

**Implementing water refill stations across
campus to promote reusable water bottle use**

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Abstract

In America an overwhelming amount of plastic water bottles are consumed and disposed of on a daily basis. A Villanova student is not much different than the standard American, who is more likely to pick up a disposable bottle over a reusable water bottle. In fact, 86% of Villanova students reported that they always or sometimes use a disposable bottle rather than a reusable water bottle. We compiled a survey that included questions about Villanova students' reusable versus disposable water bottle use habits, and whether they would be willing to switch to reusable water bottles if more convenient water refill stations were installed on campus. We administered the survey both via paper and electronically to Villanova students in each of the four grade levels. The results to the question, "Would you be willing to switch to a reusable water bottle if there were refill stations in prominent locations on campus?" showed that 91% of students that were currently using disposable bottles would be willing to switch, or at least attempt to switch to a reusable water bottle if there was a convenient and easy way to refill it. Additionally, 52% of students responded that the ideal place for a refill station would be on the first floor of the Connelly Center. Overall, our data indicated that if water refill stations were installed in prominent places on campus, students would change their habits and reduce the amount of disposable water bottles consumed. The implementation of water refill stations would aid the university in their initiatives to become a greener and more sustainable campus.

Introduction

The consumption of disposable water bottles has grown in popularity around the world, and particularly in the United States. It has been estimated that more than 30 billion disposable water bottles are discarded each year in the United States alone, with the average American responsible for approximately 166 bottles per year (Budzaj, 2012). However, many have started

to look past the immediate convenience of disposable water bottles to the long term environmental effects of their use.

Scientists estimate that bottled water requires up to 2000 times more energy than tap (Gleick and Cooley, 2009). The typical consumer is unaware that energy is needed throughout the water bottle production process, starting with the bottle's creation through the final product's transportation. In the United States, the 2007 annual consumption of water bottles required between 32 and 54 million barrels of oil (Ross, 2009). Awareness of the immense carbon footprint created by disposable water bottles has led to an increase in reusable water bottle usage. The EPA estimates that if a person chooses to drink tap water instead of one liter of bottled water each time he/she drinks, then 46 gallons of gas a year, the equivalent of 0.41 metric tons of CO₂, would be saved (2010). If everyone in the United States did this, then it would save approximately 14.2 billion gallons of gas a year, which is the equivalent of 126 metric tons of CO₂ being emitted into the atmosphere. In response, a movement in favor of more environmentally friendly reusable water bottles has sprung up in both the media and on college campuses across the country.

Over time, reusable water bottles are more beneficial both environmentally and economically than disposable water bottles. Since reusable water bottles are produced by a wide range of companies and in various styles and materials, there is no universal measure of the carbon footprint for one reusable water bottle. However, it is no secret that one reusable water bottle requires more up front energy use for production than one disposable bottle. A 300 gram stainless steel bottle demands seven times more fossil fuel, and releases fourteen times more greenhouse gases than a 32 gram plastic bottle (Goleman and Norris, 2009). The energy and environmental impact are worse for a reusable water bottle if only used once. Aside from the

environmental benefits, a person with a reusable water bottle can obtain approximately 450 gallons of tap water for the price of a single bottle of water (Goleman and Norris, 2009).

Consumers can save green by going green with a reusable water bottle.

College students across America are leading the movement in favor of refilling stations in the hopes of phasing out the use and sale of disposable water bottles on campuses. Refilling stations have a special water spigot that is designed for reusable water bottles to fit underneath and easily refill. More than 300 colleges and universities in the United States have installed either an Elkay or Brita refilling station (Koch and Marohn, 2011). Some colleges have taken the movement one step further, with more than 90 schools either banning the sale or restricting the use of disposable water bottle on campus (Savedge, 2012).

Villanova University currently sells disposable water bottles in numerous on campus convenience marts, such as the South Market, Reel Divine, and Saint Mary's Market. The university currently has one refilling station on campus, located in the Donahue Dining Hall. According to Tim Dietzler, the Director of Dining Services at Villanova, talks are underway at the university to possibly install refilling stations in up to five locations across campus. Based on the energy implications of disposable water bottles, a move toward refilling stations on campus could assist the university's efforts, as laid out by its Climate Action Plan, to reduce its carbon footprint.

In this study we will examine Villanova students' current use of reusable and disposable water bottles. We hypothesize that if more refilling stations are available in prominent locations on campus, then Villanova students would be likely to switch to reusable water bottles and by doing so, reduce the university's carbon footprint.

Methods

We gathered data from student surveys that had questions pertaining to Villanova students' use of reusable versus disposable water bottles. The surveys were distributed both electronically and by paper. We created the online survey with the website Survey Monkey. The two formats for the surveys were identical aside from one being a paper copy and one being an electronic version. Because we tallied the results from the online and paper survey together we made sure to use the same survey questions and same wording in both forms. We did this to ensure that if there was any bias or confusion in the questions it would be reflected in all of the responses. We gathered other key information through online resources and online communication with the head of Villanova Dining Services, Tim Dietzler, to enquire about the current water refill stations on campus and determine if there are any potential plans for installing additional refill stations in the future.

To collect students' responses for the paper surveys, we distributed the surveys on two separate occasions between 3:30pm- 5:00pm in the Connelly Center. We each approached individual students and small groups sitting at tables near Holy Grounds and in Belle Air Terrace, and asked if they would be willing to take a short survey for our Environmental Science class. We also distributed paper surveys in Katharine Residence Hall, a Chi Omega chapter meeting, and to various groups of friends. To obtain responses from the online survey we posted the survey link on the Kappa Delta Facebook group page.

The following is a copy of the survey that we conducted:

Reuse and Refill Survey

1. What type of water bottles do you typically use?

Reusable Disposable

2. If you said reusable ...

a. Do you ever also use disposable water bottles?

Never Sometimes Always use both

b. Approximately how often do you refill your water bottle per day?

0-1 2-3 more than 4

2. If you said disposable...

a. Approximately how many disposable water bottles do you use a week?

0-5 6-10 11-20 20+

b. Do you refill your disposable water bottles now?

No Sometimes Yes

c. If there was a refilling station in a prominent place on campus would you be more likely to use a refillable water bottle?

No I would use disposable Maybe I would try to switch Yes, use a reusable water bottle

3. Both:

If Villanova University put in a refill station where would be the most beneficial spot?

First floor Connelly Center Mendel Falvey Library

Other _____

4. Are you aware that there is currently a refilling station on campus?

Yes No

Additionally, the internet research we conducted provided information on the energy needed throughout the production and distribution of disposable water bottles, current refilling

station campaigns on other college campuses, and the average student's weekly disposable water bottle use. We gathered this data so that we could effectively propose a case to Villanova administrators that implementing the use of refill stations on campus would be beneficial to the university. This research gave us data to show the university that refill stations on campus would improve the university's carbon footprint because students would be using less disposable water bottles. The data gathered on the energy needed to produce, distribute, and break down the average number of disposable water bottles versus the energy needed to produce, distribute, and break down one reusable water bottle shows that reusable water bottles are better for the environment and uses less energy.

Finally, in order to analyze the results from our surveys, we focused on several key questions. We primarily focused on the responses of students that said they currently use disposable water bottles and examined whether or not they said they would switch to reusable bottles if refilling stations were put in prominent areas across campus. We thought that this data would give us the most leverage on the university to argue that students would truly use the refill stations if installed. The other main question that we focused on was the most beneficial location for the refill station on campus. We viewed this question as a good opportunity to suggest to Dining Services where a good potential location would be for a refill station in the future. We went through each individual survey and recorded the answers in an Excel document. We placed the questions as the headings of the columns and tallied the responses for each individual survey. After entering in all of the survey responses we calculated the totals in each category for the various questions.

Results

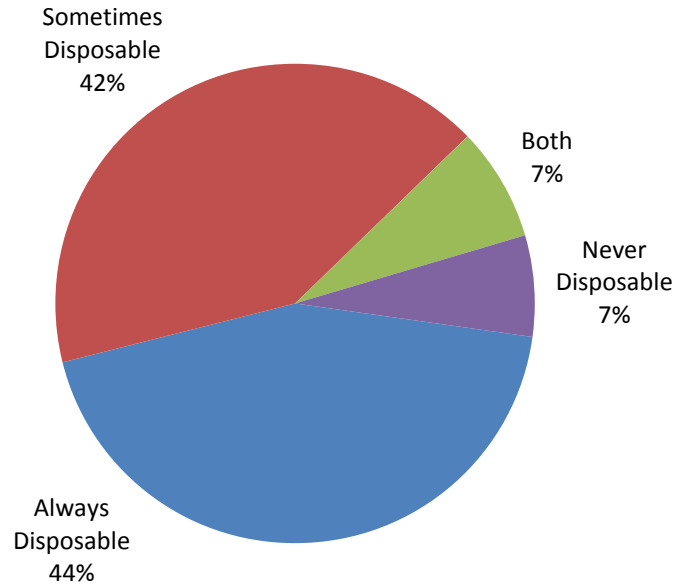


Figure 1. The percentage of students' average water bottle use habits (n=235).

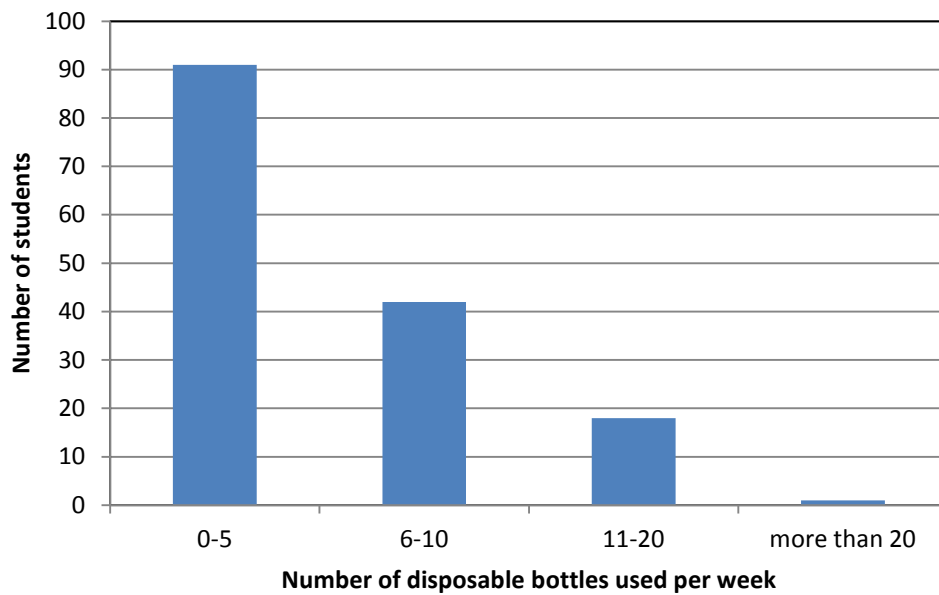


Figure 2. Average weekly use of disposable water bottles by Villanova students (n=152).

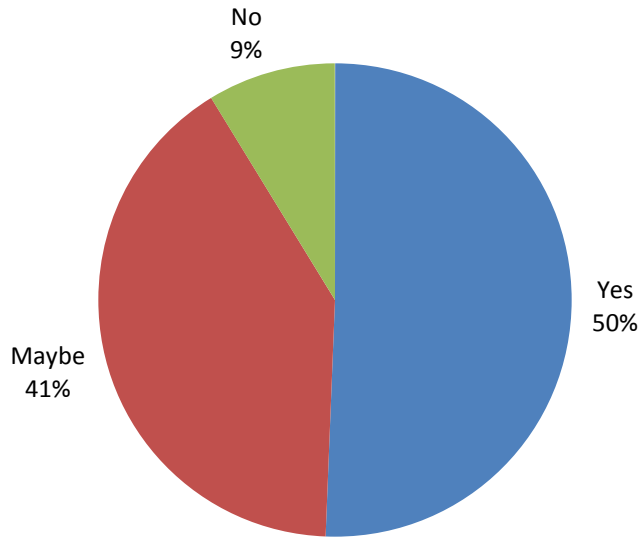


Figure 3. The percentage of students that responded yes, no, and maybe to whether or not they would switch to using only reusable bottles if there was a refilling station in a prominent place on campus (n=160).

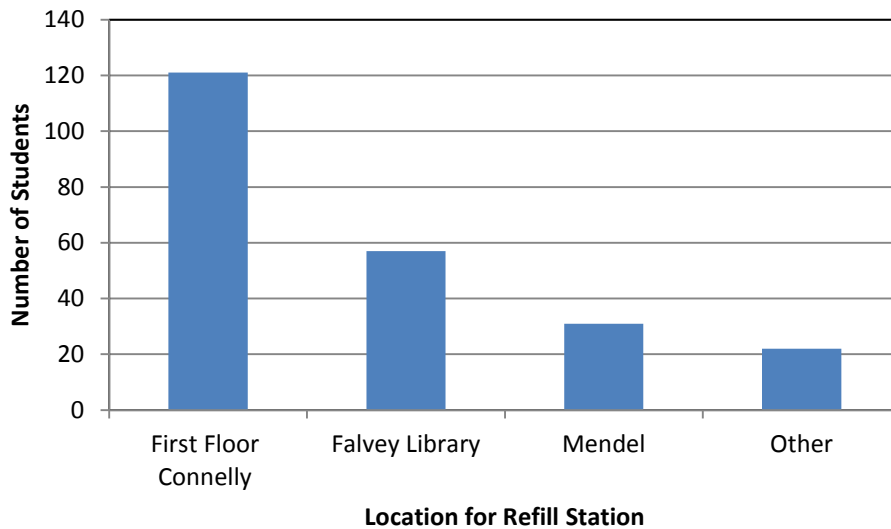


Figure 4. Villanova students' suggested locations for the most beneficial spot for a refill station on campus (n=231).

Survey results indicated that most students on Villanova's campus use disposable water bottles at some point during their week. Approximately 93% of students use disposable water bottles at least once a week, while slightly less than half are solely using disposable (Figure 1).

However, when asked how many disposable water bottles they use per week, the majority of students (60%) indicated that they use less than 5 (Figure 2). Additionally, most students (91%) would switch or attempt to switch to a reusable water bottle if there was a refilling station in a prominent place on campus; only 9% reported that they would not attempt to switch their water consumption habits (Figure 3). The majority of students agreed that the first floor of the Connelly Center would be the most beneficial place on campus for a refilling station to be located (Figure 4).

Discussion

Of the 235 Villanova students surveyed, 93% typically use disposable water bottles. The majority of students that responded that they use disposable bottles use between 0 and 5 disposable water bottles weekly. However, if Villanova University had refilling stations in prominent locations on campus, 91% of the disposable water bottle users said that they would switch or at least consider using a reusable water bottle instead. University officials can use this data to understand the potential success of an investment in refilling stations, as well as student demand for their presence.

We recommend that Villanova consider installing more refilling stations across campus for student use. Implementation of more refilling stations has the potential for success among not only those who currently use a refillable water bottle daily, but also those who do not. Out of the surveyed students who typically use plastic bottles daily, 50% claim that they would switch over to a reusable water bottle if there were more conveniently located refilling stations on campus, and another 41% said that they would consider switching. This is a strong indicator to university officials that the program has the potential for widespread success.

Additionally, if the university were to implement more refill stations across campus, it is also imperative that the university put time and effort into spreading awareness of the new refill

stations. Reusable water bottle usage will only increase due to new refill stations if students are aware of the locations and convenience of these stations. One proposed method to spread awareness is to place signs with information about the benefits of reusable water bottles and then direct students to the location of the new stations. Also, placing information about the hydration stations in the orientation packets for freshman would help spread the word. In order for the refill stations to be a big success, and for more students to start using reusable water bottles, the university must both implement the refill stations and spread awareness through signs, information packets, and word of mouth.

The number of students willing to reduce their carbon footprint makes the investment worthwhile for the university. There currently exists an unmet demand among students who are lacking the convenience of refilling stations where they live and study. Based on student responses the most favorable location would be on the first floor of the Connelly Center, and the next popular suggestion is Falvey Library. The university would need to publicize the location of new stations so that students are aware of their presence. By fulfilling the demand for refilling stations Villanova will not only help students decrease their carbon footprint, but it would decrease the university's carbon footprint as well. Thus, Villanova University could greatly benefit from taking part in this transitional movement.

Through the installation of refilling stations, Villanova would further its aims to reach net climate neutrality by 2050, as set forth by the goals outlined by the Climate Action Plan established in 2010. The reduction of disposable water bottles would fall in line with the university's goals to "promote water conservation" and "waste reduction and the conscientious use of materials" (Villanova). More refilling stations on campus will directly impact students' waste habits. As more students utilize the new resource available to them, their use of disposable

plastic water bottles will decrease or possibly cease. With less water bottle waste the university would inadvertently offset its carbon emissions, because there would be less plastic waste as a byproduct. If the EPA estimates are applied to Villanova's undergraduate population of 6,584, approximately 302,864 gallons of gas a year, the equivalent of 2,699.44 metric tons of CO₂, would be saved if each student drinks tap water instead of one liter of bottled water each time he or she drinks (2010). The positive implications of the move are undeniable.

If Villanova is to reach its goals toward net climate neutrality, this is a step that ultimately needs to be taken. The data reassures that the response from the student body would be a positive one, and in conclusion, there are definite benefits that accompany such a move toward sustainability.

Making this change on campus would help Villanova move forward, setting an example for students and other universities as it pursues its goals of sustainability.

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