Analysis of Students' Recycling Habits and Housing Choices

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Analysis of Student Housing Choices

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Abstract

Our project, sponsored by the University of Worcester, looked into how recycling habits affect students' accommodation choice. We performed door-to-door surveying, receiving 74 survey responses. Furthermore, we spoke with members of facilities about recycling on-campus. We found no solid relationship among students' recycling habits and their accommodation choice, but found that the main reason they do not recycle is lack of bins. We recommend looking into optimal placement for disposal sites to help increase recycling among students on-campus.

Acknowledgements

Executive Summary

Imagine a world with no electricity, fresh water, or raw materials. With no electricity, many modern conveniences, like computers and phones, would be impossible. With no freshwater, humanity would need to quickly evolve or go extinct. With no raw materials, production of common goods would grind to a halt, setting back civilization hundreds of years. It is our responsibility as a species to safeguard these resources. To this end, universities are a logical place to begin instilling this ethic.

The Energize Worcester Program was formed to improve the sustainability practices at the University of Worcester and the surrounding areas. Katy Boom, Director of Sustainability at the University of Worcester, reached out to the Worcester Polytechnic Institute London Project Center requesting students to survey University of Worcester students or residents to collect information on students' sustainability habits.

Specifically, the goal of our project was to work with Energize Worcester to determine whether or not University of Worcester students consider sustainability, most notably accessibility of recycling, when choosing where to live. In order to accomplish this goal, we developed the following seven objectives.

Objectives:

Objective One:	Research Factors that Influence Housing Choices for University of Worcester Students
Objective Two:	Assess Factors that Influence Housing Choices for Students with Unknown Recycling Habits
Objective Three:	Assess the Impacts that Recycling Habits have on Housing Choices for Students who have shown Good Recycling Habits
Objective Four:	Assess the Impacts that Recycling Habits have on Housing Choices for Students who have shown Poor Recycling Habits
Objective Five:	Compare Results from Previous Objectives
Objective Six:	Collect Follow-up Information
Objective Seven:	Create a Report and Presentation for the City of Worcester and Energize Worcester Representatives

Findings:

Although we did not find a correlation between student housing choices and recycling habits, we discovered findings which could still be useful for future research and projects in this field. We received survey responses from 74 University of Worcester students (see Appendix B for our survey). We also gathered data from the University of Worcester, Director Katy Boom, Energize Worcester Project Manager Peng Li, and facilities staff to bolster our findings.

Student Priorities

Out of the 74 responses to our survey, 70 of the respondents completed a chart where they told us how influential each of ten items was when choosing where to live, on a scale of 1 to 7, where 1 is least important and 7 is most important. The 10 items we asked about were: cost of rent, whether bills are included, location, social life, size, high quality interior, ease of recycling, neighborhood, landlord, and length of contract.
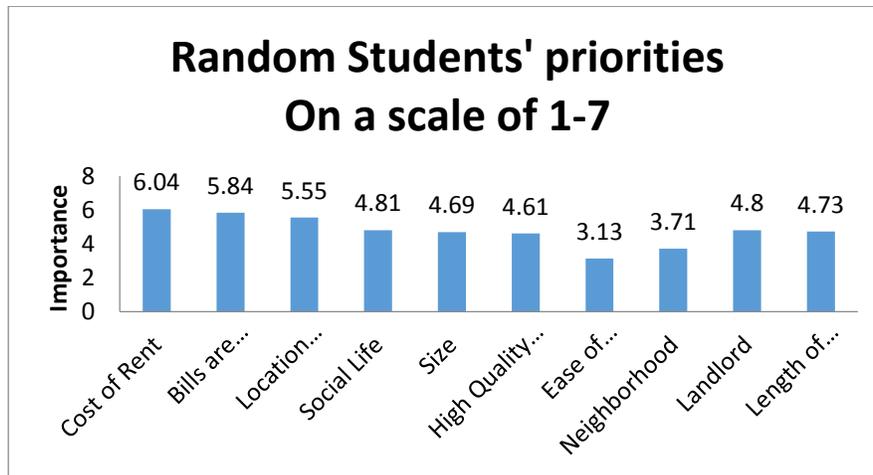
Figure 4.1: This graph shows how much each of these items influence student housing decision on average for 70 responses

The item which these students rated as most important was cost of rent, at an average of 6.04/7.00, where the total averages across all priorities was 4.80/7.00. Inclusion of bills and location are both important at averages of 5.84/7.00 and 5.55/7.00 respectively. On the other hand, the lowest rated priority was ease of recycling, at an average of 3.13/7.00. For the purpose of this survey, ease of recycling was defined as: a measure of distance to recycle bins and effort required to recycle. However, neighborhood appeared to be similarly unimportant with an average rank of 3.71/7.00.

To Stay or to Move?

Of the 60 first year students who took our survey, 93% of them said that they are considering moving into privately rented accommodations for the next year. Based on University policy, second and third year undergraduates are not guaranteed a place to stay on-campus. (University of Worcester, 2015)
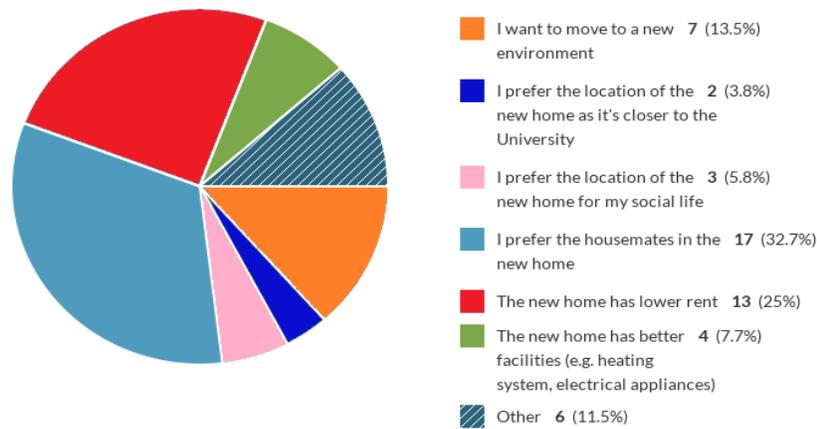
Figure 4.2: Student priorities when moving

The most notable reason to move (33% of 52 responses) was that students preferred the new housemates that they would be living with. Next highest reason was rent costs, at 25% of 52 responses. In contrast, change of neighborhood and closer location to the University were almost completely ignored on this question.

As for staying in the same home, 47% of those who answered (15 of the 32 respondents) stated the main reason they wanted to stay was that they liked their current housemates. The rest of the responses were fairly evenly distributed, and were negligible by comparison. According to the survey respondents, social factors and money are the two largest concerns for students when choosing where to live.

Reasons that Students Recycle

The survey respondents who do recycle usually do so for two main reasons: 1) because they want to help the environment, or 2) because it is made easy by the University. Eighty-two percent of the 74 total respondents said that they do recycle. Of those who recycle, 10 of the 47 responses to why students recycle were related to the bins being available and recycling being easy to do, whereas 25 respondents said they recycle because they wanted to help the environment.

Reasons that Students Do Not Recycle

On the other hand, one significant reason that students do not recycle is that they do not believe that it is easy to acquire new bins. Some students had their bins broken or lost, and never had the bins replaced. One student said, "We don't have clear recycle bins". Bin replacement is free for students. To get them replaced, students must submit a request online. It is possible that there is a lapse in communication between the students and the facilities department. The other

reason that students do not recycle is the effort required. Of the 22 respondents that answered the question of why they do not recycle, nine of the answers explained that effort was a primary reason.

Materials that Students Recycle

One question on our survey asked students to explain how often they recycle certain materials. Figure 4.4 is a graph that shows the results. Our survey results revealed that cardboard, glass, metal, paper and plastics are recycled more frequently than the other items.
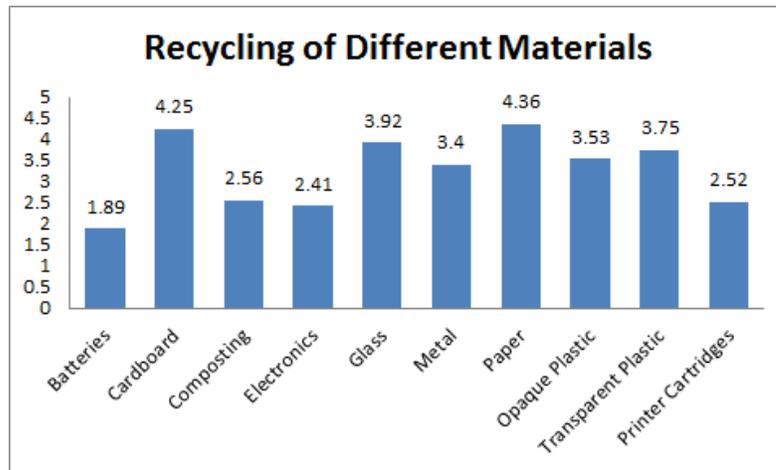
Figure 4.4: How much students recycle these different materials

Recommendations:

A result of any good research is identifying new areas for exploration. Consequently, we developed ten recommendations. Our first recommendation is that a new project look into successes and pitfalls that previous projects have faced. We learned that communication and a large amount of time to survey are critical to success. For more survey responses, we recommend starting surveys earlier in the University of Worcester academic year to increase student availability. We also recommend continuing surveying for similar information among students living off-campus. Our recommendation is that a group begins research during the month of November, as most students have not started house hunting by November, but have settled into school. Furthermore, looking into the effect that the January housing fair has on student housing priorities could also prove enlightening. We also recommend liaising with landlords to gather factual information about these accommodations.

In order to gain additional information on student recycling habits, we recommend that the University of Worcester conduct further research into students' disposal habits. Specifically,

we recommend assessing: how the distance to disposal areas affects students' habits, how often students take out the trash, and why students appear to be lacking bins.

In order to determine a relationship between recycling habits and students' accommodation choices, we recommend gathering additional data on both student behavior and on concurrent years of student recycling behavior.

Finally, to facilitate increased recycling, we recommend incentivizing recycling efforts. Another way to obtain more survey responses is to survey in a couple of specific locations. Specifically, the largest number of surveys we obtained was when we moved around getting responses from seated students at lunch. To collect even more survey responses, we also recommend knocking on student doors at specific times. Times we noted as most helpful were 16:00 to 18:00 and 20:00 to 21:00. We recommend avoiding the slot from 18:00 to 20:00, as many students are out to supper at that time.

Conclusion:

Although our goal focused exclusively on recycling, there are a host of issues which fall within the domain of sustainability, from reduction of material and energy consumption, to reuse of these materials. It is important to teach sustainability to students at universities in order to develop good habits for these students before they enter the workforce. A number of great and longstanding projects have been started at the university level, such as the Green Impact. Once students begin to develop good sustainable behaviors, they are more likely to take these green projects and ideas into the world.

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CHAPTER 1: INTRODUCTION

Imagine today's world without electricity, or even without fresh water. This would mean no cars, no factories, no heat or air conditioning, no communication, no social media and no new phones or other electronic technology. According to the United States Energy Information Administration, as of April, 2015, there are about 39 years left until the world's supply of oil runs out; about 163 years left of natural gas; and about 413 years of coal, if we do not change our habits. (Energy Information Administration, 2015) Oil, coal and natural gas are all non-renewable energy sources; in other words, once they are depleted, there is no getting them back. Not only is there a limited supply of these resources, but the dangers associated with acquiring and transporting them have been destroying our environment. Dangers such as fracking, strip mining and transportation of fossil fuels have ruined ecosystems, and the use of these materials has led to global climate change (U.S. Environmental Protection Agency (U.S. EPA), 2015).

Burning non-renewable fuels such as oil, coal and natural gas emits carbon dioxide (CO_2) into the atmosphere. According to the United States Environmental Protection Agency, global carbon emissions increased by over 16 times from 1900 to 2008 (U.S. EPA, 2015). In 2008, humans worldwide released over 30,000 teragrams of CO_2 into the atmosphere, and since 1900 the atmosphere has experienced a 40% increase in CO_2 concentration. (U.S. EPA, 2015) Carbon dioxide is the primary greenhouse gas responsible for the climate changes we see today. Due to the increased greenhouse gas emissions, the world is experiencing many changes to the climate, such as more extreme weather patterns, temperature changes, and rising sea levels. For 650,000 years the atmospheric carbon dioxide level has never been above 300 parts per million. Around 1950 the world passed that level and in 2014 the value was close to 400 parts per million. (National Aeronautics and Space Administration, 2015) Global sea levels have risen about 17 centimeters in the past century and this is in part due to the increase in temperatures. Moreover, the ten hottest years in history have occurred in the past 12 years. (National Aeronautics and Space Administration, 2015)

Global temperatures have been rising and seasonal changes have become more drastic. In the past 46 years snowfall broke previous records in North America, Europe, and Asia. Moreover, average snowfall amounts have been increasing every winter. (National Centers for Environmental Information, 2015) Residents living in areas with increased snowfall have had to bunker down in their homes to stay warm, although oftentimes heating their homes has not been energy efficient. In 2014, homes in the United Kingdom were some of the least thermally efficient in Western Europe and are the cause of 28% of the United Kingdom's annual CO_2 emissions. (Worcester Polytechnic Institute, 2014) In order to combat this problem and help mitigate the impacts of climate change, the United Kingdom's government instituted a policy known as the Green Deal. (Green Deal, 2015) The Green Deal encourages residents to make improvements to their homes making them more energy efficient and environmentally friendly. The Green Deal helps residents pay for improvements to their homes or apartments, if it results in decreased greenhouse gas emissions. Such changes can require a great deal of work and cost a lot of money.

For the purposes of this research we define green power as "a subset of renewable energy [that] represents those renewable energy resources and technologies that provide the highest environmental benefit." (U.S. EPA, 2015) Green power exclusively refers to wind, solar, and hydroelectric energy. According to the Government of the United Kingdom, green energy tends to be more expensive than coal, gas and oil. (Roadmap, 2011) (See Table 2.1) Even with policies such as the Green Deal, this potential increased cost is a roadblock for many people who might otherwise be interested in being more energy efficient. (Green Deal, 2015) Alternatively, many people may have a fear of change, and are therefore resistant to programs such as the Green Deal. (Rogers, 1983)

The Energize Worcester team was formed to improve the sustainability practices at the University of Worcester and the surrounding areas. According to a 2014 study, conducted by Worcester Polytechnic Institute (WPI) students in collaboration with the Energize Worcester Project, 68% of 102 surveyed residents in the Arboretum in Worcester, England believed there was not enough information available on green technology. (Worcester Polytechnic Institute, 2014) The Arboretum is a group of approximately 700 residences contained by Landsdowne road on the north side, a railway on the south side, Sansome Walk on the west, and the Birmingham Canal to the east. Katy Boom, Director of Sustainability at the University of Worcester, reached out to the WPI London Project Center requesting students to survey University of Worcester students or residents to collect information on their sustainability habits. Specifically, Katy Boom was interested in looking into recycling habits. Therefore, the goal of our project was to determine whether or not University of Worcester students' housing choices are impacted by their recycling habits. We have analyzed students with good, bad, and unknown recycling habits to explore how much these habits played a role in housing decisions.

In this report we have offered context to the project and have created a methodological approach to achieving our project goal. In Chapter 2, the literature review, we provide a detailed explanation of the background information driving this project, from a global scale to issues in Worcester. We examined non-renewable and renewable energy sources. We also researched current programs in the United Kingdom and ways to educate residents about sustainability. Then, in Chapter 3, the methodology chapter, we explain how we approached our project goal. Within this chapter, we broke down our goal into seven objectives. Next, in chapter 4, the Findings chapter, we describe the results of our research. Finally, in chapter 5, the Recommendations chapter, we provide details of possible continuing research and ways to move

forward. In this chapter, we conclude the report with a brief synopsis of our research and findings.

CHAPTER 2: LITERATURE REVIEW

Humanity is rapidly running out of resources and sources of energy, because we are not being environmentally sustainable. For the purposes of our project, we turned to a social and environmental specialist, Robert Goodland, for his definition of environmental sustainability: "improving human welfare by guarding the sources of raw materials that humans need and ensuring that we do not create more waste than we can handle." (Goodland, 1995) The goal of our project was to determine whether students' recycling habits influenced their choice of living accommodation. In this chapter, we discuss important information about environmental sustainability itself, as well as details about current programs and issues. First, we discuss greening behaviors: behaviors that are beneficial to the environment. Next, we describe different housing styles in Worcester, England. Then, we describe current sustainability programs in the United Kingdom. Finally, we explore educational theory and its potential relevance to raising environmental awareness.

2.1: Greening Behaviors

In 2015 alone, the world lost 1,602,610 hectares of forest, and every second industrial facilities release 310 kilograms of toxic chemicals. (U.S. EPA, 2015) These are direct examples of the world's unsustainable habits. People are dependent upon energy, and our world has a limited amount of non-renewable energy resources. Before an organization can work to implement a sustainability program, that organization's target audience needs to be educated on how individuals can make a difference. Many people will not change their habits because they are not informed or are misinformed. (We explore this in more detail in Section 2.4, Educational Theory.) Furthermore, many programs and/or strategies are confusing and may not provide information in a way that will induce change. People can live more sustainably by improving recycling habits and reducing energy consumption.

Our way of life is currently heavily dependent on sources of energy: we use it to construct all of our buildings, drive our cars, heat our homes and enrich our lives. But all sources of energy are not created equal. These sources can be distinguished between renewable and non-renewable energy. About 66% of daily energy used in the world comes from non-renewable sources. (Shift Project, 2012) Non-renewable energy is a source of energy that is dependent upon resources that will be depleted over time, most notably fossil fuels. Examples of fossil fuels include coal, oil and natural gas. (Bowden, 2010)
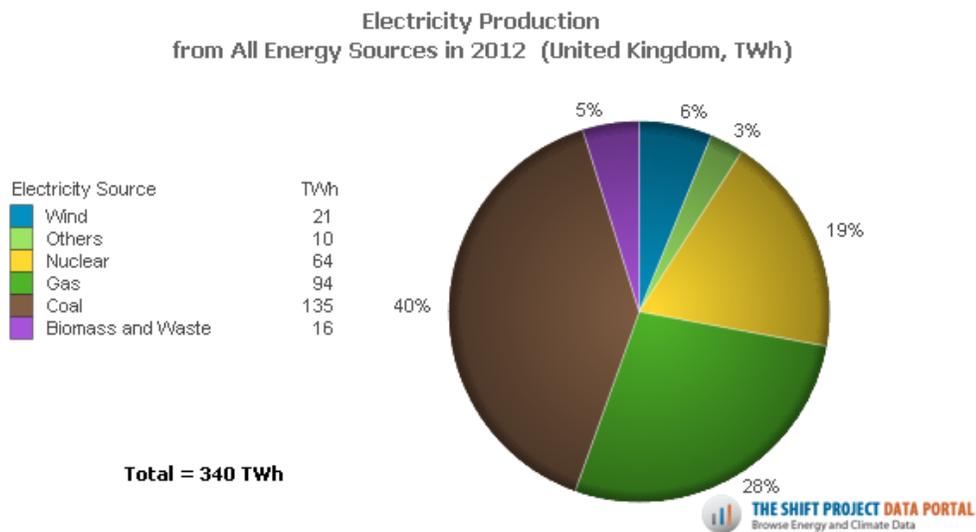
Figure 2.1: Diagram showing 2012 electricity generation in the UK (Shift, 2012)

As shown in Figure 2.1, the United Kingdom is quite dependent on fossil fuels. This figure illustrates that in 2012, 68% of the United Kingdom's energy comes from non-renewable sources. (Shift, 2012)

Non-renewable energy is used widely because of its efficiency and convenience. Our energy system has been built around non-renewable sources, thus it is currently more convenient to use. For example, gasoline is readily available because we have a network for transporting and using oil. (International Energy Statistics, 2015) Despite their convenience and efficiency, non-

renewable sources of energy are riddled with problems including resultant air pollution, the

environmental impact of resource removal methods, and the dangers of transporting fossil fuels.

(REC, 2012)

Air Pollution

Although we have the technology to harness energy from fossil fuels, these fuels need to

be converted to a usable form by combustion. Combustion is a chemical change that requires a

spark to ignite the fuel, which will release tremendous power either through heat or explosion.

(Withgott, 2015) Combustion has harmful byproducts which can include carbon monoxide (CO),

carbon dioxide (CO_2), nitrogen dioxide (NO_2), and sulfur oxides (SO and SO_2). Every year,

according to data collected in 2013 by the Shift Project, there is, on average, 1.9 tonnes of CO_2

emitted by a single person in the United Kingdom. (Shift Project, 2013)

CO2 Emissions from Energy Consumption per Capita
(United Kingdom, MtCO2 per million people)
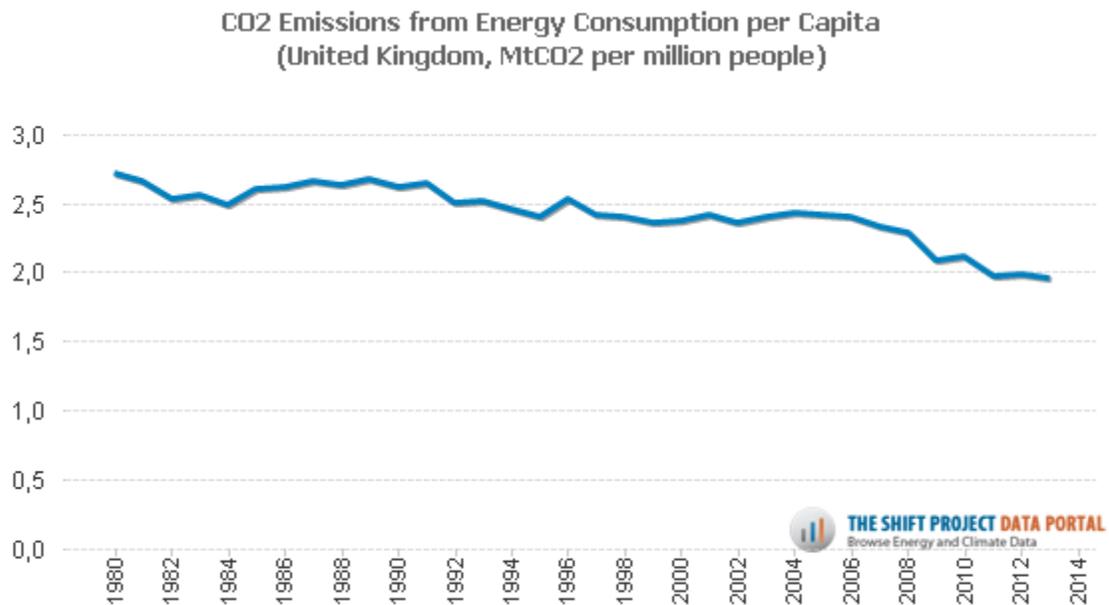
Figure 2.2: CO2 Emissions in the United Kingdom in megatons per million people (Shift Project, 2012)

These byproducts can be dangerous to human health at different concentrations especially

for the elderly, young children and people with respiratory issues and can cause diseases and

even lung damage. (CDC, 2014) For example, carbon monoxide is a gas that can cause sudden

illness or death. The real danger of carbon monoxide is that people cannot detect this gas without technological assistance because it is colorless and odorless. (CDC, 2014) Non-renewable energy has been polluting our air in this way long enough that smog has been created in large cities, such as London and San Francisco. Smog is a dense smoke-like air that is "an unhealthy mixture of air pollutants that often forms over urban areas as a result of fossil fuel consumption." (Withgott, 2015) People that live in heavily polluted areas are more likely to be affected by these maladies. (Schwartz, 1996) However, air pollution is not the only damaging factor that comes from the use and retrieval of fossil fuels.

Strip Mining and Fracking

Strip mining is a type of resource extraction where workers use machines to clear the entirety of the landscape and then sort and recover valuable minerals within. This can be detrimental to the environment in the location of the mine. Strip mining is comparable to desertification because all of the machinery tends to destroy the area as the resources are being depleted. (Terrascope, 2015)

Fracking is another harmful and potentially dangerous resource removal method. Fracking uses high pressure water, sand, and air to fracture the shale rock to allow the gas to flow into the inserted pipe. Fracking can leave the land uninhabitable and with deposits of chemical pollution. Although it is unlikely that the gas will leak from the process, there is still machinery that could pollute and destroy the area. (Howarth, 2011)

In 2013, there were 192 oil drills active near the Theodore Roosevelt National Park. This has resulted in destruction of both the American Bison habitat and the aesthetics of the area. Visitors now see oil rigs and pads rather than the once pristine landscape. (National Parks

Conservation Association, 2013) If oil drilling does not decrease in this area, the American Bison, the Bighorn Sheep, and wild horses are at risk of becoming extinct.

Transportation Hazards

Obtaining fossil fuels is not the only danger with using them; transportation of these fuels can also be destructive. Governments and corporations must construct and maintain large roads, highways, railroads and pipelines to transfer fuels. This splits up the environment, which is called fragmentation. Fragmentation interferes with migratory animals and can destroy many species' habitats. (Cagnolo, 2009) Another way non-renewable energy sources create transportation hazards is by transportation failures. These include oil spills, derailment, automobile crashes and air service failures.

Oil spills are the best known transportation hazards because of their widespread impact and lingering environmental damage. (Pezeshki, 2000) Oil spills kill some animals, poison others, and pollute the water. Over a long time, spills compromise photosynthetic production, alter chemical compositions, and make it difficult for small organisms to survive in the water source. (Neff, 1995) Another major contributor to transportation hazards is the transportation of waste from nuclear power.

Nuclear Power

Though not completely renewable, nuclear power is less fuel-intensive and creates less waste than current non-renewable methods. Furthermore, some nuclear power plants, such as the experimental Liquid Fluorine Thorium Reactors, or LFTRs, use commonly available materials such as fluorine and thorium. However, current reactors are uranium-based, which is a more limited resource. (Duderstadt, 1976) Nuclear power is the process of generating energy by either splitting apart a high-density atom, or fusing two low-density atoms together. This creates vast amounts of heat energy, which can be translated into electricity. (Duderstadt, 1976) British

Energy, an energy company in the United Kingdom, reports that, as of 2003, it currently operates

eight nuclear reactors around the United Kingdom, and these reactors provide about 20% of

England's energy, as well as 50% of Scotland's energy! (UK Parliament, 2003) The

Massachusetts Institute of Technology (MIT) estimates that in 2015, nuclear energy costs will be

between 3.9 and 4.5 pence per kilowatt-hour. (UK Parliament, 2007) Until LFTRs move into

widespread use, nuclear power remains a non-renewable resource.

Renewable Energy

Contrary to non-renewable energy, renewable energy is generally accepted as the energy

that is derived from the use of natural resources where the resource is replenished at a rate

greater than its use. (McGraw-Hill, 2012) As illustrated by Figure 2.1, 33% of energy production

in the United Kingdom in generated by renewable sources. (Shift Project, 2012) Although

historically more expensive than the alternative, rising fossil fuel costs due to depleting resources

and more efficient/cost effective technology is rapidly closing the gap in price. (Roadmap, 2011)

Green Power

Green power is a group of renewable energy sources that have the least negative impact

on the environment. Green power includes wind, solar, and hydroelectric power. (U.S.EPA,

2014)
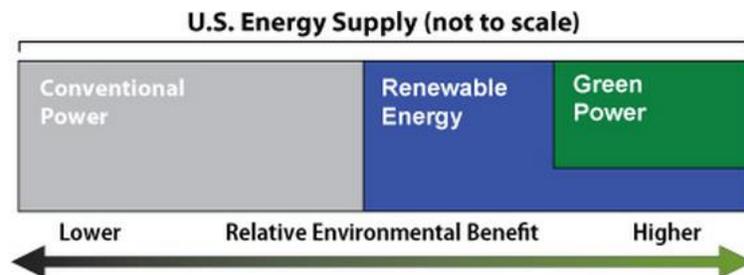
Figure 2.3: This table shows the scope of the Environmental Benefit of Green Power vs. Conventional Power (U.S. EPA, 2015)

Although this graphic is not to scale, it depicts the general breakdown of power. In 2011,

the United Kingdom Office for Renewable Energy Deployment (ORED) set a goal for 15% of

the United Kingdom's energy to be provided from green power sources by the year 2020, and increase to between 30 to 45% by 2030. (Roadmap, 2011)

Solar

While solar energy may not be fully renewable, according to Robert Foster, program manager in the college of Engineering at the Southwest Region Solar Experiment Station and Institute for Energy and the Environment at New Mexico State University, the sun will continue to shine for four to five billion years, far outlasting our coal and oil reserves. (Foster, 2009) Solar energy is generated when light from the sun shines on specially treated panels, which turn the photons into usable electricity. These panels are installed directly on a house, or in large solar collection fields. Although the technology requires very little human input after manufacturing, solar power has several drawbacks: clouds and night time render them much less effective, as well as their very high costs. For example, a one kilovolt system can cost upwards of £5000 as of 2015. As a result, many people cannot yet afford to install solar panels on their roofs. However, due to the minimal extra costs, solar panels can be expected to pay for themselves in 20 to 30 years (REC, 2012) and a typical solar panel system has an expected useful life of 25 years. (Foster, 2009) The Renewable Energy Centre (REC), a United Kingdom website organized and run by a coalition of renewable energy providers, suggests that solar power will be more viable in the years between 2020 and 2030, as the technology is made more space and cost efficient. (REC, 2012)

Hydroelectric

Hydroelectric power is one of the oldest methods for producing energy, and is the most common form of green energy today; in 2006, 20% of the world's electricity was generated using hydroelectric power. (Maehlon, 2014) However, in 2012, the United Kingdom had only 2% of its total power provided by hydroelectric, partially due to the lack of water bodies suitable

for damming (See Figure 2.1). (Shift Project, 2012) Hydroelectric power relies on water passing

through a turbine, which spins an electromagnet, creating a charge that turns into electricity.

Estimated Cost Ranges for Electricity Technologies in 2010
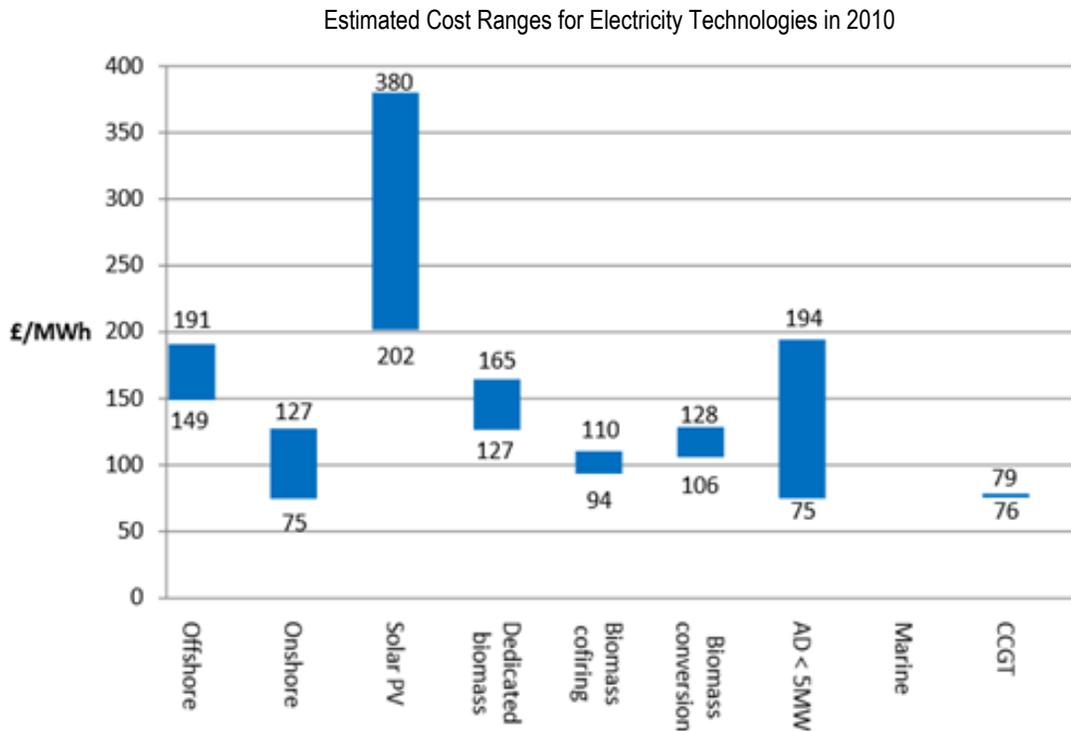
Table 2.1: This table shows the high and low cost values for electricity derived from different sources (UK Energy Roadmap, 2011)

While drawing power from a water supply is cleaner than many non-renewable

alternatives, there are only a limited number of spots in the world suitable for dam construction.

Furthermore, these dams can disrupt the local ecosystem, depending on their placement. For

example, fish habitats are dependent upon maintaining the same water quality, temperature,

velocity, and levels. (Maehlum, 2014) If these environmental factors are changed, many fish

species could die or have to migrate. However, unless dams are built with a fish ladder, there is

no way for the fish to migrate. That being said, dams themselves require very little maintenance,

and run off the natural cycle of water replacement. Also, unlike solar and wind power,

hydroelectric power generally does not fluctuate over time. (Maehlum, 2014)

Wind Power

In 2004, the world increased its wind energy generation by 20%, and this number has only continued to grow. (Herbert, 2007) Typically, wind energy is acquired from turbines, both on-shore and off-shore. In the United Kingdom, the Office for Renewable Energy Deployment estimates that wind energy will be responsible for 57 to 90 terawatt-hours by the year 2020. (Roadmap, 2011) The Renewable Energy Centre (REC), reports that as of February 2011, there are 283 wind farms composed of 3,153 turbines in the United Kingdom, boasting a 5,204 megawatt capacity. (REC, 2012) Wind energy is already quite cost efficient at 75 to 127 pounds per megawatt-hour for onshore turbines and 149 to 191 pounds per megawatt-hour for offshore turbines. (Roadmap, 2011) See Table 2.1 for a cost comparison of wind energy to other sources.

Of particular note are the government programs put in place to move the United Kingdom towards nuclear and wind power. Not only are there programs in place to create more renewable energy, there are also programs focused on lowering our carbon footprint.

Reduction of Waste

The United Kingdom is putting in a lot of time and effort towards becoming a zero-waste economy. (United Kingdom Government, 2015) One style of conservation involves the three R's of sustainability: reduce, reuse, and recycle. (Groves, 2008) This background has talked about reducing energy consumption, and the same methods can be applied to reducing material consumption. Now, it is not possible with our current technology to reuse energy, but materials can be reused depending on how well they were made. (McDonough, 2013)

According to the Government of the United Kingdom, as of 2012, the United Kingdom generated approximately 177 million tonnes of waste annually. (United Kingdom Government, 2015)

Waste Management and Method of Disposal

Waste management method	Sites permitted at end 2012	Sites that accepted waste in 2012	Millions tonnes managed in 2012	Percentage change from 2000 to 2012	Percentage change from 2011 to 2012
Landfill	510	380	43.9	-48.0	-6.3
Transfer	3,478	2,677	41.2	1.6	-0.9
Treatment	2,319	1,649	46.3	309.9	11.0
Metal recycling	2,662	1,316	15.3	58.5	-6.3
Incineration	123	82	7.1	-	7.7
Use of waste	219	163	4.0	-	110.2
Land disposal	199	114	8.6	-	220.7
Total	9,510	6,381	166.4	-	5.5

Table 2.2: Waste Management and Method of Disposal (This table does not include closed landfills, mobile plant, pet crematoria/cemeteries, gas engines and mining waste operations) (National Archives UK, 2013)

This table helps to show the various disposal methods and how much the world relies on them. In the past century, the United Kingdom has decreased their waste production through government-funded programs and incentives.

The European Union has set several waste reduction goals for the United Kingdom in the coming years. By 2020, the United Kingdom is tasked with recycling 50% of its waste, and reducing the amount of waste that goes to landfill to 35% of its 1995 value of 35.7 million tonnes. As it stands, about 50% of the total waste that entered final treatment in the United Kingdom was recovered. (UK Statistics on Waste, 2014) We explore some of the materials that can be recycled in the next section.

Types of Recycling

In the United Kingdom there are many different types of recycling; these types of recycling differ from those in the United States. The materials for public recycling are split up into various categories.

Waste Generation Split by Waste Material
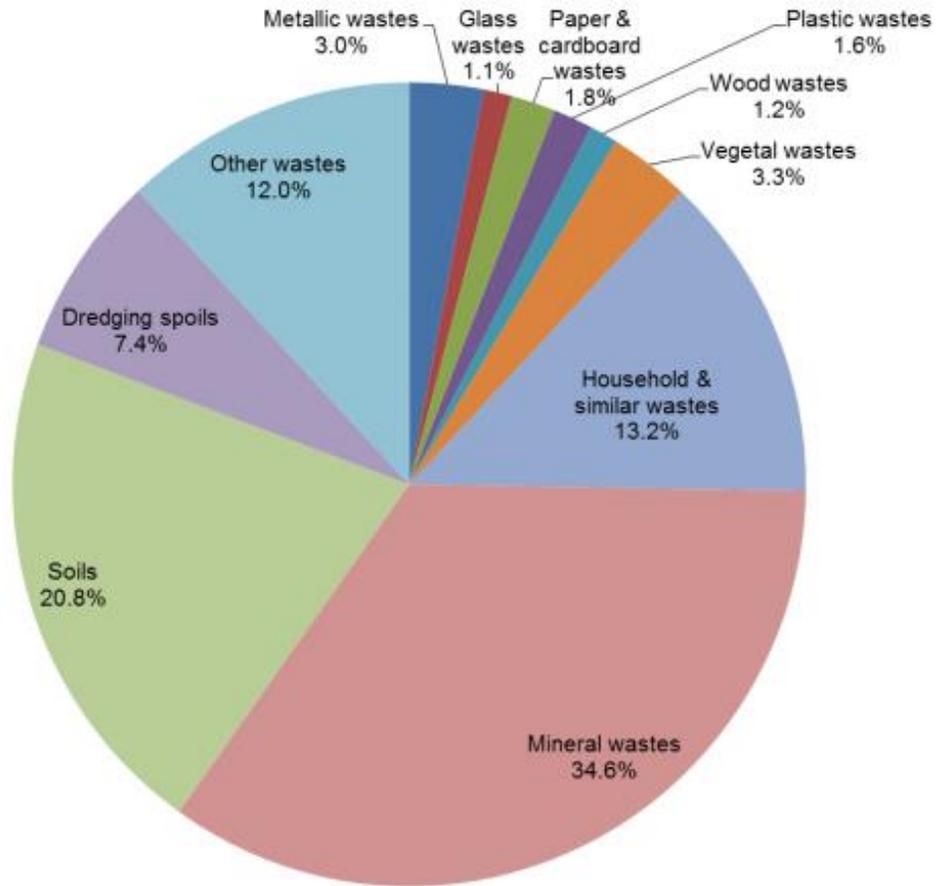
Figure 2.4: A depiction of the percentages of wastes coming from different sources. (Shift, 2012)

Some of these recyclables are unable to be recycled curbside and must be taken to a

Recycling Point or Household Waste and Recycling Centre. (Aberdeenshire Council, 2015) A

few materials that need to be brought to a Household Waste and Recycling Centre include:

electronics, hard metals, printer cartridges, automotive batteries and lead-block batteries.

(University of Worcester, 2015)

Examples of materials that can be recycled curbside include composts, plastics,

aluminum foils and other soft metals, glass and paper. Some types of pick up services allow for

mixed recycling and will sort the materials at their recycling center. (UK Statistics on Waste, 2015) Others will require for each material to be sorted according to the local standards. (Aberdeenshire Council, 2015) Although the city of Worcester has good recycling habits, the University of Worcester has stricter guidelines dealing with the sorting of recyclable materials.

Due to the fact that the University of Worcester has stricter guidelines, we focused on the recycling guidelines at the University of Worcester because it is a sustainable university. There is a difference between what is allowed to be recycled in students' accommodations on-campus and off-campus. For on-campus housing the facilities services provided three different bins. There is the black rubbish bin, which is for crisp pockets and sweet wrappers, foils, black plastic dishes, plastic bags, and disposable coffee cups. The brown bin is for compost, and includes food wastes and tea bags. The green recycle bin is for food packages, glass jars, bottles, drink cartons, paper, trays and cups. (University of Worcester, 2015)

The requirements for recycling in privately rented accommodations will differ from landlord to landlord. This is dependent upon the recycling service that is hired by the landlord or if the tenant/landlord must transport the recycling to a recycling center themselves. If most of these accommodations do not have access to recycling methods, then students will put most of their recyclables in the landfill bin.

2.2: Types of Housing

Many of the accommodations that students living at the University of Worcester live in are provided by the University. (University of Worcester, 2015) The other options include renting from privately owned accommodations, such as terraced housing, semi-detached housing and detached housing.

One type of student housing is terraced housing. Terraced housing is generally very cheap, sectioned housing where all of the houses are connected side by side. These houses are a relic of the Industrial Revolution, where they were constructed quickly to house the influx of workers to the cities. As a result, they can be more cramped and a bit lower quality to balance out their lower cost. (Trueman, 2013)

Figure 2.5: An example of Terrace Housing (Geograph, 2015)

Another type of off-campus student housing is the semi-detached housing, which is usually two or three houses attached to each other that share a yard and driveway area. This accommodation represents a middle ground between the cheaper terraced housing and the expensive detached housing, with a medium-high price range but more privacy. (Our Property, 2015)

Figure 2.6: An Example of Semi-Detached Housing (Geograph, 2015)

The final type of student housing is the detached housing, a single home where the lot is only occupied by that home alone. This is uncommon among student rented houses because it is expensive to pay for and maintain. As a result, some students will not go for this option because it is out of their price range. (University of Worcester, 2015)

Figure 2.7: An Example of Detached Housing (Geograph, 2015)

2.3: Current Programs

Waste management can be a hassle for those living in crowded areas, such as terraced houses. This is where government programs can step in to help mitigate costs and regulate

management. Both the United Kingdom government and United Kingdom institutions have

created programs to help increase the amount of green energy used, while reducing individual

carbon-footprints. (United Kingdom Government, 2015)
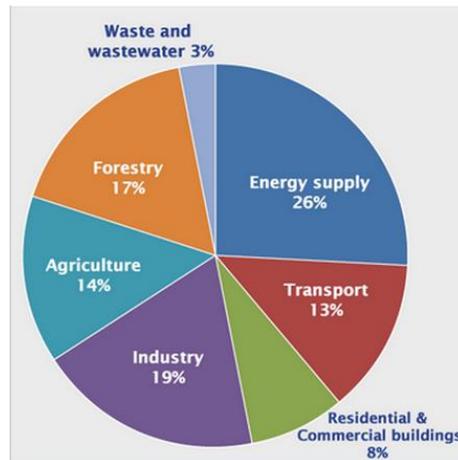
Figure 2.8: Global Greenhouse Gas Emissions by Source (IPCC, 2007)

The people in the United Kingdom are working toward a zero-waste economy; making

recycling a major part of life and using landfills as a last resort. (United Kingdom Government,

2015) This zero-waste program aims to reduce the amount of waste produced in the United

Kingdom every year. There are also many other programs which aim to reduce energy use. The

most successful of these programs keep the interests of their target audience in mind. Described

below are two well-known programs: one developed by the government and another by students

at University. The government-based program is the Green Deal, and the University-backed

program is the Green Impact.

Green Deal

The Green Deal is an ambitious United Kingdom government program that seeks to

achieve, among other things, an 80% reduction in carbon emissions by the year 2050 (Roadmap,

2011). The United Kingdom Department of Energy and Climate Change (UKDECC) recognized

that energy changes first start at home. The UKDECC is also aware that the home is where

people tend to waste energy from poor insulation as well as many other factors. In 2014, 38% of the total greenhouse gas emissions in the United Kingdom came from buildings that leaked and wasted energy. (United Kingdom Government, 2015) To address this, the UKDECC provides the upfront cost of upgrading a person's home or apartment to make their home more energy efficient. Once the upgrades are installed, then the owner will slowly pay the government through their energy bill, which will be lower than what they were paying before. However, if the person moves out of the new Green Deal upgraded house or apartment, the re-payments for the upgrades stay with the house. This means once someone moves they are no longer responsible for paying for the upgrades. If someone is moving into a property with a Green Deal installment the landlord or seller must explain the improvements made and the repayment process. (United Kingdom Government, 2015)

Since it was first put in place in 2013, the program has created 60,000 jobs, has benefited 230,000 low income homes each year, and is on the road to reducing carbon emissions by 4.5 million tonnes per year by 2020. (United Kingdom Government, 2015) The Green Deal is still gaining in popularity, but there are several alternatives, such as the Green Impact.

Green Impact

The Green Impact Program is trying to get Universities to increase their sustainability by performing small actions accomplishable by individual people. As of 2012, this program was working with over 50 universities and 105 students' unions. (What Is Green Impact?, 2012) The program has mainly focused at the University level but has started to get small companies to participate. According to the University of Worcester, the Green Impact is trying to get university departments to implement easy and useful actions to aid the environment. (University of Worcester, 2015) The Green Impact attempts to get people to make small changes and then

rewards them with name recognition for accomplishments such as reducing their energy bill or improving the amount of materials recycled. (What is Green Impact?, 2012)

Participants, both universities as a whole and individual people, in the Green Impact, are given a workbook online that outlines different actions they can take. Participants who perform these actions are called green teams. These actions cover multiple aspects of sustainability, such as waste reduction, water conservation, sustainable travel, energy reduction and consumer decisions. (What Is Green Impact?, 2012) These workbooks break down the process and the method of evaluation to make it easy for teams to achieve the goals set for them in their workbook. These goals could be using less water, recycling more, or printing papers double-sided. This workbook also helps the teams to keep an active log of their work throughout the year.

As of 2012, over one-third of the 700 employees working at the University of Worcester are part of the environmental accreditation scheme. Depending on the number of environmental actions that are carried out, each green team can earn a Bronze, Silver, Gold, Platinum and/or Excellence award for improving the environment and creating a greener workplace. (University of Worcester, 2015)

To gain Bronze or Silver, the team needs to complete all actions in their workbook. For Gold, the team needs to have obtained the highest number of points out of all the teams for their activities. For Excellence, the team needs to have won the Gold award for two years in a row. Finally, for Platinum, the team needs to complete all Bronze or Silver criteria, as well as bonus criteria. Part of the reason this program is so successful is because people are directly rewarded for their time and effort, making them feel great and wanting to strive for even greater success next time. The Green Impact Program has also grown more popular due to the fact that they

make their information readily available. Right now in the city of Worcester the University is striving to meet the goal of having most, if not all, of the residents aware of the information out there about green energy. (University of Worcester, 2015)

2.4: Educational Theory

There are a lot of programs available already, so why are they not being used? Before a program can gain participants or facilitate behavioral change, it must first teach the community why it should care. To do this, the person proposing the change needs to develop and execute an effective campaign to teach the community about the problems that they need to address. Effectively teaching energy and waste reduction is important to helping people understand why they should care about the topic.

So the next question is: what is the best way to teach a topic in order to facilitate behavioral change? This section discusses basic theories of learning, containing introspection as an educational method, followed by andragogy, the art and science of helping adults learn. (Kaufman, 2003) In the final section we discuss how to use these methods and theories to facilitate behavioral change.

Basic Theory

At the earliest stages, during childhood years, education is about learning and memory. In 1970, Ulric Neisser, a famous cognitive psychologist, created a model of learning called 'bottom-up processing' based on what computers do. The first thing that happens is that someone receives a stimulus event, such as seeing, hearing, or reading something. Then, that person detects the information. Next, they identify and then categorize the object or information. Finally, the event is committed to memory. (Khalid, 2015) In other words, it takes a lot of focus to commit something to memory. Have you ever repeated something to yourself so you don't

forget? This is the idea of focus at work. The learner will repeat something to themselves to lengthen the amount of time they have to categorize it and put it into memory.

This brings us to the next big topic in basic knowledge, gestalt. Gestalt comes from German and means 'shape', 'form', or 'pattern'. The idea of gestalt is that a whole is better than a piece. This means that information should be taught in sections or groups of similar information in order to help the target audience categorize it and put it into memory. (Khalid, 2015) For example, a teacher teaching about different kinds of animals should categorize all of the birds together.

Introspection

In the late 1800s, Sigmund Freud developed the idea that psychological experiences come from biological needs and instincts. (Khalid, 2015) What is important here is that people will learn if they have the need to. This raises the question: what makes people need to learn? One factor is introspection, a method for self-reflection and analysis. A learner needs to be able to associate with the topic in order to make it as effective as possible.

Examine this statement:

"Every year, 66% of the total energy used on Earth comes from non-renewable sources." (Shift Project, 2012)

Notice the impact if this statement is attached to it:

"Imagine, 66% of all electrical systems in the city go out. Maybe your lights go out and you trip down the stairs and break your leg. Maybe the power goes out in the hospital, while someone you know is having surgery. Just think, every year, 66% of the energy you use is never going to come back, whether it is from coal, oil or natural gas, and one day, the Earth will run out." (Shift Project, 2012)

While the second statement may be longer, it addresses the reader, and gives them a reason to care. Maybe they pictured a certain person there, in surgery when the power goes out. While this

theory is hard to quantify in terms of educational growth, it is a good way to get people to focus and really reflect on their decisions. (Khalid, 2015)

Andragogy

However, introspection is not the only way to get an audience to learn. Another way is called andragogy or "the art and science of helping adults learn." (Kaufman, 2003) This method requires making the learners feel comfortable, and then letting them plan how they want to learn, create their own objectives, and evaluate their own learning. It operates on five basic principles about adults: adults are independent and self-directing; adults are experienced; adults value learning which affects their everyday life; adults are more interested in problem centered approaches than subject ones; and finally, adults are more motivated to learn by internal drive then external stimulus. This is a way to get people, adults specifically, to want to learn by designing their own objectives. If you can motivate people to learn and inspire themselves, they can go further on their own than a teacher could ever force them to go. (Kaufman, 2003)

Behavioral Changes

These behavioral changes are the start of how to create a learning experience that people will remember. However, to create real behavioral change, such as living a more sustainable lifestyle, a teacher needs to instill habits. (Darnton, 2011) Based on previous psychology research, 45% of human behaviors are done in the same place each day. (Darnton, 2011) Some habits include taking shorter showers or riding a bicycle to work. However, other habits are far less environmentally benign. Some habits include the use of disposable bottled waters every morning and leaving the lights on when leaving a room. (Darnton, 2011) Figure 6 is an example of the habits that exist within the Arboretum community in Worcester, England, based on a survey of 102 people.
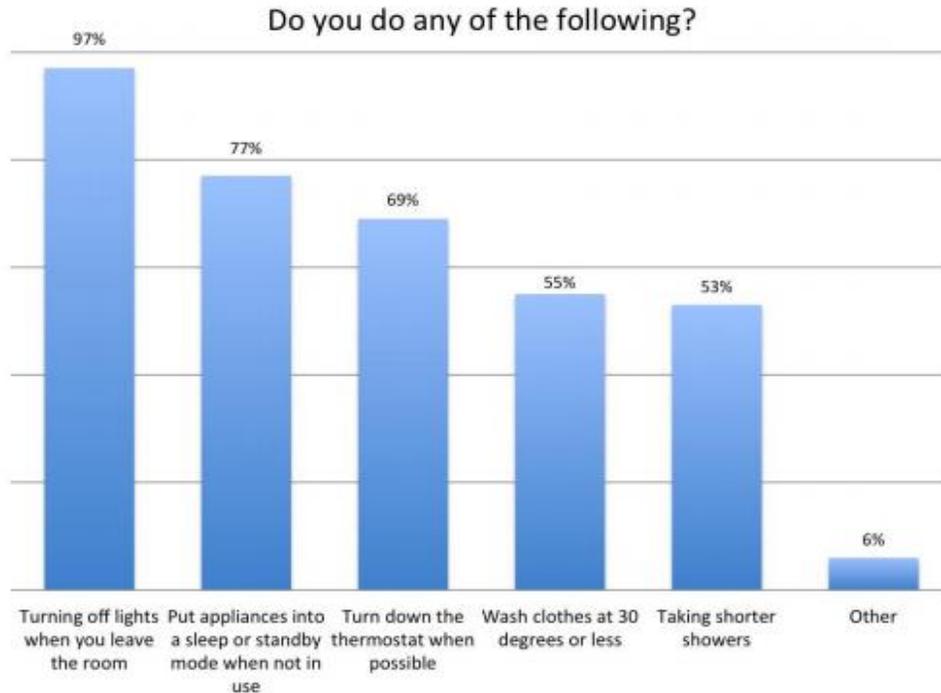
Figure 2.9: Graph from Energize Worcester 2014 showing percentages of people's energy saving habits that exist in the Arboretum. (Worcester Polytechnic Institute, 2014)

Habits are not only very important for creating real and consistent change; but are also the main reason why people's behaviors do not match up with their intentions. (Darton, 2011) Psychologists have recently developed a theory in sociology, regarding creating habits, called Practice Theory. (Darnton, 2011) Practice Theory states that habits are made out of three basic ideas: materials, competences, and images. *Materials* are the objects and infrastructure that exist, *competences* are what skills the person has and *images* are what meanings and interpretations the person has. While it is difficult to change what materials someone has, competences and images can be affected by learning. To create habitual change, the teacher needs to alter what images their target audience has on a specific topic. While a teacher cannot force an audience to learn new skills, they can provide an audience options. (Darnton, 2011)

2.5: Raising Awareness

A previous survey found that 68% of the 102 residents in the Arboretum felt they did not have enough information on programs that individuals could benefit from, such as the Energize

Worcester program or the Green Deal. (Worcester Polytechnic Institute, 2014). This is a statistic that needs improving. The information is available but it is just not always accessible, or individuals are not aware of its existence. One goal of our research was to determine the level of awareness that University of Worcester students have about sustainability. There is a lot of information available about sustainability and many sustainable habits are linked. When recycling habits are improved, both energy usage and material usage are reduced. This in turn, means less raw material consumption and less fossil fuels being used retrieving these materials. (U.S. EPA, 2015) (Shift, 2012)

2.6: Conclusion

Energize Worcester is a program to increase sustainability and reduce energy consumption and waste in Worcester, England. This program aims to accomplish three goals: reduce students' energy bills, ensure that students still have a comfortable place to live, and improve their sustainability. The University of Worcester and the area around it have been working towards a greener future. They have been measuring and improving insulation in homes, recycling habits and energy reduction techniques. The main focus of our project was how sustainable habits, specifically recycling, affect people's everyday choices such as picking an accommodation. In the next chapter, we discuss the methods we used to achieve our goal.

CHAPTER 3: METHODOLOGY

The goal of this project was to analyze University of Worcester students' accommodation choices and to determine if there is a relationship between these choices and their recycling habits. For the purposes of this project, we assessed accommodation choices by analyzing where students live and how much they recycle. During this project we examined whether it was the lack of materials or the wrong images about recycling that were the main reason that students did not recycle. Below we provide a list of our seven objectives and describe how we accomplished our goal.

Objective One: Research Factors that Influence Housing Choices for University of Worcester Students

Objective Two: Assess Factors that Influence Housing Choices for Students with Unknown Recycling Habits

Objective Three: Assess the Impacts that Recycling Habits have on Housing Choices for Students who have shown Good Recycling Habits

Objective Four: Assess the Impacts that Recycling Habits have on Housing Choices for Students who have shown Poor Recycling Habits

Objective Five: Compare Results from Previous Objectives

Objective Six: Collect Follow-Up Information

Objective Seven: Create a Report and Presentation for the City of Worcester and Energize Worcester Representatives

We discuss each objective in detail below.

Objective One: Research Factors that Influence Housing Choices for University of Worcester Students

Our first step was to collect the necessary data from University of Worcester students. We created a survey asking about students' house hunting and recycling habits. (Please see Appendix B for a copy of our survey.) We developed our survey using a program called Bristol Online Surveys. We used this program because it had the ability to do in-depth data analysis and because it was made available to us through Energize Worcester's Project Manager, Peng Li. We created a list of data points that we wanted to gather information on, and made sure this survey

hit each of these points. During the first four days, we pre-tested our survey on students in the multiple cafés on-campus. We conducted these pre-tests to make sure the survey was easy to take and clear for the students. Using the results of the pre-test, we revised our survey.

Once we finished testing our survey, we surveyed students who reside on campus. We chose students living on campus to gather data from people who had just gone through the housing process. We made the survey available to respondents both online and on paper to make it as accessible as possible for the survey respondents. Some students preferred to take the survey on paper when approached, while others preferred to take the survey later. To distribute the survey, we went door to door on the St. Johns Campus. We sent out our survey link through email, but we did not receive many responses. Response rates for email surveys are often significantly lower than door knocking. (Baruch, 2008)

We surveyed three groups: two experimental groups and a control group. The experimental groups were a group of about 40 University of Worcester students known to have good recycling habits and a group of about 46 University of Worcester students known to have bad recycling habits. These groups were identified by facilities management, the department responsible for collecting recycling from disposal areas. The control group was determined by convenience sampling of University of Worcester students living on-campus.

After distributing the control group surveys, we surveyed the students who were determined to have good or bad recycling practices and asked questions about their housing choices. Our intent was to gather large amounts of data from all three groups of students for later analysis. Data collection spanned from May 19th until the last students left the campus on June 12, although most students were gone by May 29th.

Objective Two: Assess Factors that Influence Housing Choices for Students with Unknown Recycling Habits

We began to analyze the survey data on the third week. We analyzed survey data from 74 respondents and interview data from talking with students while they took the survey. We investigated what percentage of each group was influenced by recycling when choosing where to live. As data gathering continued throughout our project, we simultaneously continued to analyze any new incoming data. We used Bristol Online Surveys to compile our survey data into a usable format. Bristol Online Surveys interpreted the survey responses and translated them into percentages and running averages. We exported the data to Excel for further analysis. We analyzed student responses to the more open-ended questions we asked them while surveying. Once we compiled the survey and open-ended responses, we searched for patterns in the data.

Objective Three: Assess the Impacts that Recycling Habits have on Housing Choices for Students who have Shown Good Recycling Habits

In contrast to the randomly selected group of students, we also were given a list of students that facilities staff had determined to have better than average recycling habits. We collected data from this group of students as they were a known quantity and would provide good comparative data against the control group. Furthermore, we were interested in how their method of housing selection was affected by their habits. We were provided a list of these students by Peng Li and Katy Boom. Since room numbers and email addresses were on this list, we used door to door surveying from 16:00 to 18:00 during the second week. We chose this time because it is considered "tea time", and we expected students to be in their flats. We also surveyed students at lunchtime in the cafeteria and outside because the students were usually willing to take our surveys as they ate lunch. We wanted to identify what was most important to them when deciding where to live; and in the end, assess if the presence of good recycling habits influenced the housing priorities of this group.

Objective Four: Assess the Impacts that Recycling Habits have on Housing Choices for Students who have Shown Poor Recycling Habits

The final group of students that we surveyed had poor recycling habits. We wanted to see if these students chose accommodations with different priorities than the other two groups. We went on to see what priorities they did have, and if recycling played into their decision at all, either positively or negatively. Our surveying tactics here were nearly identical to the previously mentioned methods. To accomplish this objective, we had to determine if these students were simply misinformed, or uninformed, about recycling or if they just have no motivation to recycle. Recall that 68% of people in the Arboretum felt that there was not enough information about sustainability available to the public. (Worcester Polytechnic Institute, 2014) Based on these results, we assessed whether it is lack of information or personal motivation that hinders sustainable housing choices. This changed the tactics that we recommended for future research and approaches to promote recycling.

Objective Five: Compare Results from Previous Objectives

After we looked into what factors affected housing choices of University of Worcester students, we examined the impact that recycling habits had on these choices by comparing the three groups. This comparison began on the fifth week of the project, when the students departed, in order to make sure we had a full and complete grasp of the information by the project's end. For this objective, we observed the difference in results between the randomly selected group of students and the students known to have better or worse recycling habits. We drew parallels and contrasts between the three groups, by comparing their survey answers, in order to see what effect these recycling habits had on housing decisions. See Chapter 4: Findings for the outcomes.

We also looked into differences that exist in other groups of students, such as class year and area of study. While not our main focus, we wanted to investigate the effect that these

factors had on the recycling habits of the students. Specifically, we wanted to see how students'

priorities changed as they progressed through university. This process occurred naturally, as we

had already accumulated data from previous objectives, so analyzing this data was a simple

matter of statistical analysis. (To see the detailed explanation of our statistical analysis, see

Appendix D)

Objective Six: Gather Follow-Up Information

In order to solidify our data, we also interviewed both University staff involved in the on-

campus recycling efforts and a representative from a nearby letting agency. We also researched

methods that the University uses to promote recycling, such as motivational posters in student

flats and helpful stickers attached to waste and recycling bins.

First, we looked into recycling on campus. We interviewed one of the sustainability

coordinators, Matt Smith, to gather data on the University of Worcester's recycling process. (Our

interview questions are located in Appendix C.) Next, we emailed an anonymous member of

facilities who is responsible for replacing broken or lost bins and emptying full recycling

receptacles, to gather more data. We researched methods the University used to promote

recycling by walking around the campus and observing what materials were available.

We also interviewed a representative from a letting agency in the city of Worcester. We

focused mainly on students' behaviors and what they generally look for in accommodations. The

representative we talked to confirmed many of our early findings. Interviewing the letting agency

provided us with a perspective from someone responsible for matching students to housing and

therefore knowledgeable about student behaviors and their housing needs/choices.

In order to gather more information about on-campus recycling, we emailed members of

the University's Facilities department that we were unable to connect with in person. We

received no responses and were informed that many of the facilities members have no need of their work email for their job so they were not likely to respond. They do most of their contact by phone, radio, or in person. Although we attempted to contact them for more information, we did not receive a response in time for the end of the project.

Objective Seven: Create a Report and Presentation for the City of Worcester and Energize Worcester Representatives

Once we had gathered all of our data and analyzed it, we put it together into a presentable and understandable form. We created a presentation for members of the University Sustainability Committee, including our sponsors, Katy Boom and Peng Li. Using the data we collected, we created graphs and tables that are readable both on PowerPoint and in our report. We made sure to be careful that the graphs and tables have large font, such that they were readable for anyone viewing our presentation. We wanted to make sure that our report gives a clear outline of recommendations for future research groups to pursue. It was also important that the Student Union be able to use this research, not only to improve recycling, but also student housing.

3.1: Conclusion

Our role in this project was to work with the Student Union in collaboration with the Energize Worcester program. Our group worked with the Student Union, as well as Katy Boom and Peng Li, to analyze the recycling habits of the University of Worcester. Furthermore, we investigated whether a connection exists between recycling habits and accommodation choices. Our goal was to synthesize information from surveys of the chosen populations into predictable patterns of behavior based on current recycling habits. In the following chapter, we present the results of our methods in detail.

CHAPTER 4: FINDINGS

We received survey responses from 74 students attending the University of Worcester (see Appendix B for our survey) and explored student decisions and actions based on the students' answers. We also gathered data from the University of Worcester website, as well as interviewed Sustainability Director Katy Boom, Project Manager Peng Li, and facilities staff to bolster our research. Through surveying students and interviewing facilities, we cannot determine a relationship between student accommodation choice and recycling habits due to a small number of survey respondents. Nevertheless, there are a multitude of factors that influence housing choices of students, and although there is a lot for students to think about, we identified several factors that influence the accommodation choices and recycling habits of our exploratory sample.

Before we discuss these trends, we present some of our other findings to provide background information. This will provide some of the necessary context to our findings and help to understand student behavior. In Section 4.1, we discuss student priorities when choosing housing. In this section we explore how recycling compares with other factors that influence student decision making. In Section 4.2, we discuss how students look for accommodations, and the reasons they choose to search for new accommodations and stay in the same accommodations. In sections 4.3, 4.4, and 4.5, we discuss our findings on recycling habits. This includes the major reasons that students do and do not recycle, as well as how their habits change between the ease at which different materials are recycled. With that knowledge in mind, we discuss what we found with the relationship between student accommodation choices and recycling habits.

4.1: Student Priorities

Students have varying priorities when looking for accommodations, although they do follow a few noticeable trends. When analyzing student behavior, the majority of our responses were from students completing their first year at university. Out of the 74 student responses to our survey, 70 of the respondents completed a chart where they told us how influential each of ten items were when choosing where to live, on a scale of 1 to 7, where 1 is least important and 7 is most important. The ten items we asked about were: cost of rent; whether bills were included (such as heat and water bills); location; social life; size; high quality interior; ease of recycling; neighborhood; landlord; and length of contract.

Out of the ten priorities, cost of rent was rated as most important, at an average of 6.04/7.00, where the total averages across all priorities was 4.80/7.00. Further research into living on campus shows that, as of 2015, living in university provided accommodations can cost from 344 to 564 pounds per month. (University of Worcester, 2015) However, off-campus prices can vary, which could be the reason that cost of rent is important. As of 2015, a student moving off campus will pay less on average than a student staying on campus, but could still end up paying anywhere between 60 to 120 pounds per week. (Wistanley, 2015) These numbers take into account the bills for electricity and heating because bills are included in the total prices.

Student Average Priority Chart from Survey Responses on Question 12 in Appendix B
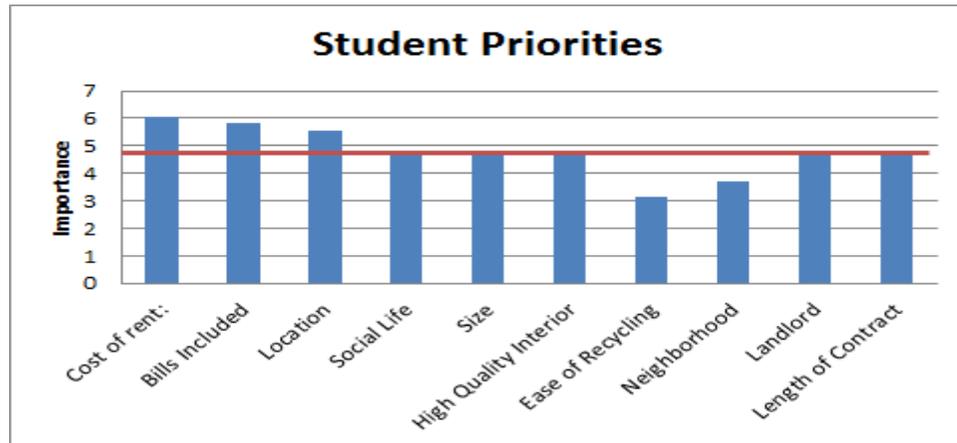
Figure 4.1: This graph shows how much each of these items influence student housing decision, on average

Although cost of rent was the highest priority for the 70 question responses, as illustrated

by Figure 4.1, inclusion of bills and location are also very important, at averages of 5.84/7.00

and 5.55/7.00 respectively. On the other hand, the lowest rated priority was ease of recycling, a

measure of distance to recycle and the effort required, at an average of 3.13/7.00. However,

neighborhood appeared to be similarly not important, at 3.71/7.00. The other five factors; social

life, size, landlord, high quality interior and length of contract, appeared to be somewhat neutral

for the students, coming in pretty close to the 4.80/7.00 average across all priorities.

While these ten factors are the items we thought of that would be most influential to

student accommodation choices, there may be other factors driving their decisions. While

interviewing Stephen Winstanley, a letting agent from Premier Places, we acquired more details

about what students look for when searching for a new accommodation.

Mr. Winstanley explained that Premier Places has their own "marketing campaign"

focused on students' needs, due to the fact that students are very different from normal

customers. (Wistanley, 2015) According to Mr. Winstanley, since most of the time bills are

included in the accommodation's rent, students rarely have any questions about energy

efficiency or utilities. He noted that this was much different when bills were not included. When

bills were not included in a rental, students would inquire about insulation, as they would have to pay for heating costs separately. Other than that students never seem to ask about it. (Wistanley, 2015) This data supports our claim that cost is paramount to students looking off campus for a place to live.

4.2: To Move, or to Stay?

Beyond student priorities when choosing where to live, our survey sample revealed some other reasons why students may wish to stay in one accommodation or move to another. Many students decide to move off campus after their first year at the University. Of the 60 first year students who took our survey, 56 of them (93%) said that they were considering moving into privately rented accommodations for the next year. Moreover, of the 14 students that responded who are not in their first year of college, only two of them were still living on campus. This supports our finding that the majority of students move off-campus after their first year. Upon talking with students on campus, we learned that new University students get priority when choosing where to live among on-campus choices. This could mean that students who want to stay on campus may not necessarily get the housing they want, or even get on-campus housing at all. In fact, one of the students said that "we get kicked out of uni owned accommodation [after our first year]" (University of Worcester Student, 2015) and at least seven other students echoed this sentiment. This is likely to make room for new students.

The University policy for 2015 is, "If you're a first year undergraduate student who has accepted a conditional or unconditional offer, you are guaranteed a place in our university-managed accommodation if you apply for accommodation before May 31st." (University of Worcester, 2015) Notice that, based on this policy, second and third year undergraduates are not guaranteed a place to stay on campus. (University of Worcester, 2015) However, beyond the lack of on-campus housing, students had many other reasons that they wished to move off campus.

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We asked survey respondents to explain the main reason that they wanted to move. The most notable reason, based on students' responses, was that students preferred the new housemates that they would be living with. Thirty-three percent of 52 students who responded to this question marked their main motivation as "I prefer the housemates in the new home" (see Figure 4.2). Moreover, we received many comments from students noting that they preferred to form groups before looking for housing. One student said: "Me, and Raul (not the actual student's name) and three other guys talked about living together before Christmas but we did not start house hunting until late January." (University of Worcester Student, 2015) As evidenced by these students looking for housing with predetermined numbers in their group, social factors are more important when deciding whether or not to move, beyond even cost.

A Chart of Reasons to Move to a New Location

I want to move to a new   7 (13.5%)
environment

I prefer the location of the   2 (3.8%)
new home as it's closer to the
University

I prefer the location of the   3 (5.8%)
new home for my social life

I prefer the housemates in the   17 (32.7%)
new home

The new home has lower rent   13 (25%)

The new home has better   4 (7.7%)
facilities (e.g. heating
system, electrical appliances)

Other   6 (11.5%)
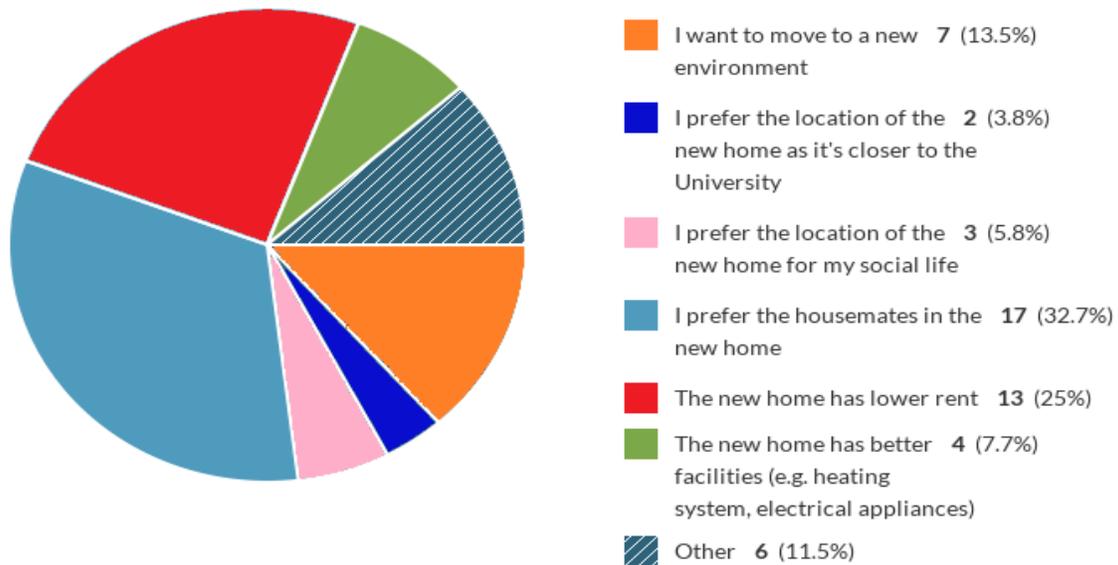
Figure 4.2: Student primary priorities when moving

After their compatibility with flatmates, the next highest rated student concern was the rent costs of their new accommodation; specifically, 25% of the 52 students who answered this question were motivated to move because their new housing had lower rent. From this, we found that, on average, the students in our exploratory sample are more concerned with the cost of their

accommodation than other priorities when choosing a place to live. This is supported by a previously stated finding that students prioritize rent costs, rating it as (on average) a 6.04 out of 7.00.

These two reasons comprised over 50% of student responses on this question, and neither are based on reasons at all related to the actual accommodation. In contrast, change of neighborhood and closer location to the university were almost completely ignored on this question. This indicates that it is possible that location is, while a consideration when choosing where to live, not necessarily a defining factor for students when moving.

On the other hand, students staying in the same home have varying reasons for doing so, but similarly to those moving, housemates were the highest priority. A large percentage, 47% of those who answered (15 of the 32 students), stated the main reason they wanted to stay was that they liked their current housemates. Once again, we have seen that social factors play the most prominent role when determining whether to stay or move. The rest of the responses, shown in Figure 4.3, were fairly evenly distributed, and were negligible by comparison. The second highest number of responses was four, tied between students being used to their house and thinking that their current house was of good quality.
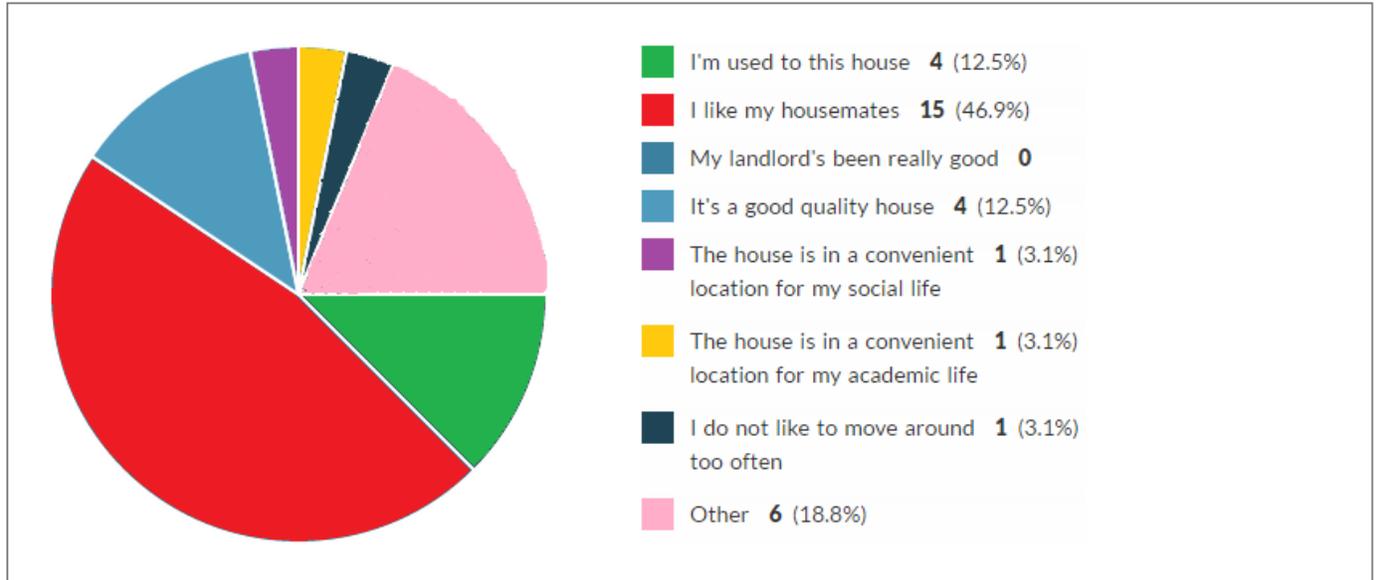
Figure 4.3: Students total responses on why they stay in the same accommodation

4.3: Reasons that Students Recycle

There are several factors that dictate what students will recycle, as well as whether students will recycle at all. The students who do recycle usually do so for two main reasons: because they want to help the environment, or because it is made easy by their accommodations. Of the 74 responses, 61 students (82%) said that they do recycle.

In our survey we asked students why they recycle and left a space for open ended responses. This allowed students to provide their own opinions without being restricted by multiple choice guidelines. To this open-ended question, we received 47 answers from our survey respondents. Ten respondents (or 21% of respondents who answered this question) explained that they recycled because bins were available and recycling was easy to do. Furthermore, according to Katy Boom, Director of Sustainability, convenience is a primary reason for recycling. From our survey respondents, we received 25 answers that stated helping the environment as their reason. One respondent explained that the "uni provides guidance [in the form of bin labels and handouts] and bins." (University of Worcester Student, 2015) Another

respondent explained that s/he was "Doing my bit for nature and this beautiful planet." (University of Worcester Student, 2015) Students who recycle to help the environment will likely continue doing so when they move off campus based on established behavior and habits; however, students that only recycle because they are given the materials to do so may not continue this habit after they leave. (Darnton, 2011)

4.4: Reasons that Students do not Recycle

Similarly, students provided numerous reasons as to why they do not recycle. One significant reason that an unrecorded number of students mentioned is that they do not believe that it is easy to acquire new bins. One student said, "[because they] weren't provided with the right bins, then [they] never started again." (University of Worcester Students, 2015) Other students had their bins broken or lost, and never had the bins replaced. We interviewed Matt Smith, a sustainability coordinator at the University, to determine how accessible the bins are to students. He explained that although bins are free to replace for the students, the University needs to pay eight pounds per bin when replacing them. The University buys these bins in bulk, so they currently have around 250 sitting in storage. To get them replaced, students must submit a request online, and a member of facilities will pass on the request to the proper department to get these items replaced. (Smith, 2015)

According to Mr. Smith, replacing recycling bins should be simple. (Smith, 2015) It is possible that there is a lapse in communication between the students and facilities. While the materials that the students are provided gives guidance on where to recycle specific items and what to recycle, it does not provide information on bin replacement. However, lack of these bins is not the only reason that students do not recycle.

Another reason that students do not recycle is that they were not willing to put in the effort. One student mentioned that when s/he were going to recycle, s/he needed to carry all five

bags down to the disposal area, which is outside and sometimes as much as two flights of stairs down. Students are requested to separate out their different recyclable materials. To make it easier, this particular student just put it all into one bag and threw it into the rubbish bin. It was much easier for them to carry one garbage bag down a flight of stairs and outside to the bins than carrying five separate garbage bags to the building's bins. Of the 22 students who answered this question, nine (41%) mentioned that effort was a defining reason to not recycle. One student even said that "[recycling] can take a lot of effort." (University of Worcester Students, 2015) This supports the notion that students often do not want to take the time and effort to recycle when simply throwing away everything is more convenient, building the image that it is difficult up in their heads. (Darnton, 2011) This means the students are unlikely to form good recycling habits.

4.5: Materials that Students Recycle

Even students who do recycle may dispose of some potentially reusable materials. There are two main reasons for this. Firstly, materials that are more difficult to recycle, such as batteries, will be improperly disposed of more often than materials that are easier to recycle. Secondly, reason is that not everyone is aware of what can and cannot be recycled. Figure 4.4 illustrates survey responses to Question 18, which asked students to explain how often they recycle certain materials. The figure illustrates that cardboard, glass, metal, paper and plastics are recycled more frequently than the other items.
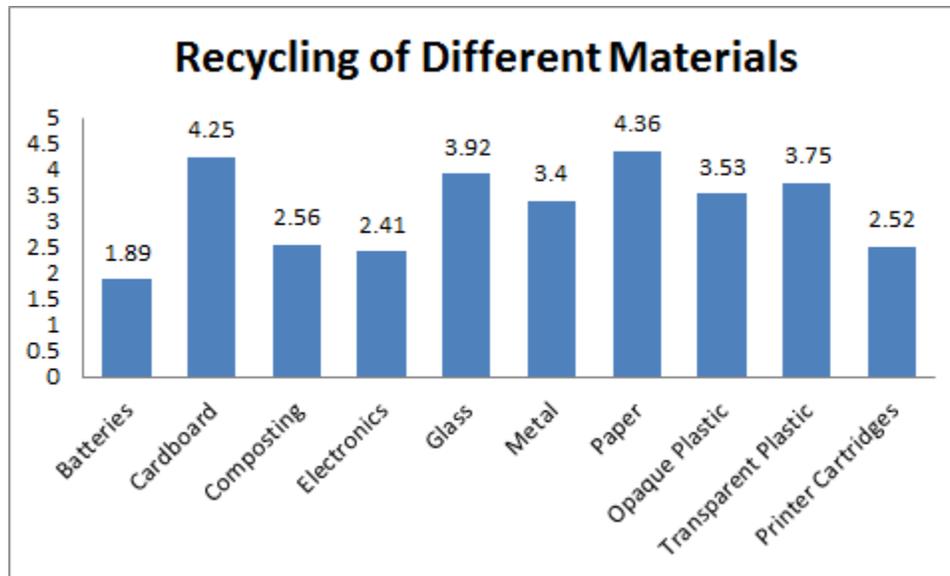
Figure 4.4: How much do students recycle these different materials (where 1 is never recycled, and 5 is always recycled)

Further research into this topic led us to believe that difficulty to recycle was a prime reason that these other items were recycled less. In the flats on campus, there are mixed recycling bins which can take in plastic, glass, paper, cans, and small pieces of cardboard. These items are then sorted into different piles by the University's waste contractors. (University of Worcester, 2015) On the other hand, to recycle batteries, the student needs to bring the batteries to special collection areas on campus. In the *Recycle, Reuse and Repair Guide* on the University of Worcester website, there are only four battery collection areas listed: the Edward Elgar Digital Art Centre Foyer, Bredon main corridor, Woodbury main corridor and the City Campus main reception. The St. Johns campus is roughly a quarter of a square mile, so it is not a particularly long walk to any one collection bin. Similarly, to recycle electronic waste, a student must contact Campus Services. On the other hand, printer cartridges can be recycled at 20 different locations on campus, typically near photocopiers. (University of Worcester, 2015) Many students do not wish to go out of their way to recycle these materials. One student remarked when asked why they did not recycle that they "can't be bothered" (University of Worcester Students, 2015) and another student remarked that recycling is "not a priority." (University of Worcester Student,

2015) In these students' eyes, it appears that even when they have the motivation to recycle items in their own flats, seeking out a special recycling zone is more effort than they are willing to put in.

4.6: Relationship between Recycling and Student Priorities

From our surveying, we analyzed the answers from student responses and determined whether or not the data we gathered was enough to discover a relationship. Based on statistical analysis, we were not able to draw conclusions for the students' priorities between the students that have been determined to have good recycling habits and the students that have been determined to have poor recycling habits.
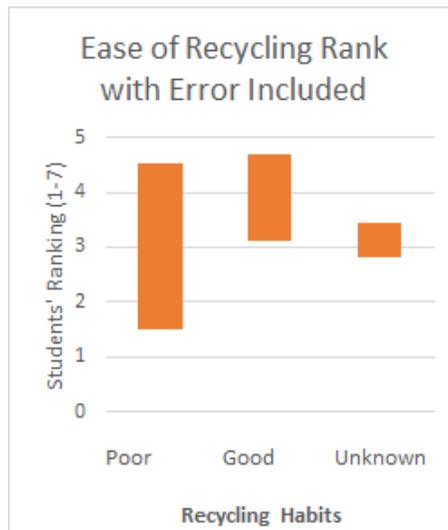
Figure 4.5: The Ease of Recycling rating of Students with poor, good and unknown recycling habits with the error included. The mean of the data is the center of the bar and the error is the extent of the bar.

The reason we cannot derive conclusions on the different average ratings between the good and poor recyclers, with regards to their housing priorities, is because our exploratory sample is too small to accurately represent the total population. Notice on our graph that the error bars (orange zones) overlap. This means that the true average for our whole survey group is somewhere in this zone. Since the orange zones overlap heavily, we cannot draw definite conclusions about our results. However, we also cannot say that there is no difference between

the two groups. (For our entire statistical analysis on the priority rating question in our survey, please see Appendix D.) Even though we did not have a significant number of overall responses, we had a good response rate. The response rate for the students that were determined to have good recycling habits was 10 out of 40 students. The response rate for the students that were determined to have poor recycling habits was lower, at 6 out of 46 students. These response rates, and how to improve them, are discussed further in the next chapter, Chapter 5: Recommendations.

CHAPTER 5: RECOMMENDATIONS

5.1: Survey Earlier in the Year to Increase Sample Size and Diversity

Even with all of this information, there is still a plethora of knowledge to discover. The starting date of our project, May 2015, meant that many students were unable to participate due to finals or having left campus. For more survey responses, we recommend starting surveys earlier in the University of Worcester academic year to increase student availability. Not only would this mean that more students would be on-campus, but also that the students would be more willing to provide answers. Twenty-eight out of 65 students (45%) told us that they started house hunting before January. Students start school on September 28th, and may still be settling into school for a few months. According to our survey, 23 of the 65 students said they had started house hunting by November. Thus, our recommendation is that a group begins research during the month of November. This could allow more time for survey alterations and improvements, which could in turn increase the variety of questions that can be answered, as well as the bulk of data provided. Starting then would also give the researchers the opportunity to observe the students' and the letting agencies' interactions since students generally look for accommodations in January. (Wistanley, 2015) Having more total data, with greater variety, would make for better statistical analysis, thus allowing more evidence and stronger conclusions.

5.2: Survey Students Living Off-Campus

When surveying, we focused on students living in on-campus accommodations. However, we recommend surveying for similar information among students living off campus. This could give an in-depth comparison between students living on campus and those living off campus. This information could also help the Sustainability Office understand how much the students learn about paying bills, once they have gone through the bill-paying process. This would, of course, create a split between students off campus with their bills included, and those whose bills are not included. One other piece of information that may especially warrant future

research is in seeing if the priorities of students who have gone through house hunting are different than those who are currently searching for the first time. To start the process of surveying off campus, we did preliminary canvasing of houses off campus to determine where students live. We used this information to update the University's database in order to assist future research groups. To gain access to this information, contact University of Worcester Sustainability Director Katy Boom.

5.3: Assess Impact of University Sponsored Housing Fair on Student Accommodation Choices

By January, many students have an idea of what they are looking for in a house. We noticed that in 2015, many students began to think about house hunting due to either attending or hearing about the University sponsored housing fair. This fair was the first one that has been hosted by the University of Worcester, and according to the Student Union, it was not very well documented. We recommend looking into the effect that the housing fair has on student housing priorities. Moreover, as there was also a sustainability booth set up at the 2015 housing fair, we recommend assessing the impact that this booth has, and if it increases the student focus on sustainability when looking for a house. This information would be most useful if found by the University or University staff, as that would allow the reports to be easily accessible for future research groups. One piece of information that may be useful to gather is how many of those who come to the fair currently live on campus, and how many currently live off campus. It may be useful to see if those off-campus students attending the housing fair have different priorities than those living on campus.

5.4: Assess Student Knowledge of Off-Campus Accommodations

It may also be worth surveying of campus to see what people living off campus know about their accommodation, with regards to both sustainability and actual cost of living. For example, are people living off-campus aware of how energy efficient their accommodation is?

To get these answers, we also recommend liaising with landlords to gather factual information about these accommodations. This could also give more information about the different types of houses. In our survey, we found that of 67 responses, 54% of people, said that they are living in semi-detached housing next year, while 24% said detached housing. Looking further into the typical differences of these types of accommodations, such as energy efficiency based on both landlord and student perspectives, may prove useful to students when choosing where to live. It may also help to guide further research into improving sustainability in accommodations. For example, knowledge of energy efficiency in these types of accommodations may help to discover where more work needs to be done. It may also provide useful information to the city about what types of housing should be built to improve sustainability. We canvassed where students live. To get that information please contact Katy Boom, Director of Sustainability at the University of Worcester, England.

5.5: Analyze Impact of On-Campus Disposal Sites

On campus, we found that there are disposal sites scattered around, but not always as equally accessible or known to the students. In the University of Worcester's *Recycle, Reuse and Repair Guide*, we found that there were four battery collection areas listed, but when we were walking around campus, we found one in the Hines building that was not listed. We recommend future research groups further research how the distance to these on-campus disposal areas affects the students' habits. On a similar note, we recommend looking into how often students take out the trash. The frequency that students take out the trash could increase the effect that the distance to the disposal areas has on students' habits.

5.6: Recycling Bins

Another factor in students' recycling habits could be lack of bins. We recommend looking further into why students appear to be lacking bins. Since facilities believes it should be

easy to replace bins, and students have trouble replacing their bins, it may be worth researching more in depth the process to replace bins, and student understanding of this process. Furthermore, it may prove useful to look into other possible miscommunications between facilities and the students, as we had difficulties pinpointing the exact issues. We recommend interviewing facilities further as well as the students to compare the two views on these topics. It may prove enlightening to conduct a focus group where both facilities and students are present. This opens up the door for future communication between the two groups, as well as making clear where the miscommunication is happening.

Providing Students with More Opportunities for Bin Replacement

Due to the fact that students mentioned that their recycling bins were broken and never replaced, or missing to begin with, we recommend supplementary ways to replace these bins. One idea is to include a day during the school year where facilities hosts a booth on campus where students can replace common items such as recycling bins. Students would merely stop by the booth, show an ID, and pick up their replacement. Providing other methods to obtain new recycling bins could increase replacement rate and thus student recycling. Based on comments from our survey respondents, facilities had no knowledge of which flats had broken or lost bins. This means that students were not filing reports or the reports they filed were lost, so there was no chance for the bins to ultimately get replaced. An even simpler way to increase replacement rate than hosting a booth would be to send out reminder emails about how students can report broken or lost bins. Even just a reminder email with an explanation could be all it takes for students to report these issues. Having these bins replaced could improve recycling habits.

5.7: Ways to Gather More Data

In order to determine a solid relationship between recycling habits and students' housing choices, it is important to gather more data. This will allow further statistical analysis to be done

with a smaller margin of error. We recommend surveying students of multiple years to gather similar information, thus increasing the bulk of total data. Although more research will reinforce each claim, the data should be targeted to the specific recycling groups: those with good recycling habits, and those with poor recycling habits. These groups should be determined using extensive measures to monitor their recycling habits. We had a good amount of data from our control group, but we did not have sufficient data from our experimental groups. One way to gather more data on these experimental groups is by surveying for concurrent years. This would allow an accumulation of total student responses so that the high response rate actually achieves enough data.

One problem with response rate that we ran into was often only one student per flat would take our survey. To fix this, we recommend making the prize pool done per flat, such as a pizza party. If more people from the flat take the survey, the flat has a higher chance of winning the prize. Furthermore, students were more likely to fill out the survey when they knew the people surveying them. For example, one student that we knew wanted to help so much that they convinced eight other students to take our survey. Thus, we recommend surveyors use their on-campus connections to increase the bulk of survey responses.

Another way to obtain more survey responses is to survey in a couple of specific locations. Even letting agencies have trouble contacting students because generally students do not make the first contact. They tend to fill out online and email inquiries instead of going to a letting agency or making a phone call. This is why letting agencies tend to focus on social media and approach students before the students approach them. (Winstanley, 2015) If the letting agency does not make the first contact, then they may miss their chance because most students would rather fill in the quick, easy option than make direct contact. (Winstanley, 2015) We

noticed that the most responses we received in the shortest amount of time was when we surveyed inside and outside the cafeteria from 12:00 to 14:00. Specifically, the largest number of surveys we obtained was when we moved around getting responses from seated students at lunch. To collect even more survey responses, we also recommend knocking on student doors at specific times. Times we noted as most helpful were 16:00 to 18:00 and 20:00 to 21:00. We recommend avoiding the slot from 18:00 to 20:00, as many students are out to supper at that time. Surveying at the proper time and place will more efficiently use the time a research group or project has while at the University, allowing the group to acquire more data.

5.8: Learning from Past Project Groups

One action that we recommend, especially for new, short-term projects, is to look into issues that other projects have faced. To this end, we looked into other projects, both in the United Kingdom and in the United States, and made brief pamphlet of what we recommend to new projects, based on this research and our own experiences. (See Appendix E for the pamphlet). While the pamphlet does have some parts that are helpful for longer term projects, such as the communication and transparency pieces, it is mostly geared towards projects of three years or less. We spoke with a student who was involved in many projects here on campus, and s/he mentioned that, although many projects start up in the United Kingdom, oftentimes they make the same mistakes as previous projects.

Some of these mistakes include lack of communication, especially of the end goal that the project wishes to achieve, and not keeping the line of communication open, which does not allow people to voice their opinions and concerns. Our group at one point closed a crucial line of communication for about a week, and later found that information that we missed out on would have proved invaluable to our efforts. Furthermore, we recommend new projects do their own research into other projects within their specific field of sustainability, as our research was solely

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focused within recycling and was geared towards teaching students. We would like to stress that this recommendation is for short-term projects, not departments or longer-term projects, especially the recommendation for a narrower focus. Many times, because these larger projects focus on broad topics, smaller projects believe that they can as well. This can lead to resources being spread too thin, and, in the end, accomplishing nothing at all.

CHAPTER 6: CONCLUSION

From our experience, sustainable issues should be tackled with an open mind and the capacity to adapt. This is especially important as circumstances change. Although our goal focused exclusively on recycling, there are a host of issues which are within the domain of sustainability. From reduction of material and energy consumption, to reuse of these materials, there are a number of different areas to focus on. It is important to teach sustainability to students at universities in order to develop good habits for these students before they enter the workforce. A number of great and longstanding projects have been started at the University level, such as the Green Impact. As students begin to develop good sustainable behaviors, they will take these green projects and ideas into the world. This will help promote a more sustainable world for everyone.

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APPENDICES

Appendix A: UK total energy consumption by source

UK total primary energy consumption by source, 2001-2012

Source: U.S. Energy Information Administration, *International Energy Statistics*, World Bank
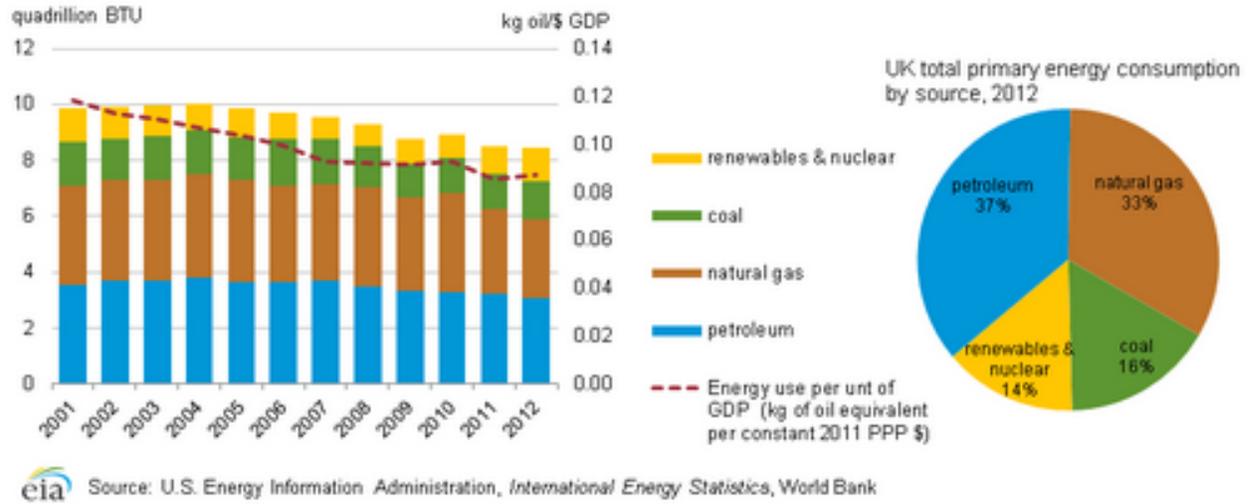
(U.S. Energy Information Administration, 2014)

This shows that the United Kingdom has made progress in reducing their energy consumption from 2001 to 2012 but it does not look like there is a significant increase in the use of renewable energy.

Page 1:

We are a group of students from Worcester Polytechnic Institute (WPI) in Massachusetts. We are conducting interviews of University of Worcester students to learn what they focus on when choosing where to live. We believe this kind of research will ultimately help Energize Worcester and the Worcester Students' Union improve student living in Worcester. Your participation in this survey is completely voluntary and you may withdraw at any time. If interested, a copy of our results can be provided at the conclusion of the study.

Note that once you have clicked on the CONTINUE button at the bottom of each page you cannot return to review or amend that page

Page 2: Privacy Statement

All data collected in this survey will be held anonymously and securely. No personal data is asked for or retained.

Page 3: The Status of your Current Accommodation
1. Are you currently living in…?
    a. University provided term-time accommodation on-campus
    b. University provided term-time accommodation off-campus
    c. Privately Rented Shared Student House
    d. Your own home
    e. Home with parents
    f. Other
        i. If you selected Other, Please specify:

Page 4: University Provided Accommodation
2. Are you considering moving into a privately rented house for next academic year?
    a. Yes
    b. No

Page 5: Moving to Private Accommodations
3. In what type of house are you planning to live next year?
    a. Detached house
    b. Semi-Detached house
    c. Terrace house
    d. Flat
    e. I am still house hunting
    f. Other
        i. If you selected Other, please specify:

4. How did you find your term-time home for next academic year? (Tick all that apply)
    a. Random search on internet
    b. Social Media
    c. University accommodation services (StudentPad)
    d. Letting agency
    e. Recommended by friend and/or family
    f. Advertisements from public places (i.e. university notice board, supermarket advertisement board, etc.)
    g. Other
        i. If you selected Other, please specify:

Page 6: Privately rented houses
5. How did you find your privately rented house? (Tick all that apply)
    a. Random search on internet
    b. Social Media
    c. University accommodation services (StudentPad)
    d. Letting agency
    e. Recommended by friend and/or family
    f. Advertisements from public places (i.e. university notice board, supermarket advertisement board, etc.)
    g. Other
        i. If you selected Other, please specify:

6. When you start house hunting again, which of the following methods would you PREFER to use to find another house?
    a. Random search on internet
    b. Social Media
    c. University accommodation services (StudentPad)
    d. Letting agency
    e. Recommended by friend and/or family
    f. Advertisements from public places (i.e. university notice board, supermarket advertisement board, etc.)
    g. Other
        i. If you selected Other, please specify:

7. Will you be staying in the same home again next year?
    a. Yes, I will
    b. No, I will not
    c. Not sure

Page 7: Staying in the same home
   8. What is the main reason to make you want to stay in your current house? (choose one answer only)
      a. I'm used to this house
      b. I like my housemates
      c. My landlords been really good
      d. It's a good quality house
      e. This house is in a convenient location for my social life
      f. This house is in a convenient location for my academic life
      g. I do not like to move around too often
      h. Other
         i. If you selected Other, please specify:

Page 8: Moving to a new home
   1. What is the main reason that you want to move house? (choose one answer only)
      a. I want to move to a new environment
      b. I prefer the location of the new home as its closer to the University
      c. I prefer the location of the new home for my social life
      d. I prefer the housemates in the new home
      e. The new home has lower rent
      f. The new home has better facilities (e.g. heating system, electrical appliance)
      g. The new home is in a nicer neighborhood
      h. Other
         i. If you selected Other, please specify:

Page 9: Housing Hunting
   2. When did you start house hunting for your term-time accommodation for next year?
      a. September-October 2014
      b. November-December 2014
      c. January-February 2015
      d. March-May 2015
      e. June-September 2015
      f. Other
         i. If you selected Other, please specify:

3. In the past, what were your priorities when choosing your home?

	How important are each of the following issues when choosing where to live from 1 to 7:						
	1 (less important)	2	3	4	5	6	7 (more important)
Cost of Rent	o	o	o	o	o	o	o
Bills are Included	o	o	o	o	o	o	o
Location (close to University)	o	o	o	o	o	o	o
Social Life	o	o	o	o	o	o	o
Size	o	o	o	o	o	o	o
High Quality Interior	o	o	o	o	o	o	o
Ease of Recycling	o	o	o	o	o	o	o
Neighborhood	o	o	o	o	o	o	o
Landlord	o	o	o	o	o	o	o
Length of Contract	o	o	o	o	o	o	o

4. If you were to start house hunting again, do you think your priorities would change?
    a. Yes
    b. No

Page 10: Future Priorities
5. What would your new priorities for house hunting be?

	How important are each of the following issues when choosing where to live from 1 to 7:						
	1 (less important)	2	3	4	5	6	7 (more important)
Cost of Rent	o	o	o	o	o	o	o
Bills are Included	o	o	o	o	o	o	o
Location (close to University)	o	o	o	o	o	o	o
Social Life	o	o	o	o	o	o	o
Size	o	o	o	o	o	o	o
High Quality Interior	o	o	o	o	o	o	o
Ease of Recycling	o	o	o	o	o	o	o
Neighborhood	o	o	o	o	o	o	o
Landlord	o	o	o	o	o	o	o
Length of Contract	o	o	o	o	o	o	o

Page 11: Energy Efficiency
6. Do you think your home is energy efficient?
a. Yes
b. No
c. Maybe

Page 12: Recycling
7. Do you recycle?
a. Yes
b. No

Page 13: Recycling Habits
8. Why do you recycle?

9. What materials do you recycle?

	How much do you recycle each of them?				
	Never	Almost Never	Sometimes	Almost always	Always
Batteries	o	o	o	o	o
Cardboard	o	o	o	o	o
Composting	o	o	o	o	o
Electronics (e.g. computer, cell phone, etc)	o	o	o	o	o
Glass	o	o	o	o	o
Metal	o	o	o	o	o
Paper	o	o	o	o	o
Opaque plastic	o	o	o	o	o
Transparent plastic	o	o	o	o	o
Printer cartridges	o	o	o	o	o

Page 14: Recycle Habits
10. Why don't you recycle?

Page 15: About Yourself
11. Are you…?
a. Male
b. Female
c. Prefer not to state
d. Other
   i. If you selected Other, please specify (optional):

12. Which institute are you studying with?
    a. Institute of Education
    b. Institute of Health and Society
    c. Institute of Humanities and Creative Arts
    d. Institute of Science and the Environment
    e. Institute of Sport and Exercise Science
    f. Worcester Business School
    g. Other
        i. If you selected Other, please specify:

13. Which year are you currently in?
    a. First year undergraduate
    b. Second year undergraduate
    c. Third and final year undergraduate
    d. Postgraduate
    e. Other
        i. If you selected Other, please specify:

14. Are you a…?
    a. UK student
    b. Non-UK student from European Union
    c. Non-UK student from outside the European Union
    d. Other
        i. If you selected Other, please specify:

15. Are you happy with your current home?
    a. Yes
    b. No
16. Feel free to elaborate on your previous answer. Your answers will be kept in the strictest confidence.

Page 16: Future Research
17. Would you like to be entered into a prize pool?
    a. Yes
    b. No

18. Would you be interested in receiving a copy of our report when it is complete?
    a. Yes
    b. No

19. If you answered YES to either of the previous two questions, please leave your name and email address here. Your address will be kept confidential, and you will not receive any spam.

Page 17: Any comments?
   20. Do you have any comments about the survey?

Thank you for your participation! Have a snack!

Appendix C: Interview questions

We are a group of students from Worcester Polytechnic Institute (WPI) in Massachusetts. We are working with the Energize Worcester project to develop a project on University of Worcester students' habits. We are conducting interviews of University of Worcester students to learn what they focus on when choosing where to live and would like to interview you on your knowledge of Students' housing choices. Your participation in this survey is completely voluntary and you may withdraw at any time. If interested, a copy of our results can be provided at the conclusion of the study.

Letting Agency: Questions marked with a "**" are questions that were asked in response to answers

1. Do you focus more on student housing or housing for the general public?
2. Do you also work with student accommodations?**
3. About how many students do you accommodate per year?
4. So can you walk me through the process a student goes through to find accommodations here?
5. Do you have a separate process for students that are looking for accommodations compared to a general customer?
6. Would you say that this approach is an entirely new marketing campaign?**
7. So, you would say that social media and email is best to contact students?**
8. What is the price range that students are offered for single room accommodations? Double rooms? Shared houses?
9. Do you have any students asking about environmental sustainability, such as insulation, recycling, or CHP, when looking for accommodations?
10. What about when bills are not included?**
11. Do you offer environmentally sustainable accommodations?
12. So it is more because sustainable accommodations are more cost efficient and reduce bills instead of students wanting to live sustainably?**
13. So do you think that environmentally sustainable options are important to advertise to students?

Sustainability Coordinator and Facilities: Questions marked with a "**" are questions that were asked in response to answers

We are a group of students from Worcester Polytechnic Institute (WPI) in Massachusetts. We are working with the Energize Worcester project to develop a project on University of Worcester students' habits. We would like to interview you on your knowledge of students' habits and recycling. Your participation in this survey is completely voluntary and you may withdraw at any time. If interested, a copy of our results can be provided at the conclusion of the study.

1. How hard is bin replacement?
2. How hard is it to log jobs for students to replace bins?
3. How long does it take to log jobs and have these jobs taken care of?
4. Are there extra bins to replace broken ones, or do you have to buy them every time?
5. How much does it cost to replace bins?
6. Is it free for students?**
7. So are students just lazy?**
8. Do you sort the recycling from students or pass it off to a contractor?
9. So what is the tolerance for poor recycling? E.g. is there a percentage allowance for wrong materials in the bins?**
10. How often do you empty battery bins/how long does it take them to fill up?

Appendix D: Full statistical analysis

Unknown Recyclers	n	1	df(n-1)	Tdf(T-table value)	σ(std. Dev.)	SE(σ/sqrt(n))	Negative	Xavg	Upper End	Lower End
Cost of Rent	68	1	67	1.67	1.18	0.14309602	-1	6.04	6.2789704	5.8010296
Bills are Included	70	1	69	1.669	1.44	0.17211292	-1	5.84	6.1272565	5.5527435
Location	69	1	68	1.669	1.21	0.14566688	-1	5.55	5.793118	5.306882
Social Life	70	1	69	1.669	1.39	0.16613678	-1	4.81	5.0872823	4.5327177
Size	70	1	69	1.669	1.48	0.17689383	-1	4.69	4.9852358	4.3947642
High Quality Interior	70	1	69	1.669	1.27	0.15179403	-1	4.69	4.9433442	4.4366558
Ease of Recycling	69	1	68	1.669	1.51	0.18178264	-1	3.13	3.4333952	2.8266048
Neighborhood	70	1	69	1.669	1.4	0.16733201	-1	3.71	3.9892771	3.4307229
Landlord	70	1	69	1.669	1.56	0.18645566	-1	4.8	5.1111945	4.4888055
Length of Contract	70	1	69	1.669	1.44	0.17211292	-1	4.73	5.0172565	4.4427435
Good Recyclers	n	1	df(n-1)	Tdf(T-table value)	σ(std. Dev.)	SE(σ/sqrt(n))	Negative	Xavg	Upper End	Lower End
Cost of Rent	10	1	9	1.833	1.17	0.36998649	-1	5.8	6.4781852	5.1218148
Bills are Included	10	1	9	1.833	1.22	0.38579787	-1	6.1	6.8071675	5.3928325
Location	10	1	9	1.833	0.9	0.28460499	-1	5.7	6.2216809	5.1783191
Social Life	10	1	9	1.833	1.1	0.34785054	-1	4.7	5.33761	4.06239
Size	10	1	9	1.833	1.27	0.40160926	-1	4.3	5.0361498	3.5638502
High Quality Interior	10	1	9	1.833	0.89	0.28144271	-1	5	5.5158845	4.4841155
Ease of Recycling	10	1	9	1.833	1.37	0.43323204	-1	3.9	4.6941143	3.1058857
Neighborhood	10	1	9	1.833	1.55	0.49015304	-1	4.3	5.1984505	3.4015495
Landlord	10	1	9	1.833	1.64	0.51861354	-1	5.1	6.0506186	4.1493814
Length of Contract	10	1	9	1.833	1.22	0.38579787	-1	4.9	5.6071675	4.1928325
Poor Recyclers	n	1	df(n-1)	Tdf(T-table value)	σ(std. Dev.)	SE(σ/sqrt(n))	Negative	Xavg	Upper End	Lower End
Cost of Rent	6	1	5	1.943	1.11	0.4531556	-1	6.33	7.2104813	5.4495187
Bills are Included	6	1	5	1.943	1.34	0.54705271	-1	5.83	6.8929234	4.7670766
Location	6	1	5	1.943	0.69	0.28169132	-1	6.17	6.7173262	5.6226738
Social Life	6	1	5	1.943	1.41	0.57563009	-1	5	6.1184493	3.8815507
Size	6	1	5	1.943	1.46	0.5960425	-1	5.83	6.9881106	4.6718894
High Quality Interior	6	1	5	1.943	1.34	0.54705271	-1	4.83	5.8929234	3.7670766
Ease of Recycling	6	1	5	1.943	1.91	0.77975423	-1	3	4.5150625	1.4849375
Neighborhood	6	1	5	1.943	2.11	0.86140389	-1	3.17	4.8437078	1.4962922
Landlord	6	1	5	1.943	1.57	0.64094982	-1	5.17	6.4153655	3.9246345
Length of Contract	6	1	5	1.943	1.11	0.4531556	-1	5.33	6.2104813	4.4495187

This is the raw data from question 12 from our survey as well as the values from our Student t-test. A t-test is a statistical analysis method to determine averages with corresponding error values at a certain confidence level. In accordance with our goal, we were not able to draw conclusions for the students' priorities between the students that have been determined to have good recycling habits and the students that have been determined to have poor recycling habits. This analysis specifically pertains to the students' rating of their priority level of ease of recycling. Although we focused our data analysis on this subject, we also analyzed the general rating responses for all three of the groups for every question. While analyzing we used a 90% confidence interval, since this is a value often used by statisticians to account for the error with small sample sizes.
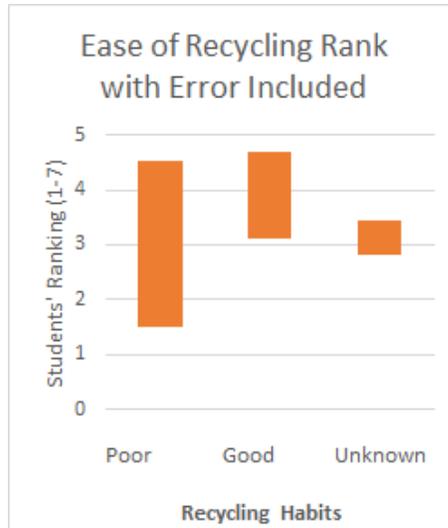
Figure 11: The Ease of Recycling rating of Students with poor, good and unknown recycling habits with the error included. The mean of the data is the center of the bar and the error is the extent of the bar.

Recall that students were asked to rate their priorities when looking for a new accommodation on a scale of 1 to 7, with 7 as most important. The above graph depicts the range that the true mean values for each group could be in. This graph in particular includes only the students' rating for ease of recycling as a priority. We are confident that there is a 90% chance that the true mean for the students with poor recycling habits is 3 +/- 1.515. We are also confident that there is a 90% chance that the true mean for the students with good recycling habits is 3.9 +/- 0.794. We are furthermore confident that there is a 90% chance that the true mean for the students with unknown recycling habits is 3.13 +/- 0.303.

The reason we cannot derive conclusions on the different average ratings between the good and poor recyclers is because the error is significantly large. This causes the range of potential averages to overlap. We cannot derive conclusions because we are confident that there is only a 58.8% chance that the true mean for the good recycling students is greater than the true mean for the poor recycling students. We will not use this data to compare the two different groups, because under the guidelines of a good statistical analysis, we should have at least an

80% confidence level. This is the standard we will be using, as it would provide small allowances for error, but not enough so that the data is skewed.

The reason we do not have a high enough confidence level is because of our small sample size. Although we had a good response rate, we did not have a significant number of overall responses. The response rate for the students that were determined to have good recycling habits was 10 out of 40 students. The response rate for the students that were determined to have poor recycling habits was lower, at 6 out of 46 students.

Although we determined that we could not definitively conclude anything about the difference between the two experimental groups because of small sample sizes, we do not have enough confidence in the error to say that there is no difference between the groups. Around the 50% threshold is the gray area for confidence levels, so we cannot statistically determine if the experimental groups rated ease of recycling differently or similarly.

Front Page

Decide on a CLEAR FOCUS

It is important not to tackle too much. Oftentimes campaigns fail because they try to solve too many issues.

Create:

DIRECT GOALS **CLEAR PLANS**

Know exactly what you plan to do. Understanding your approach and breaking it down into small steps are keys to success

Communicate

Your team is key. Tell them your plans and allow them input and feedback.

Furthermore, tell the students what you have achieved and plan to accomplish.

BE TRANSPARENT

Types of Learning:
Different people learn in different ways

- Auditory: *Some people learn through sound*

- Visual: *Others learn through visuals*

- Kinetic: *Still others learn through action*

1 **2** **3**

It is important to engage all types of learners.

Success on a College Campus

Make it EASY!
Make it CONSISTENT!
Make it FUN!

- Set up booths at big events
- Hand out giveaways to get students interested
- Relate the topic to students' lives
- Explain why the topic matters