survey were obtained from the Assessment of Sustainability Knowledge developed by the Environmental and Social Sustainability Lab at Ohio State University (Zwickle et al., 2014).

The purpose of a university is to educate students and prepare them for their chosen profession. By incorporating sustainability into school curriculum, universities can help foster students that will want to lead people toward developing a sustainable future (Van Weenen, 2006). Understanding the role that knowledge plays in promoting sustainable actions can help guide universities in creating a more successful and tailored curriculum that will help students gain more sustainable knowledge which can better inform behaviors (Heeren et al., 2015). Cornell University is an example of a campus that has successfully measured its carbon output (Climate Action, 2017). They recognized the importance of keeping students informed about their carbon- neutral plan and have worked with students across all disciplines to find ways to lower their carbon emissions (Climate Action, 2017). Studies have shown that spreading sustainable knowledge across all majors helps keep students knowledgeable and also encourages sustainable practices (Zwickle et al., 2014). The purpose of this study is to assess how knowledge affects a person's behavior and attitude towards sustainability.

Methodology

The evaluation of the knowledge section for the Stinger Sustainability Survey found the statistical averages of correct and incorrect answers for each individual question, as well as the overall trends by category. The analysis of each knowledge question surveyed consisted of counts, averages and percentages of correctly and incorrectly submitted answers. Each question had its respective correct, incorrect, and incomplete submissions counted. Averages were calculated for correct, incorrect, incomplete submissions for each question. In addition, the overall average of correctly answered questions was found by finding the mean of the averages of correct submissions for all of the questions that were presented. Survey questions used to assess sustainability knowledge can be found in Table 1.

Results

The knowledge assessment portion of the Stinger Sustainability Survey was meant to measure student's prior knowledge of sustainability by asking knowledge-based questions. The questions were broken up into 7 different categories all designed to test the student's familiarity with a different area of sustainability. The categories are environmental, carbon, social, economics, global issues, social/economic, and environmental social issues. Each category had at least one question to gauge student knowledge and the percentage of correct answers was then determined from the data. Figure 1 shows each knowledge assessment question asked in the survey and the percentage of correct answers. There was an average response rate of 81.43% of all the survey participants and correct response range was anywhere from 24-83%.

Students showed the highest rate of correct answers for the carbon knowledge questions and the lowest rate of correct answers in the Environmental Social category. Tables 2 and 3 display the results of each category and question, respectively. The carbon questions were answered correctly 65% of the time and was the highest percentage of all the categories. The Global Issues question #1 was the most correct answer and had a 82% success rate. The Environmental Social category had a 24% correct rate and was the lowest of all the categories. Conducive to the Environmental Social category displaying the lowest percentage of correct answers, it also had the lowest amount of submitted entries. Global issue questions maintained a reasonable amount of submitted entries similar to the other categories, but still resulted in the lowest rate of correctly submitted answers. Following the Carbon knowledge questions, Economic, Environmental, Social/Economic, and Social category questions received the highest rates of correct answers, respectively.

Discussion and Recommendations

From our results we can see that there is a gap in background knowledge in several areas of the survey. Carbon was the section that the largest percentage of students answered correctly, which is helpful to understand that students sampled have some background information regarding what are the major causes in the rise of global mean temperature, and have some understanding on what the goal of carbon neutrality is. Global issues were the area where there was the largest percentage of students who answered questions incorrectly. However, when the individual questions were broken down, it was evident that one question may have been problematic for students. The question asked, "Which of the following is a leading cause of the depletion of fish stocks in the Atlantic Ocean?" The majority of students answered this question incorrectly with the responses of Global Climate Change, or Ocean Pollution.

The correct answer was fishermen seeking to maximize their catch. However, this disconnect could have been due to the answers that were available. Even if the student did not know the answer, it is understandable why in a sustainability survey, a "guess" of an answer would be about pollution or global climate change. Before the survey is conducted again, an analysis of the questions and answers based on the data we have collected and analyzed would be helpful to ensure that the survey does not create any extra confusion for students while taking the survey.

Some recommendations moving forward for the survey would be to make this survey, or a version of it, mandatory to all incoming students. Students have to take surveys about alcohol and sexual assault when they first sign up for classes, at the same time, this survey could be added to that list to get students some background information on sustainability. Continuing a survey across a student cohort's progress through the university could offer information on general trends through the average four-year collegiate career at the university. Incentivizing students to participate with university products, food and beverage vouchers, tickets to university related events, or various other means could potentially increase student participation. Making the survey mandatory is a viable option with some minor concern over resistance by students that is likely to be short lived so long as students understand the rationale behind university efforts.

Having a set "core" of knowledge questions that remain largely similar would offer a method of analysis to examine trends across student cohort years, but may constrain the breadth of sustainable knowledge examined. Developing a working pool of questions can offer a variety of question topics that have been predefined by categories that would then provide insurance for long-term survey development and maintenance as those staff members that produce the survey may shift in and out of the role. Analyzing the knowledge question set by student rank, college, and other university demographics can offer the ability to tailor efforts of sustainable education to certain groups and colleges. Creating a well-organized database and documented processing and analysis techniques is necessary to collect, store, and provide survey questions and student cohort answers that can then be readily consumed and analyzed by any staff members. There are many different ways to continue this survey and make it available to students, but creating the conversation about sustainability early in their college careers is an excellent place to start.

Source: CSUS Office of Sustainability

Carbon Neutrality

Carbon neutrality, or having a net zero carbon footprint, is when you are able to achieve net zero carbon emissions. This is done by balancing a measured amount of carbon released by doing actions that offset your carbon emissions. Carbon offsetting means compensating for the carbon-dioxide pollution you're making (your carbon footprint) by preventing the same amount of pollution (Carbon emissions) from happening somewhere else. One carbon offset means

compensating for emitting carbon dioxide (CO_2) into the atmosphere by preventing CO_2 from entering the atmosphere elsewhere on Earth. What is Sacramento State doing? Sacramento State should care about becoming carbon neutral because it is an opportunity for this campus to become a leader in showing all other businesses the importance of going green and can be a model for how things should be done. The President and the Office of Sustainability signed a pledge to become carbon Neutral, along with several other businesses. In the long run if everyone started reducing their carbon footprint, it would help reduce greenhouse gases and start reversing climate change. Sacramento State is currently considered to be a commuter campus. Sacramento State is currently considered to be a commuter campus.

What does this mean? It means that most of Sacramento State's students commute from somewhere else and do not live on campus. According to 2016-17 data from the Office of Institutional Research, 94 percent of undergrads and 72 percent of freshman at Sacramento State live off campus or commute.

Results

Results indicate 93% of students surveyed live off campus, while only 7% live on campus. Using Excel, we analyzed the data regarding how often students utilize different modes of transportation to travel to campus. For all categories except driving (e.g. carpool, bus, drive etc.), the majority of students participated in the form of transportation less than 10% of the time when traveling to campus. Although the majority of students drive to campus the greatest percentage of time, a noticeable portion of students drive 10% or less of the time (Figure 7). To gain insight as to why more students aren't participating in alternative modes of transportation, we analyzed the data on how far students travel one-way to get to campus. We found that the majority of students travel greater than 1 mile but less than 10 miles to get to campus. Additionally, nearly 30% of students travel between 11 miles to 20 miles. This might explain why more students surveyed do not walk or bike to school, since on average it takes about 15 minutes to walk a mile and 6 minutes to bike a mile. For example, for a student who travels 5 miles to campus, it would take approximately one hour and 15 minutes to walk to school! Even a 30-minute bike ride may seem too lengthy for some students. Next, I used an online mapping tool to map all the different zip codes students' surveyed travel from (Figure 8). Results indicate 95% of students travel from zip codes within a 50 miles radius of campus.

With goals of becoming a carbon neutral campus, we need to looks at where carbon is coming from. Driving is a huge source where it is emitted. Through the process of burning fossil fuels, such as the use of gasoline, the primary anthropogenic greenhouse gas emitted is carbon dioxide. According to the Environmental Protection Agency (2014), a typical passenger vehicle emits 8,887 grams CO_2/ gallon or 19.59 pounds of CO2/ gallon. For one mile, these emissions equate to 411 grams of CO_2/mi or 0.9061 pounds of CO_2/mi (EPA, 2014). For Sacramento State, the average amount of gasoline students use, 0.7396 gal, per one way to campus was multiplied by 19.59 pounds of CO2/gal to find the amount of CO_2 emitted per one gallon, which came out to be 14.49 pounds of CO_2/gal on average (Table 4). In addition, for the average distance a student takes one-way to campus is about 18.03 miles (Table 4). Using this number, it is multiplied by the EPA's data of 0.9061 pounds of CO_2/mi which gives us a rough estimate for the average amount of emissions of 16.34 pounds of CO_2 (Table 4). If multiple trips were factored in and as well as the thousands of students driving to campus, the amount of CO2 emitted is very large.

Another area that was measured was each respondent's distance traveled one-way to campus and the amount of gas used. There were actually a few outliers that were taken out of the graph (Figure 9). There were three people who took the survey who answered for their daily one- way to campus as 110 miles and up. The furthest one away actually answered as 200 miles which could be a typo but regardless if it is true, then they would be emitting tremendous amounts of carbon dioxide in their one-way commute. Without those outliers, the scatterplot shows a huge cluster of respondents who answered less than 10 miles. This means there are a big number of students who live fairly close to campus yet they still choose to take their car to school, so looking at the possible reasons and barriers as to why students drive is important to take note of to recommend possible solutions to lessen the amount of car trips people are taking to campus.

Discussion

Implementing an easy way for students to find other students commuting from nearby areas is one-way Sacramento State can increase the use of alternative mode of transportation. This could be done using an app where students create a profile that says what area they commute from and what days they commute to Sacramento State. Students traveling from nearby areas with similar schedules could then partner with other students to commute to campus. This would encourage students not only to branch out to meet new people, but is in line with Sacramento State's goal of becoming carbon neutral. Students that participate in these programs could be incentivized by a discounted parking pass for carpoolers or by having access to closer parking spaces than students who do not carpool.

To promote the use of the city's bus system and light rail, students would benefit from better guidance on how to use these modes of public transportation. Many students do not feel confident in knowing the best route to get to campus. This could be even more confusing if the best route requires transferring from one bus to another. Safety is another concern for many students who may consider public transportation. Sacramento State can work with city officials to promote a safe riding atmosphere on public modes of transportation.

As a part of our analysis we asked participants that drive a car to campus about the barriers they face that prevent them from using alternate forms of transportation. We then took then found the percentage of the student population that faced each individual barrier shown in Figure 10. Alternate forms of transportation include: walking, carpooling, biking, taking the bus, light rail, or a shuttle. From our results we were able to conclude that the majority of the Sacramento State University student population feel as if the amount of time it takes one to get to campus using an alternate form of transportation is a significant enough barrier to encourage said student to drive to school. The distance traveled to school was the second most common barrier and the third barrier was the convenience of having a car and being able to drive themselves. The survey included five other barriers, listed above, along with the individuals who opted out of the question because they did not have a car or chose to skip the question.

Barriers like the changes in weather throughout the day are difficult to accommodate for because often time weather changes are unpredictable. However, the majority of the barriers listed, Sacramento State can possibly accommodate for as an attempt to prevent or minimize the population of students who rely on cars as their main method of transportation. The first and second barriers include distance and time traveled to

get to and from campus, which go hand and hand with each other. The third barrier was the convenience of having a car, which in many cases may have to do with weather changes throughout the day and the safety risks of other forms of transportation.

There are plenty of cases of commuter students who leave home at 5:00am to get to school at 7:00am just to sit in their cars and sleep or do homework until 9:00am, just for a good parking spot and to beat traffic. To accommodate for this, Sacramento State could create a shuttle or busing system to students that live in the vicinity of Yuba, Stockton and Vacaville. If the shuttle provided free WIFI and tables similar to that found in Amtrak busses, students would have an area to possibly sleep or do homework on the way to campus, all the while cutting their total commute time in half. This being said, before the school can take this step, another survey should be conducted which would ask when the busses should pick up and drop off students, along with how many students would take the bus if it was provided. Sacramento State could attempt to team up with companies like Amtrak or Greyhound to see if there was a way that they would sponsor a project like this.

Another accommodation that should be focused on is the safety concerns of alternative transportation. When the days get shorter and it gets darker earlier, students tend to stray away from using the bike trail that runs along the American river. Students often feel as if their safety is at risk because of the lack of lighting and patrol in those areas. Sacramento state could add additional solar powered lighting and blue post further down the trail, at least to Rivercrest apartments and possible increase patrol of that area. The convenience of having a car could be accompanied by increasing the amount of parking available on the first floor of every parking structure to students who carpool. Although this may seem excessive, it will be more convenient that decreasing the amount of parking available, seeing that we are facing an increase in student population.

Source: Heather Crabb, 2017

Sustainability Attitudes

Carbon neutrality is an important concept in the topic of climate change and sustainability. To date, the concept of carbon neutrality has become popular for institutions and even some organizations as an effort to become more sustainable overall. While carbon neutrality is a desirable goal for society, achieving carbon neutrality is not an easy task and implementing carbon neutrality is difficult.

As an important global concern today, sustainability efforts are increasing worldwide, including on the campus of CSU, Sacramento. According to the 2012-2014 CSUS Sustainability Report, there are several areas that CSUS is focusing on to reduce the size of the campus' carbon footprint. Some of the practices and technologies that are being implemented by CSUS to reduce the size of their carbon footprint include: stormwater treatment, food waste composting, low flow toilet retrofits, solar power, smart electrical

switches, alternative transportation, led lighting retrofit, planting trees, sustainable new construction projects, recycling events, water bottle refill stations and well water irrigation (CSUS, 2014). In addition to suitable practices and technologies, CSUS is exceedingly focused on creating an atmosphere where students are informed and empowered to participate in promoting sustainability efforts.

The university is also focused on reducing consumption of natural resources through efforts such as having recycling containers in every building. In an effort towards carbon neutrality, other efforts include creating a campus sustainability education campaign.

The sustainability efforts at CSUS are clear. However, it is important to have a measure of the student body knowledge, attitudes, and behaviors toward the topic, as the students play a key role in the efforts to implement and maintain initiatives put into place. Therefore, questions were asked to assist in measuring the student body attitudes towards reducing carbon emissions.

Attitude is a group of opinions, values and dispositions to act associated with a particular object or concept. Measuring attitude in a survey can be difficult because it requires a series of questions to evaluate attitude effectively. Some examples of subjects that an attitude survey might attempt to measure; Attitude Surveys, The Likert-type scale and semantic differentials.

An attitude is an enduring positive or negative feeling about some person, object or issue. Students attitudes towards their own beliefs, social influences, and lifestyle patterns influence the way people may think or behave and attitudes can be measured by evaluating how they feel about certain subjects towards carbon neutrality.

Methodology

Nine hundred and thirteen students (N = 913) participated in the study during the fall semester of 2017. The students were enrolled in various concentrations at Sacramento State University. A course instructor for one of the Environmental Sciences courses along with his environmental science class developed the research questions. The instructor worked with university administration to distribute the research survey to the entire student body. Participation was voluntary, and students were incentivized with the possibility of winning a free Bike U-Lock for completing the survey. Students may be biased toward participation, but there was no indication of bias in the results.

To become carbon neutral, CSUS needs to first measure student attitudes toward reducing carbon emissions. In the survey, CSUS students were asked to answer the two following questions to provide information regarding student attitudes toward achieving carbon neutrality at CSUS:

1. How concerned are you that global carbon emissions will negatively affect the following?
- economy
- themselves personally
- family, fish, wildlife, and plants
- future generations
- people in other states
- people in their community
- people in other countries

Response choices were: not at all concerned (rank 0), concerned a little (rank 1), concerned (rank 2), or very much concerned (rank 3).

2. How important, if at all, should reducing carbon emissions be for Sacramento State?
Response choices for question 2 were: extremely important (rank 4), very important (rank 3), moderately important (rank 2), slightly important (rank 1) or not at all

important (rank 0). Gender and class level were used as independent variables in order to determine whether differences existed for either survey question to understand more about the surveyor's attitudes towards carbon neutrality.

Results

Of the total sample (N=913), 894 participants provided their gender with a total of 590 (64.6%) females and 296 (32.4%) males responding. In regard to class level, 139 (15.2%) participants were Freshman, 95 (10.4%) were Sophomores, 310 (34.0%) were Juniors, and 369 (40.4%) were Seniors. To determine whether group differences of attitude towards carbon neutrality existed for the independent variables of gender and class rank, a Two-Way MANOVA was conducted in SPSS. Both independent variables have two or more levels (gender =2; class level = 4) and the dependent variables measuring attitude were all scored on a continuous scale.

To determine if an interaction effect existed between gender and class level, multivariate analysis was completed. There was not a statistically significant interaction effect between gender and class level on the combined dependent variables, $F(36, 2572.5) = 1.131$, $p = .273$, Wilks' $\Lambda = .943$, partial $\eta^2 = .015$ (Table 6). Simple main effects for gender were then calculated and one significant effect was found. There was a statistically significant difference between males and females regarding the importance of reducing carbon emissions, $F(3, 694) = 4.209$, $p = .006$, partial $\eta^2 = .018$ (Table 7). Based on a test of between-subjects, there was a statistically significant main effect of class level for economy attitude scores, $F(3, 694) = 3.598$, $p < .05$, partial $\eta^2 = .015$, but not for any other attitude scores. There was also a statistically significant main effect of gender for economy attitude scores, $F(6, 694) = 2.797$, $p < .05$, partial $\eta^2 = .024$.

Discussion

Because the only significant group differences for both gender and class level were found regarding economy attitude scores when asked about carbon emission concerns, university administration should consider an educational campaign to educate the student body on how climate change can affect them more closely, such as personal impact, family, and future generations.

Although there was also a significant main effect for gender in regards to the importance of reducing carbon emissions at CSUS, it is also advised that university administration consider an awareness campaign to inform the student body exactly how the university intends to become more sustainable and how that will affect their experience at Sacramento State. This significant main effect in gender could be due to the vast difference in participation between genders in this study. 65 percent of the total participants were female and 35% were male.

Source: CSUS Office of Sustainability

Psychological Distance of Sustainability

The administration of California State University, Sacramento and the Department of Sustainability are implementing sustainable polices and projects that improve the campus's carbon footprint. While the Department of Sustainability has assessed the carbon footprint of the facilities and faculty, there has not been a systematic assessment of students. To understand the role of undergraduate students in the campus' efforts to become more sustainable, a survey was conducted that allowed us to get a general idea on where the student bodies' opinions regarding campus sustainability. Asking questions regarding current behaviors and willingness to act in campus changes, a consensus was created to interpret the student body's attitude towards sustainability.

One measure of environmental perceptions that may play a role in motivating students to engage in pro-environmental behaviors is psychological distance. Psychological distance affects how one thinks and makes decisions regarding certain ideas. Psychological distance can be used to measure how far removed an individual view themselves from the issue. Certain questions were placed in the survey that could be analyzed to measure one's personal psychological distance when it comes to sustainability. Four questions that pertained to the various types of psychological distance were asked. Experimental distance, which is an individual's perception of just how likely on unlikely a future event is going to happen. Temporal distance refers to an individual's perception of distance in time. The closer the individual perceives an event to happen the more concrete the event is and the further away it is the more abstract it is. Spatial distance is the physical distance at which an event is taking place from the individual. If the individual themselves are closer to the event the more concrete the event is for the individual. And finally, social distance is measures. Social distance is the measure of space between the individual and other social groups. The more socially near the event is from the individuals own social groups, the more concrete it is.

Methodology

To measure the psychological distance of sustainability on Sacramento State campus, the survey asked four questions pertaining to the various forms of psychological distance. For experimental distance the survey asked the question: How likely is it that Sacramento State will become sustainable? The responses were recorded on the scale of 1 to 5, 1 being extremely unlikely and 5 being extremely likely. Measuring temporal distance, or how removed the student views themselves from future events, the survey asked the following: When, if at all, will Sacramento State begin to experience the benefits of sustainability? The responders were asked to choose one of the following which were then correlated to number values for statistical analyzing: we will never experience it (0), we are already experiencing it (1), we will experience it in the next two to five years (2), in the next five to fifteen years (3), in the next fifteen to fifty years (4), in the next fifty to one hundred years (5), or in hundreds of years from now (6). For spatial distance the survey asked the question: Which of the following are more likely to experience the benefits of Sacramento State sustainability efforts? Like the responses for temporal distance, the responders were asked to choose one of the following: Humans will not experience the benefits (0), people in other countries (1), people in other states (2), people in other counties (3), people in other communities (4), people in Sacramento (5), Sacramento Sate staff and students (6), or me (7). Finally, the survey measured social distance from sustainability by asking the following question: Which of the following groups or people, if any, are or will experience the benefits of Sacramento State sustainability

efforts? The responders were asked to choose from the flowing list and the answers were correlated with a number value: No one will benefit (0). People in a different socio-economic group than me (1), everyone will benefit equally (2), or my own socio-economic group (3).

Results

To measure experimental distance, the survey focused on likelihood, how likely it was that Sacramento State would become a sustainable campus. Over 80% of the sampled student body believe that it is more likely than not that the campus will become sustainable in the future (Figure 11). In this case the sampled student body show a shared attitude that is favorable to achieving sustainability in the future. This however, does not accurately show the willingness of the student body to personally participate in campus sustainability measures. The survey contained questions asking how willing the individual was to participate in certain sustainable measure throughout campus. The results were different depending on the magnitude of personal sacrifice the student would have to make. Two questions bring up an important barrier that can decrease the amount of support – willingness to increase parking fees and planting native plants on campus. The responses showed most of the sampled students were strongly against the increased parking fees to support solar panels. On the other hand, 50% of students were strongly in favor of supporting the increase of native plants on campus to reduce water use (Figure 12). The difference between these two sustainability measures is personal sacrifice for the student, there is a monetary barrier. Money is seen by students as barrier they have no control over and it prevents them from being supportive. Planting native plants on campus requires no personal cost to the student and therefore would be supported more by students. So, although most of the sampled student body agreed that the campus will most likely become sustainable, the willingness to support certain sustainability measures differs depending on the personal sacrifice of the student.

The survey also asked question regarding students spatial (Figure 13) and temporal distance (Figure 14) from campus sustainability. In response to the question, where might the effects of sustainably have the most impact, over 50% of sampled students believe that it would be the Sacramento State students and staff, as well as the Sacramento area, who will be affected the most by campus sustainability. The spatial distance for the students is close, there is a belief that the efforts put into sustainability will be directly felt by the student body personally. This brings up the question of temporal distance, when will the campus begin to feel the effects of sustainability? For the most part, the students believe the efforts put into campus sustainability now will be felt within five years (Figure 14). This is typically the amount of time a student spends at Sacramento State. As far as temporal distance, the student body is not far removed from the effects of campus sustainability.

Social distance plays a large role when it comes to measuring psychological distance. The survey asked which socio-economic groups within the community will benefit the most from sustainability. Nearly 75% of the samples students believe that sustainability efforts made on campus will be felt equally among everyone (Figure 15). This kind of response is one guided by normative beliefs, one set by social expectation. We see this response in other questions throughout the survey, particularly when asking which aspect of sustainability should be a Sacramento State priority. Once again, most students believe that all aspects of sustainability are of equal priority. There could be various reasons why most of the sampled student body responded

that way. There could be a real belief that everyone will benefit from sustainability measures. More likely however, it could be a default response to the question that is driven by social expectations.

Discussion

Psychological distance was measured in this survey to find out how removed the student body was from the concept of sustainability. The survey uncovered some common control beliefs within the student body- for the most part it being money. The likelihood of campus sustainability really depends on the willingness of support by the student body, suggesting that the Sacramento State sustainability group start with programs and measures that require the least personal sacrifice of the student. As for spatial and temporal distance, the student body is not far removed from sustainability. There is a shared belief that efforts put in now towards sustainability will have effects felt by the students within a matter of years. Social distance is also not far removed from the student body. Almost two-thirds of the students who answered this question believed that their social class has little to no effect on how sustainability affects them. Suggestions for future sustainability measures and projects would have to take into account the various barriers students have little control over. The Sacramento State students appear to want a more sustainable campus, but the ability to support sustainable measure needs to be there. Start introducing projects like planting native plants first and providing opportunities for Sacramento State students to choose to be more sustainable. This can be little things like provide more recycling bins around campus to promote recycling. Introduce more compost trash options in locations where students eat regularly. We should also be providing more accessible information on already existing programs set up throughout campus through the Sacramento State Sustainability group. Any sustainability projects that will require monetary donations from students should be optional and should come with rewards. A free bumper-sticker that noted their support of sustainability with a donation towards a Sacramento State sustainability project might incentivize more donations and also become an advertisement for other students who see it.

Source: CSUS Office of Sustainability

Uncertainty of Climate Change

Uncertainty about a topic can stem from a multitude of variables. Misinformation, trusted sources, ignorance are all factors that can cloud the mind of an individual making him/her uncertain. Although uncertainty is not the sole component at play when it comes to making a decision, it almost certainly plays an important role in the decision making process. Baumgart-Getz, a researcher, studied why farmers adopt best management practices. He found that the biggest factors at play when thinking about adopting a best management practice was, “Access to quality information, financial capacity, and being connected to agencies or local watershed groups.” (Baumgart, 2012). Access to quality information was one of the most important variables when making a monumental decision such as adopting a new farming practice. By having quality information you reduce uncertainty, and thus are able to make

an informed decision. Although the circumstances vary from a Sacramento State student's uncertainty on climate change, to a farmer's uncertainty on a best management practice, the idea that more information equals less uncertainty holds up. The goal of this uncertainty analysis is to try and find correlations between levels of uncertainty that Sacramento State students have towards climate change, and the attitudes/behaviors those students exhibit towards pro environmental behaviors.

Uncertainty is the state of being unsure, skeptical, suspicious or mistrusting of a person, phenomenon, or event. An individual who is uncertain will have difficulty in arriving at a decision or judgement on how to guide future behavior. Two types of uncertainty include aleatoric and epistemic. Aleatoric uncertainty is characterized by the perception that a phenomenon occurs by chance. Epistemic uncertainty is characterized by the level of knowledge or understanding of the phenomenon. In the case of climate change, an individual who perceives change as occurring at random with no clear patterns could be considered to have high levels of aleatoric uncertainty. Someone who perceives that there is not enough evidence that climate change is occurring and is searching for new information to support the theory of climate change is considered to have high levels of epistemic uncertainty. There are ranges of aleatoric uncertainty and epistemic uncertainty when it comes to climate change; these ranges are to place and describe people as being skeptics, optimist, believers, or distrusting skeptics. Skeptics believe climate change happens by chance and no amount of information will sway their opinion. Optimist also believe climate change occurs by chance, but they believe more information about climate change is needed. Believers know that more information is needed to better understand climate change and believe that climate change has a pattern. Distrusting skeptics also see a pattern to climate change, but no amount of information will change their belief of climate change being a hoax.

Influence of uncertainty on decision-making

Uncertainty plays a critical role in the decision making process. If a person is uncertain that changing their lifestyle will have any positive environmental impact then why would they change? Take recycling for example, why should someone spend the time and effort it takes to recycle if they can just throw their trash away. Aside from making a few dollars the real benefits of recycling are not seen. Instead the rewards compound over time and the benefits affect the common good reducing uncertainty allows people to evaluate the consequences of their own actions. This idea feeds into what is called the Normal Activation Model or (NAM). The behavioral pattern of NAM focuses on awareness of consequences and attributed responsibility which feed into personal norms and then behavior. A study on "Understanding Consumer Recycling Behavior" showed that the biggest determining factor for a positive recycling behavior was awareness of consequences (Park et. al., 2014). Teaching the Sacramento State value and effects sustainable behaviors have on the environment is important. Increasing awareness on contemporary environmental issues will cause people to think twice before engaging in environmentally unfriendly behaviors. Furthermore, reaching out and elevating student understanding on environmental issues will have far reaching consequences beyond Sacramento State alone. If we are able to enlighten the minds of just a few individuals, they can then use the information they learned to better educate their family and friends. Obtaining and communicating accurate information is imperative to reducing uncertainty and making informed decision.

Research Question

Does uncertainty and climate change affect concern and decision-making?

We wanted to test the correlations between student's climate change uncertainties and how their uncertainties could affect the student's over all concern and decision making processes. Do students uncertainties about climate change make them more or less likely to make a decision on new campus policies, or new practices?

Methods

The uncertainty section of the Stinger Survey consisted of nine different questions, each question was formulated to be aleatoric or epistemic. The available five responses were based on the Likert Scale, with answers ranging to strongly agree to strongly disagree. The aleatoric questions were;

"Even if climate changes, we can't predict what those changes will be in the future";

"Earth's climate conditions occur at random with no cycles or trends";

"Earth's climate conditions occur in a cyclical pattern";

"Climate Models are accurate enough to predict long-term climate patterns in my area";

"The earth's climate is always changing".

The epistemic questions:

"There's too much uncertainty about the impacts of climate change to justify changing the way I live my life";

"There is enough evidence that climate is changing"; "Having more information about climate change will reduce uncertainties about the future where I live".

Our uncertainty questions were correlated with the Attitude section of the Stinger Survey, in which students were asked to rate their attitude for each category based on the following question;
"How concerned are you that global emissions will negatively affected the following?". The responses were based on the Likert-type scale with four answers ranging from the lowest, "Not concerned at all", to the highest, "Very much concerned". The categories in which students were asked to rate their attitudes were; "The economy"," You personally", "Your Family", "Fish, wildlife and plants", "Future generations", "People in other states", "People in your community", and "People in other countries".

Results

The results of the Stinger Sustainability Survey provided us with some interesting data (Table 8). Out of the nine uncertainty questions, only four of them had an even moderately significant correlation to the attitude questions. These four uncertainty questions are epistemic in nature, and the highest category of concern is always associated with, "Fish, wildlife, and plants". There is a much smaller correlation between concern for the economy and how climate change will affect it, and a more medium correlation with communities and families. The aleatoric questions did not have significant results, thus were not included. The results show a higher correlation between epistemic questions and attitude. This shows that the more information students have about climate change, the greater concern they have. More information about climate change correlates with lower uncertainty, and allows students to develop a more informed attitude because they understand the direct and indirect effects of climate change on

aspects in their life.

Discussion

With the results we want to grab the attention of our students that are on the fence. With this being a California campus, it makes sense that there is a large majority of students that believe in climate change, that they would be willing to make decisions on campus policies that could help Sacramento State become Carbon Neutral.

However, those large majority of students that fell in the middle need to be swayed, they are going to be the overall swing vote in implementing any campus policies, and the only way to do that is to make them more certain about climate change.

Recommendations

What it all comes down to is, what do students know about climate change? Have they ever taken the time to educate themselves on what causes climate change? Recommendations that the uncertainty group would make for the Sacramento State Sustainability Department is to appeal to the students that fall in the optimist and believers. They are the students you have the chance to educate and have them hop over that fence into understanding what climate change is and its causes. Offer literature, get Environmental Studies students involved in putting out climate change facts in our Sacramento State paper, or even fast and easy "fact of the day" with a Green Team mobile app. Even take into consideration making it mandatory for Sacramento State students to have to take an Environmental studies course before they graduate. When it comes to making Sacramento State University a carbon neutral campus, we have to educate our students about the basics of the environment in respects to climate change.

Source: CSUS Office of Sustainability

Sustainability Behaviors

Behavioral analysis is a major piece in the puzzle of creating a sustainable campus environment. Behaviors can take the form of a variety of things. They can include what kind of transportation an individual uses, what kind of food containers or water bottles they use, or even as simple as what kind of bag they choose in stores at check out. Looking at previous behaviors of individuals can be a good indicator as to how they will behave in the future. These indicators are also an important tool in the formation of policy. If policymakers can gain an understanding of how individuals in their community behave, then they will be better able to create and implement more effective policies that the individuals would be more likely to get behind. The Behavioral Analysis portion of the Stinger Sustainability Survey looks to do just that: gain a better understanding of the behaviors of the student population and in return create and implement more student friendly and effective programs and policies on campus.

Methods

In order to see what the current behavior looks like when it comes to sustainability as a whole, a good strategy is to look back at previous habits that students have had. In this

survey, students were asked a variety of questions ranging from how often they reused bags and containers, to how often they carpooled or used public transportation. The response in general mostly consisted of habits that were not done often. Some specific questions that we analyzed for prior behavior were: how often do you reuse bags for grocery items and non-grocery items, how often do you recycle paper and cans etc. and what how often do you carpool, use public transportation, or walk/ride bike to school. The possible answers were 0-5 with 0 being never and 5 being always. The average numeric answer for each question was the calculated and compared to the answer scale and the direction of skew was determined.

List of Questions:

1. Prior Behavior: When you have the opportunity, how often do you do the following?

a. Use reusable shopping bags when purchasing groceries items.
b. Use reusable shopping bags when purchasing non-groceries items.
c. Use a reusable water bottle.
d. Purchase organically grown food.
e. Plant a vegetable and/or fruit garden or participate in a community garden.
f. Buy produce and other foods from a farmer's market or CSA (community supported agriculture).
g. Turn off lights when I leave the room.
h. Sign up to receive electricity from renewable sources from my utility company (e.g. PG&E, SMUD) when I move houses.
i. Turn off electronics when not in use.
j. Purchase second hand items instead of purchasing new items.
k. Recycle paper, cans, or bottles.
l. Carpool to campus with other students.
m. Take an online class rather than drive to campus.
n. Use public transportation instead of driving when coming to campus.
o. Use public transportation instead of driving when coming to campus.
p. Choose to walk or bike instead of drive when coming to campus.
q. Choose to eat a vegetarian meal.

2. How likely are you to do any of the following in the next month?

a. Use public transportation to come to class (light rail, bus).
b. Ride my bike to campus.
c. Bring lunch from home in a reusable container.
d. Carpool to campus with other students.
e. Reduce or modify the number of times I commute to campus.
f. Sign up for an online class.

3. How willing are you to do the following in order to reduce your carbon emissions?

a. Participate in a reusable takeout container program to reduce use of single use plastics.
b. Support an increase in parking fees to support shaded parking lots using solar panels.
c. Plant a tree on campus.
d. Use a student-only rideshare app similar to Uber or Lyft.
e. Support more water filling stations for reusable water bottles on campus.
f. Support planting of native plants to reduce watering of lawns on campus.
g. Take a direct express Sacramento State bus between campus and surrounding areas (e.g. Rocklin).
h. Support programs to reduce single use plastics on campus.

i. Attend classes at regional campuses (in Roseville, Folsom, etc.).
j. Attend hybrid classes that are taught online and in-person.
k. Donate $1 per semester to fund reductions in carbon emissions on campus.

Results

Of the questions listed, only a select few were chosen to be analyzed. Reuse/recycle, transportation, hybrid classes and planting a tree/native plants were the main sections that were used to interpret data. These results represent both, prior behavior habits and potential behavioral intentions. For "How often do you use reusable bags for grocery and non-grocery?", the average response was about a 3 which represents "about half the time." For "How often do you recycle?", the average response was also about a 3. For transportation, the answers were a bit lower. When asked, "How often do you carpool, use public transportation, or walk/ride to school?", the average responses were about a 2 which represent "sometimes."

Regarding behavioral intentions, the participants came across questions that asked about their likeliness to get involved in some ways to help reduce their carbon footprint and become more carbon neutral. The answers ranged from a 1-5, 1 being extremely unlikely, to 5 being extremely likely. The questions that were involved stated how likely within the next month are you to: use public transportation to come to campus, ride a bike to campus, carpool with other students to campus, and reduce or modify the number of times you commute to campus. For the questions about using public transportation and riding a bike to campus, they averaged at about a 2 which represented that students were "somewhat unlikely" to use those methods. Although biking and using public transportation are not seen as ways students are likely to take, the average of carpooling with others to campus had a better response rate. Students averaged at a 2-3 which was "neither likely nor unlikely."

The last section dealt with planting habits and alternative education options. We measured an average of around 4.1 that students would be willing to engage in planting more trees on campus. The average score for students that would be willing to have more native and drought resistant plants on campus was about a 4.3. For responses regarding alternate education options, the data shows they were less willing. We had an average of 3.1 students willing or not willing to attend a satellite campus of CSUS responded at an average of 3.1. The idea of cutting down on commutes to campus and attending a more flexible scheduled hybrid class showed more of a positive response with an average of 3.8 shifting to "almost willing" on our scale.

Discussion

The data shows some major patterns that are quite interesting. For starters, it seems that when it comes to previous habits, most participants did not practice sustainable options. This could be because they did not want to, or simply because it was not possible for them. Maybe they did not have any reusable bags so they just continued to use the bags the stores provided. Or maybe they don't recycle often because they are not provided with a specific recycle container, so they just use the trash container.

By acknowledging the Stinger Sustainability Survey, we observed and learned that the likeliness to explore different ways of more efficient transportation by the student body at Sacramento State is not where we would want it to be. Students do not seem likely to try better and more efficient ways as we would want them to in the near future. This could be because students do not have the resources to

try new ways, it could be possible that the students commute from more than a 5 to 10 miles radius from campus, or they just simply care very little about the problem and refuse to participate in something that to them could be phenomena that is "fake" and not caused by humans. This is a perfect opportunity for groups like us, (the ENVS department & Sacramento State Sustainability department) to try and push and hatch new ideas that would help the campus become better sustainable and catch the attention of the student body so that participation rates to become carbon neutral can increase.

With the survey conducted we were able to gauge the tolerance of the student body's willingness to try new programs. In order to understand the student body's willingness we extrapolated the data analyzing two portions, new landscaping techniques along with the participation in distant learning classes. According to the data from the survey conducted students are willing to lead the way to carbon neutrality by planting more trees on campus. With the addition of more trees on campus this would help with Sacramento State's overall carbon footprint, by offsetting carbon emissions. With the participations of students planting trees, students can have an everlasting mark on campus with their fight towards climate change. In prior efforts the sustainability department has introduced landscaping features throughout campus that help cut down on water usage. The student body is willing to see more feature like this. The idea is to change some of the existing landscaping with more native species of plants that are more drought resistant. With the consideration of the student body's willingness, we analyzed if students are willing to participate in more distant learning classes to cut down their commutes to Sacramento State. At the moment students had neutral feelings about the collaboration with a satellite school. They're neither willing or not willing to attend a satellite campus if CSUS offered one. Hybrid classes on the other hand were more favorable. With students having the flexibility in their class schedules, allowing them to be a part of a class where it's thought online and in the classroom. This would drastically cut down on the amount of times students would need to commute to campus. The willingness of the student body is a key component to reaching carbon neutrality on campus. With this we can see what is tolerable by the student body and develop programs that will work.

Recommendations

Based on the conclusions from our analysis we have determined some recommendations to consider. In the attempt to reduce waste it would be appropriate to implement a more intensive program to incentivize or influence the use of reusable products such as food containers and water bottles. This would substantial reduce the litter on campus as well as the amount of trash that is disposed of. This could also be combined with a program to reduce plastics in general on campus.

Another recommendation that was reached was the use of a $1 donation to fund programs for carbon reduction. Usually most students have at least a dollar sitting in the bottom of their backpack which would deem this type of program economically feasible to the average college student. The only set back that may be experienced is a poor attitude/lack of participation which could be countered with some sort of "giveaway" for those who donated to the fund.

Another recommendation that was decided on was a major push to increase public transportation use. This would reduce the amount of cars on campus, which would in turn reduce the amount of greenhouse gas emissions emitted on campus. This would lead to better air quality as well as the obvious benefits in regards to climate change. The one

issue would come from the negative image and connotation surrounding the idea of public transportation. In order to increase student use of public transportation, a substantial clean up, remodel and adjustment in policy would need to be enacted in order to make regional transit more attractive. A way to accomplish this would be to work with SacRT and start an effort to clean, refurbish and change regulations in order to increase its attractiveness to students.

Looking at past and current behaviors of individuals can be a critical asset in regards to shaping sustainable programs on campus. The efforts of this survey, especially the behavioral aspect, are to benefit the CSUS Sustainability department gain a better understanding of how the student body acts in certain situations or when they are presented with different options.

Source: Heather Crabb, 2017

Institutional Policy and Programs

The goal is to analyze survey questions pertaining to levels of likelihood and willingness of students to participate in sustainable practices on campus. Willingness has been defined as the inclined and consenting readiness of someone to do something or act in a certain way. Through analyzing the results of these types of questions in the survey, information was gathered about practices that students would be most willing to do, as well as things that students are not willing to do.

In this analysis, questions deemed influential to implementation of potential policy, what students care about most in terms of sustainability, how students learn about sustainability programs on campus, and recommendations and possible solutions to sustainability shortcomings. This study will focus on waste management (the management and processes regarding a product's waste after initial use/consumption) and energy conservation (efforts made to reduce the consumption of energy). By utilizing this information, we hope that our findings and potential solutions will help Sacramento State in becoming carbon neutral.

Results

Analysis of Stinger Sustainability Survey questions pertaining to sustainable energy and emissions reductions programs reveals information regarding attitudes and opinions of CSUS students. Two key survey questions were asked, both questions assess answers on a Likert scale (very unwilling, unwilling, neither unwilling or willing, willing, very willing).

The first question asked students how willing they were to donate $1 per semester to fund reductions in carbon emissions on campus? This question received n=703 responses and

answers are: very unwilling n=73, unwilling n=44, neither willing or unwilling n=148, willing n=215, very willing n=223. These results suggest that students may have a real interest or an attitude of acceptance if this policy were to be implemented. The most popular responses were from the willing and very willing category while the lowest responses came from very unwilling and unwilling. This data is a good indicator that students would be willing to donate $1 for reductions in carbon emission programs (Figure 19).

The second question asked students how willing they would be to support a parking fee increase to help fund parking lot solar panels to provide shade and renewable energy for campus. This question received n=703 responses and Answers were: very unwilling n=182, unwilling n=122, neither willing or unwilling n=148, willing n=153, very willing n=98. These results show that students have mixed opinions toward the idea of increased parking fees for solar panels. The most popular answer was very unwilling, while very unwilling was the least popular answer. There is such a small difference between values it appears that students would be more comfortable without a parking fee increase (Figure 20).

From these results we can gather a few considerations. The first consideration is that, college students tend have financial struggles, if fee increases are needed to achieve a sustainability goal it is important that expectations are kept low for students this is perhaps why the $1 donation for sustainability received such a high level of willingness compared to the parking fee increase. The parking fee increase for solar panels received such uneven willingness because at CSUS parking is a sensitive subject for students. Parking is already hard a challenge to our commuter heavy student base, current construction projects are making it worse, and some think that price of a parking permit is already too high. A combination of threatening to increase the price of parking and perhaps temporarily losing more parking to construct solar panels seems to be an unpopular idea now. Solar panels in the parking lot would be a great idea since students do want to reduce emissions but for now this project should be reexamined later when parking conditions improve.

Data was taken from two questions within the topic of waste management. The first question that was analyzed was 'How willing are you to participate in a reusable takeout container program to reduce single use plastics'. A positive correlation with the student population and their willingness to partake in this action illustrates that programs involving this topic may have a positive impact on campus (Figure 21).

Under further research on our campus it came to our attention that there is already a small-scale program similar to this in Residents Hall for students living on campus. The next two graphs represent the students that live on campus in relation to their willingness for the program compared to students that do not live on campus.

Figure 22 illustrates that the willingness relation to the on-campus residents, for approving a reusable food container program. There is a small rise within very unwillingness column and we can assume this may be due to negative personal experiences. We can also assume that our sample size is not representative to the population due to only a select few students living on-campus participating in the survey. Sacramento State has a very large waste stream from food vendors on campus and to be able to eliminate single use food containers will drastically reduce our output.

The second question analyzed within this

study was 'How willing are you to support more water filling stations for reusable water bottles on campus'. students participated in providing their feelings towards the subject.

Figure 6 displays the number of students that participated in sending their answers as in relation to their willingness. The trend of the graph is in favor for placing more water stations. We can assume that students at Sacramento State are aware of their part within reducing single use plastics and are willing to bring reusable water containers. With more water station will reduce in single use bottle waste produced on campus. Overall reduction our waste stream will reduce the direct amount of greenhouse gases and the Carbon Dioxide released in our atmosphere due to transportation of waste. This will lead our campus to take a step closer to carbon neutrality.

Discussion

Findings through our analysis on the Stinger Sustainability Survey shows that the majority of the campus community are very willing to participate and help implement certain policies that would create a push toward carbon neutrality and having a greener campus. It is common knowledge in the environmental science community that the problem with the implementation of environmental and sustainability policies and programs is both the comprehension and awareness of policies and programs, not just at Sacramento State, but universally. To tackle this issue one of our objectives was to determine where students mainly received their information about new and current events on campus. Results pulled from one of the Stinger Sustainability Survey questions that focused on how the majority of students learn about new campus programs and policies reported that the main instrument of campus information was through their email and second to that through Facebook. This shows that in matters pertaining to sustainability programs the key tool to knowledge of such programs lies in the means of communications. The premise is that this can be represented literally through informational emails getting out the message and visual representations of programs and policies in common places that see a high volume of student traffic throughout campus such as the union and the well.

One of our goals in analyzing data from the survey was to interpret information that would be able to show a clear relation between policy implementation and program awareness that proves to be of importance which led us to evaluate the written inputs. These written inputs from the campus community answered a question that asked if members of Sacramento State community knew of any sustainability programs or projects on campus and If so, which one(s); and also how they learned about the said program or project. By sifting through the responses and gathering data from these written inputs we concluded that the sustainability programs that had the most recognition among the majority of students on campus are the water bottle filling stations and the Low Impact Development projects, and when responding to query on how they learned about these programs and policies students stated it was due to the commonality and recurrent visuals of the programs. This supports our previous premise of the importance of these projects being easily viewed in public areas on campus in places of higher traffic on campus.

One goal was to understand what Sacramento State can do to raise program awareness both in relation to Sacramento State's pledge to carbon neutrality and in matters that are important to the campus community. Analysis of information found that the best way to determine this relation was to gather information based on a question from the

Stinger Sustainability Survey that took an assessment on what aspect of sustainability was the highest concern among students that they believe we should make a priority. It was concluded that the highest priorities are waste management and energy use. A recommendation would be that in the push for carbon neutrality, more efforts should lean toward programs that reduce both waste and energy consumption to appeal toward student's interest and gain student support in policy measures.

In short, based on our findings through an analysis of specialized questions pulled from the Stinger Sustainability Survey in relation to sustainability policies, programs, and the awareness of them here at Sacramento State. It is advised that (1) sustainability efforts on campus should lean toward programs that reduce both waste and energy consumption to appeal toward student's interest and may receive support from students in future policy measures. (2) introduce the potential of new policy and programs through mass email where the bulk of students receive their news as well as widening online presence through Facebook. (3) projects in effort to attain carbon neutrality, should be visible or the programs themselves be in a position that is easily observed so that it may gain support by students and members of the campus and sent out through the more popular communication methods to maximize awareness.

Recommendations

As previously stated, the survey questions that indicated the highest levels of willingness or support from the student body related to participation in a reusable food container program, increasing the number of water bottle filling stations around campus, and the donation of $1 in support of carbon neutrality. Based on our analysis, we propose implementing the following programs:

Expansion of the reusable food container program: Per the STARS Report (2016), a reusable food container program is already in place in the residence halls, with each resident receiving a reusable food container, mug, and bag when they move in. We suggest expanding this program to all university eateries. Many universities, such as, Harvard, Cornell, Columbia, Oregon State, Boston University, and the University of Montana have already implemented such programs, though information on their success rate was not readily available. Aspects of those programs that may help encourage use here at Sacramento State are listed below:

Program aspects:

-Initial container cost ranging from $4-7.50

-Container included in meal plan if purchased

-$0.25 discount on food when container is used

-Token exchange system

-Refund for token return at the end of semester

-First meal free when container is purchased

To elaborate, although one of the above schools requires the student to purchase and maintain possession of their container, many reduced this barrier by simply requiring the student to rinse the container after use and return it to one of the many collection sites where dinning staff would retrieve, and sanitize and return the container to circulation. A token or carabineer exchange was popular in these situations. Students carry a small token in their pocket, or a carabineer that can be clipped to a backpack, instead of the needing to remember and carry a potentially large and awkward food

container. Reducing this barrier increased the likelihood of program participation. Fees for admission into the program ranged from free, with the purchase of a meal plan, to $7.50 per semester; the average price was $5.00. Additional incentives included a $0.25 discount on meals, when the reusable container or token is used, a free meal with the initial purchase of program membership, and a refund of the program cost at the end of the semester when the token or carabineer is returned.

As an additional recommendation, we suggest requiring food vendors to use only eco-friendly package and banning non-recyclable food containers, such as, Styrofoam.

Banning the bottle: According to D'Altrui, (2017) over 70 universities have already banned the sale of bottled water on campus in an effort to reduce their plastics waste. Washington University in St. Louis was the first campus to implement the ban. The university experienced excellent results. In the first year of the program Washington University saw a 39.4% reduction in plastic bottle waste (567,312 bottles). (Figure 5, D'Altrui, 2017) However, the University of Vermont, which implemented their ban in 2012, saw surprisingly different results. UVM saw an increase in bottle sales as the student body chose to purchase bottled juices, sodas, and sports and energy drinks in place of the missing bottled water. The increased consumption of high calorie, high sugar content beverages also correlated with an increase in the body max index of the students during that year. It is important to note that the results of the University of Vermont ban are quite different from the overall trend of this ban among university campuses. Washington University, for example, not only saw a decrease in plastic bottle waste, but also a 39% decrease in beverage concessions overall. Although this figure does indicate loss of revenue for the university, it also shows a trend towards healthier beverage choices among the student body and faculty overall. There are financial implications of such a ban for the universities; loss of beverage sales, expense of increasing the number of and maintenance of water stations, and the increase in water consumption among them. Conversely, the decrease in recycling costs will also be substantial (D'Altrui, 2017). Furthermore, reducing participation in the consumption of single use plastic will also move CSUS closer towards our goal of carbon neutrality, as more than 17 million barrels of carbon per year go into the production and transport of bottled water (D'Altrui,2017).

In order to combat carbon emissions and become a leader in the "Ban the Bottle" movement, we recommend CSUS take a hard stance against the sale of single use plastic bottles by implementing a ban of not only the sale of bottled water but also any other beverage that can be purchased in alternate packaging, such as, aluminum cans, glass, or cartons. Furthermore, studies have shown that public perception of bottled water is that it is healthier than tap water when, in fact, bottled water is held to lesser standards and is more likely to contain chemicals and other contaminants. Educating the student body, and larger public when possible, of this misperception may be instrumental in reducing the consumption of bottled water. This may be especially challenging in the wake of recent water contamination crises, such as those experienced in Michigan and West Virginia, as well as, the high lead levels found here on our own campus last year.

To increase the awareness of new programs being implemented on campus and as a way of encouraging student engagement, we recommend the Sustainability Department pair with the Art Department by sponsoring a student art completion featuring a trash-only medium. Advertising of the event should be

circulated via email and on the CSUS website and the main CSUS Facebook page, as well as, the art department and sustainability department Facebook pages. Winning work, and especially large pieces, should be placed on static display around campus in prominent, high traffic areas and be accompanied by educational posters explaining the art, the new program, and the mission behind it.

Renewable energy: CSUS has already implemented several solar projects around campus and has plans for more. As a commuter school with numerous parking structures and lots, there is still a good amount of unobstructed space to be utilized for solar installation. The addition of solar covered parking structures in the open lots is an ideal opportunity to maximize the universities renewable energy potential. With 12 surface parking lots, 1000 parking spaces at off campus sites, and the many building roof tops, the roofs of the four parking structures, and the new structure still under construction, a great deal of useable space is just waiting to capture solar energy and decrease CSUS's carbon footprint (Lambert, 2017).

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