CAMPUS SUSTAINABILITY EFFORTS: A STUDY OF THE LONG-TERM IMPACT OF COLLEGE AND UNIVERSITY SUSTAINABILITY PROGRAMS ON GRADUATES

by

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Abstract

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Campus Sustainability Efforts: A Study of the Long-Term Impact of College and University Sustainability Programs on Graduates

Dissertation directed by Dr. Marcus Winters

The topic of this study is a new approach to understanding the effectiveness of campus sustainability efforts at American colleges and universities. A series of national sustainability organizations rate effectiveness of these programs, but a large scale attempt has not occurred to measure whether any lasting pro-environmental effects exist after students graduate. This research also tested two parameters of the Theory of Planned Behavior using campus sustainability ratings to confirm a relationship to pro-environmental attitude, and to determine whether perceived control had a level of significance with sustainable behaviors, for which a relationship has not previously been found. Alumni were surveyed from 61 colleges and universities in 24 states. Their responses were analyzed to determine whether graduates from campuses rated higher in sustainability tended to engage in sustainable behaviors more often at work than alumni from colleges and universities with lower ratings in sustainability. The findings indicated that alumni from higher rated HEIs did not have greater tendencies toward pro-environmental attitudes or behaviors. Perceived control was found to be significant regarding pro-environmental behaviors. However, a weak to moderate relationship was identified those attending higher ranked Sierra Club Cool schools, and those with higher perceptions of the impact of college, reported more pro-environmental behaviors at work.
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CHAPTER I

INTRODUCTION

Damage to the environment continues at an alarming rate. Although over 50% of Americans have viewed the quality of the environment as poor or fair from 2000 to the present, an increasing number are neutral or unsympathetic to the environmental movement (Dunlap & Saad, 2014). Between August 2014 and August 2015, 38 cases were filed by the EPA against US corporations and 58 criminal violations were formally identified (US Environmental Protection Agency, 2015).

According to the Global Reporting Initiative, a non-profit organization that developed environmental guidelines and metrics used by thousands of organizations around the world, despite increased environmental reporting by companies, the negative impacts on the environment continue to increase. More raw materials are consumed, increased pollution and ecosystem contamination are prevalent (Global Reporting Initiative, 2015).

Additionally, executives who were surveyed regarding environmentally friendly decisions stated that those decisions primarily enhanced their company’s reputation and public image (Bonini & Bove, 2014). As business decisions that impact the environment are made at every level in organizations, the pro-environmental decisions and behaviors are important to understand (Dilchert & Ones, 2012). This chapter discusses sustainability terminology, the progress of
sustainability in industry, the role of sustainability efforts at universities, and the importance of this study.

Universities train and educate 21 million students who will soon enter the workforce (U.S. Department of Education, 2014). Hundreds of these institutions have embarked on missions to create more sustainable campuses. Several measures are utilized to rate the campus programs, but they do not assess the long-term impact of college initiatives on students’ behaviors and attitudes subsequent to graduating. Only a few campus leaders have begun to seek a better understanding of the impact of their environmental initiatives; and the examination process is only in its infancy (Humes, 2013). Green Mountain College has referred to its long-term influence as authentic sustainability ("Alumni Impact," 2014). “The most powerful renewable energy resource these campuses generate is freshly educated young people. And colleges crow that instilling eco-literacy — teaching youths about the state of our planet — will put us on the right path. Will it though?” (Andrews, 2013, p. 3).

Overall, it is unclear whether the efforts made by institutions of higher education across the country are having a lasting effect. It is unknown whether sustainable education at colleges and universities is actually sustainable.

An extended literature search to investigate the long-term impact of sustainability education at colleges and universities revealed a significant gap in both scholarly and popular literature. No evidence of generalizable studies was discovered. The findings of Andrews (2013) and Humes (2013) emphasized the infancy of the research, with data that was informal, at best. “Only a few universities
gauge where their environmental curriculum makes a difference after students graduate” (Andrews, 2013, p. 1).

Humes (2013) found only three colleges that were beginning the research process. Oberlin College plans to conduct a sustainability specific alumni survey in 2015. Green Mountain College added pro-environmental behavioral questions to their alumni survey to determine authentic impact ("Alumni Impact," 2014), although the results have not been published in scholarly or popular literature. Prescott College identified the effort as challenging and reported no quantitative results (Humes, 2013).

A quantitative study examining student responses regarding the impact of their college and university sustainability education programs can benefit campus leaders who are working to instill pro-environmental attitudes and behaviors. A comparison between the categories of campus ratings and benefits reported from students and alumni would provide information to campus leaders in prioritizing strategies and for the development of curriculum and teaching methods. Organizations that wish to promote sustainable behaviors among their employees may find the information to be useful and valuable. Campus administrators, faculty, students, and environmental organizations also may benefit from a study of this type.

Overall, it is unclear whether the efforts of higher education institutions will be long lasting or sustainable education is genuinely sustainable. The purpose of this paper is to better understand universities’ attempts to shape an eco-friendly society that acts in ways benefitting the environment through student and employee decisions that affect global ecosystems. By an examination of the current campus measures
relative to environmental behaviors, a frame of reference can be obtained on the success of various efforts, from which suggestions and recommendations can help to set goals and track progress.

This study examines current university efforts based on mission statements, office of sustainability purposes, surveys, and ratings by national organizations. Additionally, surveys were conducted to compare sustainability ratings with graduates' perceptions of their campus sustainability efforts on their own environmental behaviors. The intent of this research is to better understand the aspects of college sustainability programs that lead to a positive, long-term impact on individual actions as leaders and employees in organizations in the US.

**Environmental Sustainability, Education for Sustainable Development, and Pro-environmental Behavior Defined**

Although challenging, changes are essential in order to improve the environment for future generations. The existence of multiple definitions of sustainability further compounds the issue. One definition claimed that “sustainability encompasses renewable energy sources, conservation, recycling, environmentally friendly land development, water management and waste disposal” (Emanuel & Adams, 2011, p. 81). Another definition often used in college campus sustainability statements comes from a report from the Brundtland Commission: "Sustainability is defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987, p. 1). The University Leaders for a Sustainable Future (ULSF) defined sustainability as the “critical activities of a college or university that are ecologically sound, socially just
and economically viable, and that they will continue to be so for future generations” (ULSF, 2009, p. 1).

Ehrenfeld (2000) gave a broader definition of sustainability, including a strong call to action and the need to protect the environment for future generation:

Ways of living in which individuals, firms and governments, and other institutions acting responsibly take care of the future as if it belonged to them today, in equitably sharing the ecological resources on which the survival of the human and other species depends, and in assuring that all who live today and in the future will be able to satisfy their needs and human aspirations. (p. 36)

The Ehrenfeld definition is used in this study, as it assigns responsibility to all individuals and it satisfies both human needs and aspirations. This definition allows for economic progress and a desire to meet the needs of future generations.

The Agenda 21 program of the United Nations developed the original concept of sustainable development to describe the proposed methods of sustainability practices (United Nations, 1992). In 1987, an international group of experts and politicians created the Brundtland (1987) report that defined sustainability as “meeting the needs of the present generation without compromising the ability of future generations to meet their needs” (p. 1). However, sustainability is more than recycling or an incremental tactic. In order for true sustainability to exist and flourish, it needs to be considered as part of long-term strategic thinking. The highly consumptive nature of American society must be evaluated to better understand the need to recycle, to reduce consumption, and to reuse materials on a regular basis. Decision makers and concerned citizens must lead and mentor society in making substantial changes to protect the environment and to solve interrelated issues that impede significant improvements (Shriberg, 2002). Shriberg (2002) stated that the
most important advantage of sustainability is the potential to mobilize individuals, groups, and organizations to drive environmental change through strategic, integrated, and overarching thinking. Internalization of such integrated thinking will lead to behaviors and actions that dramatically improve the health of the planet.

Colleges and universities play a pivotal role in the promotion of sustainability. Institutions and their leaders can contribute to a paradigm shift to help young adults alter their thinking toward a more sustainable and brighter future. Universities can develop appropriate approaches to overcome the complexity of the world’s sustainability challenges (Caeiro, Azeiteiro, & Filho, 2013). Education can facilitate integration into the current systems of conformity, and it can help to critically observe the world and find ways to transform the earth (Freire, 2000).

Another important sustainability term for the purposes of this study is Education for Sustainable Development (ESD). The term encompasses an educational concept to help students and adults understand the achievement of the goals of sustainability (Caeiro et al., 2013). The concept of ESD became institutionalized as Agenda 21 as the United Nations gained recognition. In the proceedings, the role of education to teach and instill sustainability was included (United Nations, 1992). A 1997 report by the United Nations Educational, Scientific and Cultural Organization (UNESCO) emphasized the importance of reorienting education in order to address all aspects of ESD (UNESCO, 1997). The United Nations in 2005 stressed that educational institutions measure and monitor sustainability’s progress on their campuses, which led to additional assessments and progress reports at universities (Tilbury, 2011).
Pro-environmental behavior includes 14 construct labels and encompasses a number of categories and several definitions. However, Stern (2000a) developed a means with which to categorize environmentally significant behaviors. The definition of environmentally significant behavior is understood by its impact – the extent that such behavior can change material or energy availability or alter ecosystems (Stern, 2000b).

**What are Companies/Industries Doing for the Environment – Is it Enough?**

The 1972 Stockholm Conference created the United Nations Environment Programme designed to protect human health and the environment from pollutants caused by humans (United Nations, 1972). One reason for a commitment to the environment includes the rising population on earth (2.532 billion in 1950, 6.896 billion in 2010, and 9.306 billion projected for 2050) (Cleland, 2013). The link between population growth and damage to the environment translates into dramatically larger demands on the planet’s resources (Weiss, 1992). Energy consumption has increased by 30% from 1970 to 1988, while carbon dioxide released to the atmosphere from fossil fuels has more than doubled. Pesticide use in the US doubled from 1961 to 2010 and has led to groundwater contamination in 40 states (Weiss, 1992). Deforestation led to a reduction of an additional 135 million hectares, or 333.45 million acres of forest cover between 1990 and 2010 (Adams, 2012).

Conflicting evidence exists among company executives regarding the benefit to their organizations of pro-environmental actions. A study by Bonini and Bove
(2014) indicated that most CEOs pursue pro-environmental options, primarily for the purpose of image. However, research conducted in 2010 by the Society for Human Resource Management (SHRM) examined 728 human resource professionals and revealed a different conclusion, indicating that 80-90% viewed sustainability as a method for attracting and retaining top employees. The SHRM study found that 46-49% of CEOs and members of boards of directors considered sustainability to be a business practice of great importance. Conversely, perspectives from managers and non-managers were quite different in their ratings of sustainability. Twenty-six percent of managers and only 17% of non-managers viewed sustainability as very important. In addition, 7-8% of executives viewed environmental sustainability as important, but only 10% of managers and 21% of non-managers described sustainability efforts in this way (Jackson, Ones, & Dilchert, 2013).

Findings from the Jackson et al. (2013) study indicated that mid to lower level employees may be less involved in decisions regarding sustainability; they may have less control over sustainability initiatives and programs in their organizations (Jackson et al., 2013). An SHRM study conducted a year later revealed that 67% of those primarily responsible for implementing sustainability were in upper management. Only 12% were employee taskforces or committees (Schmit, Fegley, Ese, Schramm, & Tomassetti, 2012). The Schmit et al. (2012) study also raised the question regarding the long-term impact of their backgrounds and experiences. Many managers, and possibly some non-managers, likely attended a college or university. Of interest is whether their educational background adequately contributed to their
formation of an opinion on the importance of environmental sustainability subsequent to completing their higher education.

The 2014 McKinsey report demonstrated that executives worldwide recognized environmental issues as important to businesses. According to McKinseyquarterly.com, executives are working to address these issues. “Executives at all levels see an important business role for sustainability. But when it comes to mastering the reputation, execution, and accountability of their sustainability programs, many companies have far to go” (para. 1). A perceived challenge to company executives is that of reputation management. A large proportion of executives continually assert that reputation is the main reason their companies tackle the issue of sustainability. Of 13 core business activities about which McKinsey inquired, business leaders stated that reputation was the most value potential for their companies. Improved costs and alignment to goals also are increasing in importance (Bonini & Bore, 2014; Bonini & Gorner, 2011).

Image drives environmental action for many executives. In light of the drain on the environment, one may hope that improvement of the environment for future generations is the key driver for becoming more environmentally friendly.

Comparing companies with the most effective sustainability programs (our sustainability “leaders”) with others in their industries highlights another obstacle: incorporating sustainability into key organizational processes, such as performance management, one area where the leaders report better results than others. Beyond strong performance on processes, the leaders share other characteristics that are keys to a successful sustainability program — among them, aggressive goals (both internal and external), a focused strategy, and broad leadership buy-in…. CEOs are twice as likely as they were in 2012 to say sustainability is their top priority. Larger shares of all other executives also count
sustainability as a top three item on their CEOs’ agendas. (Bonini & Bore, 2014, p. 1)

In order for sustainability to become more significant and to attain its full potential, a prerequisite is its integration into the core business processes of each company (Bonini & Bore, 2014).

**Barriers to Sustainability Within Companies**

Companies that have taken positive environmental actions frequently mentioned environmental issues along with implementation strategies. “Accountability is an increasing concern: 34% of executives (compared with 23% in 2011) say too few people at their companies are accountable for sustainability. At companies that aren’t pursuing sustainability activities, respondents continue to cite a lack of leadership prioritization as the top challenge to taking action” (Bonini & Bore, 2014, p. 1).

The increase in distress to and within the environment continues, despite university efforts to teach students. “…graduates leave college to begin lives that generally contribute to, rather than mitigate, a growing array of environmental and social problems” (Uhl & Anderson, 2001, p. 36). At the time that today’s graduates reach middle age, the world population will have increased by 33% and waste production will have doubled (Uhl & Anderson, 2001). Future employees trained at universities across the country will need to make the changes required to reverse the trends in environmental damage. For Earth’s citizens, “the time has come for the concept of sustainability…to become a new central organizing focus for higher education” (Uhl & Anderson, 2001, p. 36). Despite the call to action 14 years ago by
Uhl and Anderson (2001), it appears that the impact of colleges and universities on future leaders has yet to reach the executive offices.

**Perceptions About the Environment**

“An expanding array of individuals and institutions acknowledges that present patterns of resources use by individuals and institutions, and the allocation of resources across societies, pose significant threats to maintaining our present well-being and preserving the prospects of future generations” (Litten & Newport, 2004, p. 3). Despite this recognition, concern for and behaviors to improve the environment are declining. According to research by Gallup in March 2014, 42% of Americans believe global warming is exaggerated. Americans appear to show less concern over the environment over time (Dunlap & Saad, 2014). Another Gallup poll conducted in April 2014 revealed that climate change and the environment are prioritized by Americans near the bottom of a list of concerns. Americans tend to worry more about economic issues and healthcare. Environmental issues generally are ranked low, but the current placement of environmental concern is even lower than in past studies (Riffkin, 2014). *Gallup.com* has conducted surveys since 2002 on Americans’ perceptions of the environment. The first question on the survey asked, “How would you rate the overall quality of the environment in this country?” Responses over the past 13 years are shown in Figure 1.
Figure 1. **How would you rate the overall quality of the environment?**


Although the gap is closing, more than 50% of Americans continue to feel that the quality of the environment is fair or poor. Based on the research of Bonini and Bove (2014) and Gallup, CEOs are making more appropriate environmental decisions, but primarily to improve their organization’s reputation. It appears that the majority of Americans worries about the environment, but does not exhibit behaviors to improve its condition. Opinions differ among executives as to their reasons for concern relative to the environment (image vs. improving the environment). Furthermore, 2014 data from Gallup indicated that 50% of Americans felt the quality of the environment had worsened.

The second Gallup question was, “Thinking of the environment, do you think of yourself as an active participant in the environmental movement, sympathetic
towards the movement, but not active, neutral, or unsympathetic toward the environmental movement?” The proportion of neutral or unsympathetic Americans has grown since 2004, active participants have remained relatively the same; and sympathetic, but not active Americans, has decreased from 55% to 42% (see Figure 2).

Figure 2. Perspectives on the environmental movement in the U.S. Responses of random sample of Americans, conducted by Gallup.com from 2002 to 2014. Adapted from “Only one in four Americans are anxious about the environment,” by R. E.Dunlap and L. Saad, 2014. Retrieved November 11, 2014, from http://www.gallup.com/poll/content/loginaspx?ci=1801

Educational practices within organizations, including higher education, may not be making an impact on environmental sympathy. Campus sustainability efforts officially began with the Talloires Declaration in 1990 (see Appendix A). Considering that campus sustainability education has had a lasting impact, the proportion of Americans who are sympathetic to or are active participants in the
environmental movement would increase, and those who are neutral or unsympathetic would decrease.

**Importance of the Study**

The concept of sustainability forms the basis for analyzing attitudes and behaviors of individuals and influences that cause them to act and commit to initiating changes to improve the environment. Company executives surveyed by McKinsey (2014) have encouraged sustainability in their organizations. This represents positive progress, but the strategic rationale is to improve company image and reputation. Improving the global environment is not the key driver motivating the behavior among corporate leadership (Bonini & Bove, 2014). According to Gallup, more than half of American consumers view the quality of the environment as fair or poor, yet less than 20% consider themselves as active participants in the environmental movement. The proportion of Americans who are neutral or unsympathetic toward the environment has risen from approximately 30% over a decade ago to nearly 40% in 2014 (Dunlap & Saad, 2014).

Americans possess adequate and accurate knowledge regarding the state of the environment, but the drive and initiative to take action and change anti-environmental behaviors is lacking. Research that has analyzing pro-environmental knowledge, attitudes, motivations, and behavior indicated that knowledge of the environment has little to no impact upon environmental behavior (Kollmuss & Agyeman, 2002).

Overall, it is unclear whether the efforts of higher education institutions will be long lasting or sustainable education is genuinely sustainable. The purpose of this paper is to better understand universities’ attempts to shape an eco-friendly society.
that acts in ways benefitting the environment through student and employee decisions that affect global ecosystems. By an examination of the current campus measures relative to environmental behaviors, a frame of reference can be obtained on the success of various efforts, from which suggestions and recommendations can help to set goals and track progress.

This study examines current university efforts based on mission statements, office of sustainability purposes, surveys, and ratings by national organizations. Additionally, surveys were conducted to compare sustainability ratings with graduates’ perceptions of their campus sustainability efforts on their own environmental behaviors. The intent of this research is to better understand the aspects of college sustainability programs that lead to a positive, long-term impact on individual actions as leaders and employees in organizations in the US.

**Role of Colleges and Universities on Individual Behavior Based on Environmental Sustainability**

Colleges and universities can be viewed as microcosms of society. Most campuses include housing, food service, waste management, retail shops, recreation, entertainment, and transportation. The challenges facing U.S. cities and towns are reflected through similar issues faced by higher education institutions (Cole, 2007).

When colleges reinforce sustainability practices, apply their knowledge, and showcase projects such as energy reduction, high efficiency buildings, reduced water usage, alternate energy sources, and recycling, as well as utilize the campus as a living laboratory for sustainability, their graduates would enter the business world with deeper appreciation and determination to implement these practices. Higher
education institutions are on a path to becoming leaders of sustainability actions and development. They are in a unique position to develop leaders of the future, and “campus organizational conditions provide an atmosphere conducive to sustainable leadership” (Shriberg, 2002, p. 4). However, Shriberg (2002) observed a reluctance of universities around the world to integrate environmental issues into curricula, services, research, and processes. When students initially arrive on campus, often between the ages of 18 and 22, many have left home for the first time. They experiment, explore, wonder about their own values, forge new friendships, and think about the way in which they will live their lives. They also establish new patterns of behaviors that become the basis for living their lives and approaching lifelong learning. Therefore, campuses are compelled to demonstrate tangible experiences and examples of sustainability, from energy efficiency to recycling (Thomashow, 2014).

Uhl and Anderson (2001) proposed nine techniques for developing sustainability milestones. Fossil fuel independence has been discussed, as most universities continue to rely exclusively on fossil fuels for campus energy. Usage can be reduced by installing more efficient lighting, higher quality insulation in buildings, window improvements, and heating and cooling system changes. The State University of New York, Buffalo, implemented these changes and reduced energy usage by 20 million kilowatts between 1982 and 1999.

Universities have taken steps toward reduction in energy consumption and examination of alternative energy sources, thus creating an example to students on reducing fossil fuel consumption. Uhl and Anderson (2001) also recommended that campuses reduce water consumption and materials waste, purchase food produced
through sustainability initiatives, demonstrate responsible land stewardship, find and utilize efficient transportation alternatives, create “green” buildings, and guarantee ecological literacy among students, staff, and faculty.

A new generation of ecologically responsible adults can become socially responsible citizens. American universities can create a “new model for living – one that is highly energy efficient, produces little or no waste, supports regional economies, engenders an abiding respect for life and fosters bonds among all members of the community of life” (Uhl & Anderson, 2001, p. 42).

For purposes of this study, recent college graduates and current university students were surveyed in order to understand the impact of their higher educational institution on their environmental decisions and actions. “The time has come for the concept of sustainability to become a new central organizing focus for higher education” (Uhl & Anderson, 2001, p. 36). The authors emphasized the need to rethink values and reeducate society to make decisions and act in ways that preserve the environment for future generations. Administrators and educators are experiencing increasing pressure to address campus practices that may be detrimental to the environment (Cole, 2007).

Scope of Environmental Behaviors and Attitudes of College Students and Graduates

In his book, Earth in Mind, David Orr (2004) observed that the best caretakers of the planet and those who lived the most sustainably were the least formally educated, and most were illiterate. Being well educated in a formal setting does not guarantee “decency, prudence or wisdom” (p. 8). Perhaps education should be
evaluated on the contributions of alumni to the health and well being of others now and in the future. College students and new graduates face a staggering challenge. Each day, 15 million tons of carbon dioxide is released into the atmosphere from fossil fuel emissions. Rain forests are demolished, with losses in acreage the size of the state of Washington. Desert space as large as West Virginia encroaches on agricultural land. Current students and graduates will need a moral compass to reverse negative environmental trends in order to make the world more habitable. According to Orr, the educational system may not guide them, but education can help to instill the courage and determination they will need in the future.

Five hundred and forty colleges and universities have committed to environmental responsibility as members of the American Association for Sustainability in Higher Education, and 252 report sustainability results through the STAR’s initiative (AASHE) (2014). Over 300 have signed the Talloires Declaration, have agreed to reduce the environmental footprint of higher education institutions, and have recognized the need to teach and encourage students to embrace sustainability (Shriberg, 2002), of that 169 are American colleges and universities (University Leaders for a Sustainable Future)(2015). The Princeton Review Complete Guide to Green Colleges (2015) identified 353 green colleges in the most recent issue. Additionally, 685 college and university presidents signed the American College and University Presidents Climate Commitment, with 539 with submitted climate plans to achieved carbon neutral campuses (ACUPCC, 2015). The Sierra club scored colleges and universities out of 1000 points and ranked them each year. In 2014, 173 colleges and universities were identified and ranked (Sierra Club, 2014).
Several campus sustainability rating systems exist, including the Global Reporting Initiative for Higher Education, AASHE’s STAR’s ratings, the National Wildlife Federation’s State of the Campus Environment, University Leaders for a Sustainable Future’s Sustainability Assessment Questionnaire, and the Princeton Review’s acknowledgement of top universities in sustainability. Tracking whether or not a college or university signed the Talloires Declaration or the ACUPCC Climate Commitment are also metrics to indicate college commitment to the environment. In addition, Dilchert and Ones (2012) have developed an assessment tool for environmental behaviors entitled the Green Five Taxonomy. Despite the existence of evaluation systems and critiques of rating systems, little to no research has examined the rating system relative to the desired sustainability behaviors of young adults who have been exposed to the programs. This raises the question of the existence of a relationship between the ratings of colleges’ sustainability efforts and the behavioral outcomes of students and graduates.

**Conclusion**

Humans are the dominant force to determine the future health and well being of Earth’s inhabitants, with a force comparable in its disruptive power to an ice age or a major asteroid collision (Thomashow, 2014). It is now time to embrace new ways of living and thinking about the environment. “History has clearly shown that education is the most appropriate way to promote critical thinking that ultimately empowers people to address matters of both local and global concern ultimately developing solutions for sustainable development” (Amador & Oliveira, 2013, p. 76).
Institutions of higher learning can become a driving force and catalyst for change. Colleges can combine environmental efforts with student involvement and buy-in in order to achieve a positive environmental effect through sustainability strategies (Uhl & Anderson, 2001). “What is education for if not to play a fundamental role in how our society moves forward in meeting its many challenges?” (Uhl & Anderson, 2001, p. 36).

College sustainability efforts are judged by credible, nationally recognized organizations. As such, do those ratings predict the degree of environmental behavior desired by the colleges and universities? If colleges are not influencing behaviors of current students and recent graduates, how well are they preparing an entire generation to live in and improve the damaged world that they will inherit?

U.S. institutions of higher learning seek to educate and influence millions of young minds. This study is important, as little evidence exists that compares the relationship between college sustainability ratings and efforts of environmentally responsible behavior. If a relationship is not found, the rating systems should be reexamined and retooled. This study offers insights for those leaders in higher education and sustainability organizations who help to guide and reinforce sustainability initiatives across college campuses. Finally, this study emphasizes to higher education and industries the importance of a strong understanding of environmental behavior among individuals, in order to better understand their environmental actions and decisions.
The review of the literature discusses the research to date regarding sustainability, higher education’s role, progress, measurements, and impact on pro-environmental behavior.
CHAPTER II

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

This chapter summarizes the history of the sustainability movement, particularly among colleges and universities. Research is reviewed relative to sustainability efforts and individual behaviors at American higher education institutions and companies. The literature review establishes the basis for the Theory of Planned Behavior as the theoretical framework for the current study. Finally, this chapter also contains the rationale for the study, gaps in the literature, limitations, and conclusion.

History of the Sustainability Movement

Protection and concepts of renewable resource management have vacillated for centuries. The Roman Empire, with its continuous population and technology expansions, depleted their rich natural resources and experienced an ecological breakdown that crushed its society. The scenario repeated itself in multiple civilizations around the world for thousands of years, from Sumeria and ancient Egypt, to pre-Columbian North America and Easter Island, in which inhabitants prospered by exploiting natural resources until they could no longer sustain their populations. This led to the eventual decline and collapse of each society (Ponting, 1993).
The actions of industry and the impact of humans have caused more destruction than protection of the environment (Simon, 1995). Since 1800, 4693 million acres of the earth’s land have been deforested. This represents 32% of all worldwide forests (Earth Policy Institute, 2014). Two World Wars and the Great Depression were key crises for most individuals during the first 50 years of the 1900s. As a result, most environmental damage was ignored for decades. After World War II, a number of significant, human caused environmental disasters occurred around the world and spurred a debate on whether the costs and benefits of industrial development were appropriately balanced.

Major industrial damage to the environment continues, despite decades of educational efforts at institutions of higher education to bring greater awareness and sensitivity to the environment, as early as 1972 with the Talloires Declaration. In Nigeria, hundreds of oil spills from petroleum drilling caused tremendous damage to the water supply and agriculture that “dwarf the Deepwater Horizon disaster in the Gulf of Mexico in 2010” (McCulloch, Frantz, Geringer, & Minor, 2012, p. 146). Between 1976 and 1996, 4,647 oil spills occurred and left 2,369,470 barrels of oil in the environment. Oil spills destroyed large areas of the mangrove ecosystem along the Nigerian coast. Fresh water in nearby villages remains contaminated and unsafe for consumption.

A Texaco oil spill in 1980 led to the deaths of 180 people due to the hazardous pollution of the waterways (Nwilo & Badejo, 2006). In 2007, a Canadian gold mining company left its Costa Rican open pit gold mine after a massive landslide released significant amounts of heavy metals into the fragile ecosystem that contains 5% of all
the world’s plant, animal, and insect species (McCulloch et al., 2012). In the nearby town of Las Juntas de Aburgares, standing water is yellow with toxic chemicals, and the nearby river has 800 times the normal level of cyanide that was used in the gold extraction process (Isla, 2002). This led Costa Rica to ban open pit gold mining in 2010 (Ching, 2014). Evidence of the impact of pollution on human health was explained by data from a report by the World Health Organization (2014) indicating that seven million deaths occurred in 2012 from air pollution caused by industrialization.

The question arises relative to actions that can be taken by individuals, employees, or students to mitigate or prevent continued environmental problems. As these problems continue to persist, one can ask why individuals are not behaving in a more environmentally sensitive manner. "For the first time in recorded human history, levels of carbon dioxide in the atmosphere have surpassed 400 parts per million (ppm), according to data released from the National Oceanic and Atmospheric Administration (NOAA) from the Mauna Loa Observatory in Hawaii” (Rice, 2013, p.1) Carbon dioxide levels were approximately 280 ppm in the 18th century. During the Industrial Revolution, humankind began releasing large amounts of carbon dioxide into the atmosphere through the burning of fossil fuels (Rice, 2013). Carbon dioxide and other “off” gases produced by oil, gas, and coal extraction processes, stabilization, and combustion are increasing the greenhouse effect, releasing excess carbon dioxide into the atmosphere. This is leading to global warming that is expected by 2030 to result in the earth being the warmest in 120,000 years (Grubb, 1990). The challenge is for current and future employees to become more exposed to,
and take ownership of, sustainability concepts, techniques, and behavioral models in order to influence and change environmental practices at their places of employment.

**History and Growth of Sustainability in Higher Education**

Colleges and universities are in a better position to understand the strategic advantages of changing sustainability with their facilities, curricula, and mission statements (Cole, 2007). Some of the foremost reasons cited for implementing sustainability initiatives include building on previous organizational changes; the global nature of environmental issues; fossil fuel exhaustion; human health concerns due to poor environmental quality; and instability created by combined social, environmental, and economic factors (Cole, 2007; Hitchcock & Willard, 2006).

President Jean Mayer of Tufts University led a 1990 international conference of 22 university leaders in Talloires, France, during which the Talloires Declaration was created and signed by over 300 higher education institutions, including 86 American universities (Litten & Newport, 2004). The declaration was the first formal statement written and signed by university leaders who committed to sustainability in institutions of higher education (Wright, 2002). The document was intended to drive commitment among university leadership to push for environmental change at institutions of higher education in order to make positive change in the global environment. Colleges and universities play an important role in the education, research, policy creation and adherence, and communication needed in order that goals can be attained (Wright, 2002). An additional commitment by administrators is the American College and University President’s Climate Commitment (ACUPCC).
A national pledge signed by over 650 institutions, its commitments include formats for campus infrastructure, curriculum, and further study of sustainability (ACUPCC, 2015).

David Orr, Professor of Environmental Studies at Oberlin College, reinforced the issue of commitment by stating, “Imagine colleges and universities with a commitment to operate so they do not undermine the integrity, beauty, and stability of the world their students will inherit” (Eagan & Keniry, 1998, p. 6). Commitment is a useful approach for developing appropriate sustainability standards. The protocols for operating a more sustainable campus will serve as the basis for modeling daily life practices, from energy conservation to growing local foods. The subsequent behaviors of students, faculty, and staff also must be the subject of study and deliberation, particularly relative to the reasons that certain actions are more effective than others (Thomashow, 2014).

Colleges can impact both the environment and students, particularly by integrating more environmentally sustainable principles throughout the organization (Cole, 2007). Increased college enrollment improves the opportunities for universities to influence students regarding the environment and to instill pro-environmental actions. The number of students enrolled in degree-granting institutions rose by 11% between 1991 and 2001, and increased by 32% from 15.9 million to 21.0 million over the next decade. The growth was greater among full-time students. More important, the percentage of students ages 18 to 24 increased from 36% in 2001 to 42% in 2011. “A function of degree granting institutions is to provide students with an education as
they assume their role as citizens in an increasingly globalized world” (Cole, 2007, p. 1).

Institutions of higher education are uniquely positioned and chartered to instill sustainability among students, including sustainability issues, solutions, available resources, and techniques in order to gain a deeper understanding about environmental sustainability. Colleges and universities can and should educate students, conduct research on issues of sustainability, and encourage effective solutions and citizenship. The three million employees at colleges and universities can demonstrate and teach by offering examples of effective and efficient utilization of resources and waste reduction (Litten & Newport, 2004).

Cortese (2003) agreed that higher education institutions have a strong moral responsibility to instill awareness, skills, and values that will contribute to a sustainable future for the environment. Higher education “prepares most of the professionals who develop, lead, manage, teach, work in, and influence society’s institutions” (p. 17). However, higher education curricula has changed little since the 1950s (Orr, 2004) “The skills, aptitudes, and attitudes necessary to industrialize the earth are not necessarily the same as those that will be needed to heal the earth or to build durable economies and good communities” (p. 27).

**Role of Sustainability in Higher Education**

A growing concern for the environment emerged among institutions of higher education in the 1970s. Leaders and researchers began to realize that the continued degradation of the environment would undermine further economic success. With the
signing of the Talloires Declaration in 1990, a significant emergence began concerning the commitment of colleges and universities to contribute in a positive way toward environmental improvements (Clugston & Calder, 1999). “Universities educated most of the people who develop and manage society’s institutions. For this reason, universities bear profound responsibilities to increase the awareness, knowledge, technologies and tools to create an environmentally sustainable future” (ACUPCC, 2007).

The Talloires Declaration was followed by two commitments, the Halifax Declaration and the Luneburg Declaration. The Halifax Declaration emphasized cooperation and commitment, while the Luneburg addressed actions and provided more structure on implementing sustainability programs (Dade, 2010). Universities were criticized for making commitments to sustainability, but with few actions (Thompson & Green, 2005). The Declaration required 10 actions from the signers:

1. Increase awareness of environmentally sustainable developments
2. Create a culture of sustainability on campus
3. Educate students for responsible citizenship
4. Foster environmental literacy
5. Practice ecology at institutions
6. Collaborate between disciplines
7. Involve all campus stakeholders
8. Enhance capacity at K-12 schools
9. Increase outreach across the nation and the world
10. Maintain the movement
The ACUPCC (2007) is the most recent signed commitment to environmental concerns by higher education institutions. By signing the document, administrators agreed to address greenhouse emissions at their institutions, to implement two or more short-term actions that demonstrate commitment to the document, to establish targets and timelines for becoming climate neutral, and to publish regular reports detailing goals and activities (Dade, 2010). By 2008, three fourths of the signatory institutions were in good standing with their agreement to the ACUPCC.

"Sustainability implies that the critical activities of a higher education institution are at a minimum, ecologically sound, socially just and economically viable, and that they will continue to be so for future generations“ (University of Scranton, 2014, p. 1). A college or university that is thoroughly sustainable needs to emphasize these ideals in the curriculum and research to better prepare students to positively contribute as working citizens to an environmentally sound and socially fair society. Institutions of higher education need to work as a sustainable community, with responsible food and energy usage, and by supporting positive values and ideals in the neighboring communities (University of Scranton, 2014).

Leaders in higher education should determine whether the education they provide helps students to know how to restore and maintain the environment, as well as the purpose of learning at each institution …to become successful in their careers, or in a broader context of being successful in their careers and contributing to positive change in the environment to help humanity in future generations. Universities and colleges are criticized for separating the applied from the theoretical, emphasizing
manipulation, and providing expertise for an unsustainable world economy (Clugston & Calder, 1999).

Today’s educational institutions should educate and graduate environmental problem solvers and adults who seek environmental stewardship. Students and faculty can help their institutions to become living laboratories for the study of resource utilization, environmental waste and hazards, and environmentally sound business practices (Cole, 2007). Education also can challenge sustainability. Historically, education has rarely challenged the prevailing paradigms and interests of business and government. Universities tend to educate for economic growth and profitability. Due to this long lasting approach of higher education, with minimal concern for the environment, today’s generation must address centuries of problems that could have been prevented (MacFarlane & Pgazon, 2011). Business schools serve as a major force in developing future leaders for the 21st century business world. Unfortunately, some of the most well-known and largest business schools do not integrate sustainability concepts into the teaching of business (MacFarlane & Pgazon, 2011).

Research into the effectiveness, or lack of effectiveness, of college and university sustainability efforts is important, as few studies exist that compare highly rated programs with the long-term impact on student and graduate behavior. Without positive environmental behavior, education and knowledge about the current state of the environment will not improve the conditions that are experienced today or in future generations.

Analysis of Higher Education Mission Statements and Office of Sustainability Purpose Statements
Colleges and universities take pride in their legacies and are serious about their missions. They tend to be the longest lasting institutions in their respective communities. Responsibility falls to these institutions to consider that which their students will do and decide in the decades to come. They are mission-driven and place value on the way in which they communicate their missions (Thomashow, 2014).

The National Wildlife Federation developed a Campus Ecology program and conducted a survey entitled The State of the Campus Environment: A National Report Card on Environmental Performance and Sustainability in Higher Education (McIntosh, Cacciola, Clermont, & Keniry, 2001). The survey was conducted at two- and four-year institutions, of which 21% included environmental responsibility in their academic mission statements, and 34% educated students on environmental responsibility or planned to add similar verbiage in the future (Rowe, 2002). This is not altogether promising, however, as the Talloires Declaration was dedicated almost 25 years ago, and many institutions have not yet added environmental sustainability language to their mission statements.

Nearly 680 higher education institutions joined the Association for the Advancement of Sustainability in Higher Education (AASHE) as STARS members and submitted reports. “The Sustainability Tracking, Assessment & Rating System (STARS) is a transparent, self-reporting framework for colleges and universities to measure their sustainability performance” (AASHE, 2014, p. 1). In order to better understand the declarations of institutions regarding their key purposes for their institution and sustainability offices, an examination was conducted on the mission
statements and office of sustainability purpose statements of a sample of institutions of higher education. Each school was assigned a number, and a sample was determined using a random number generator for values between 1 and 680. An analysis was conducted on the key words of a random sample of 60 mission statements on the college and university websites from the member directory listed on the AASHE website. A review was performed of their campus suitability purpose statements from the college websites. The statements were inserted into a Word document and pasted into a qualitative analysis tool, tagCloud (http://www.tagcloud.com/).

The 50 most used words for college mission statements are summarized using the qualitative analysis tool. A review of 60 randomly selected mission statements revealed that many incorporated the importance of knowledge, public service, diversity, and linking theory and practice. Ball State University’s mission begins with a reference to students becoming global citizens and references sustainability by stating that their graduates will learn to share the world with others. “In the 21st century, college graduates need to be prepared to live as global citizens. They will need to acquire knowledge of the diverse people with whom they share this world” (Ball State University, 2014, p. 1).

The 60 college and university mission statements most frequently referenced students, community education, learning, programs, committed, knowledge, arts, diverse, provide, world, research, and development (see Figure 3). Several of these may contribute toward the long-term impact on knowledge and learning for
individuals and character development, including foster, cultural, diverse, excellence, integrity, liberal, professional, service, society, and support.

Offices of sustainability goal statements most often utilized the following 10 words: sustainability, environmental, campus, commitment, community, development, students, programs, initiatives, and energy (see Figure 4). Words in the sustainability statements expressed more specific thoughts regarding action, climate, environment, future, generations, goal, initiatives, and meet.

![Figure 3](image)

*Figure 3. Most common words in university mission statements. Most highly used words from a random sample of American colleges and universities, conducted by the researcher in October 2014.*

The goals of sustainability programs and of campus mission statements indicated missions with dedication to students’ character and sustainability program goals that emphasize change and action. Many spoke of projects and specific environmental objectives, including a minimal carbon footprint. Student involvement
was noted in many of the statements, and others mentioned a three-way approach that included a combination of curriculum and knowledge, research, applied projects, and community involvement. Hofstra University in Hempstead, New York, is an example of an office of sustainability statement that incorporates all of these elements. It encourages participation, involvement, and suggestions for improvement. “Hofstra University has a longstanding commitment to sustainable practices and the study, care and preservation of the environment.

![Figure 4. Most common words in University Office of Sustainability purpose statements.](image)

Most highly used words from a random sample of American college and university office of sustainability purpose statements, conducted by the researcher in October 2014.
Through its Office of Sustainability, degree programs, and research efforts, Hofstra continues to play an important role as a steward of the environment. If you have suggestions, ideas or a question about Hofstra's sustainability practices and environmental stewardship, please send them via email” (Hofstra University, 2014, p. 1).

Frequently used words that were common in both statements included committed, community, development, education, environment, faculty, learning, programs, provide, research, responsible, social, state, and students. This indicates the way in which colleges and universities have demonstrated a commitment to influencing the development of individuals to become responsible and socially aware graduates, as well as the potential for sustainability efforts to impact future generations. However, none of the most commonly used words in the mission statements mentioned the need to develop students for future generations, sustainability, or the need for action. Higher education, in general, succeeds in equipping the nation with a world-class workforce in order to compete in a global marketplace, with the opportunity for job growth and advancement. In order to reduce the trend of harmful gas emissions, deforestation, climate change, and industrial catastrophes, students need to know how to responsibly conserve energy and resources, use all forms of energy wisely, reduce waste and pollution in industrial processes, and attempt to repair the damage to the earth over the past 200 years of industrialization (Orr, 2004).
Measuring Campus Sustainability Efforts

Institutions of higher education have the opportunity to change their facilities and operations as both users and owners of the facilities and processes. It also is important that colleges and universities teach sustainability, research solutions to environmental issues, and demonstrate sustainability. Higher education institutions have an important role in implementing sustainability on their campuses and measuring progress on achievement of sustainability goals and initiatives (Robinson, 2004). Measurements can help universities by establishing baselines, measuring trends, and creating timelines (100 years out is suggested). Measurement also can help institutions to balance economic and societal/environmental measures and communicate to others the benefits from their progress (Robinson, 2004).

Sustainability measures are prolific, but tend to be implemented at a country-by-country basis (Ramos & Caeiro, 2010). Meta-analyses have been conducted to compare the measures used by each nation. The studies indicated that the majority of measurements were most efficient as a set, and assessment tools worked best when tailored for specific uses (Lyytimäki & Rosenstrom, 2008). In addition, most American colleges and universities are measured through the use of tools developed in the United States. As such, U.S. measurement tools were utilized in this study.

Assessing Sustainability on Campus
Table 1 presents a list of organizations that measure and report on the environmental efforts across college campuses. Also included are the criteria used by each organization to evaluate the effectiveness of campus programs.

**Table 1 National Sustainability Organizations’ Assessment Tools for Colleges and Universities**

<table>
<thead>
<tr>
<th>Assessment Organization</th>
<th>Assessment Tool</th>
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<tbody>
<tr>
<td>AASHE</td>
<td>STARS</td>
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<tr>
<td>Princeton Review</td>
<td>Guide to Green Colleges</td>
</tr>
<tr>
<td>University Leaders for a Sustainable Future</td>
<td>Sustainability Assessment Questionnaire</td>
</tr>
<tr>
<td>American College and University Presidents Climate Commitment</td>
<td>Climate Action Plan, Carbon Neutrality Date</td>
</tr>
<tr>
<td>Sierra Club</td>
<td>Cool Schools</td>
</tr>
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</table>

**AASHE STARS Assessment.** AASHE is a member-based association of colleges and universities with a mission to empower and support higher education efforts to improve and transform sustainability. AASHE provides resources, professional development, and a network of support to assist higher education organizations in becoming role models that promote sustainability in all aspects of their processes, including leadership, operations, research, and education. Higher education has recognized its public responsibility to educate students, to provide research that fuels the economy and strengthens communities, and to model the behaviors that contribute to a just and more civil society. Recently, higher education institutions also have recognized their important role in moving to a more sustainable
future, a future that will provide prosperity while ensuring that the next generations have resources to meet their needs.

AASHE provides campuses with a comprehensive tool, the Sustainability Tracking, Assessment and Rating System (STARS). Created with contributions from many students, staff, faculty, and administrators and drawn from a broad range of higher education organizations, STARS was designed to assist in the measurement of progress toward greater sustainability. STARS was developed by and for colleges and universities and assesses curricula, research, operations, strategic planning, and institutional capacity. It is a standardized tool that allows for benchmarking with other colleges and universities, as well as a method of observing and tracking trends.

**American College and University President’s Climate Commitment (ACUPCC).** The first step to the commitment is having the HEI president sign the climate commitment. The statement states that colleges and universities must demonstrate leadership on campus and in the community to reduce carbon emissions. It also states that the signatory schools are committed to providing graduates educated in environmental stewardship by providing appropriate skills and knowledge. Being a signatory school commits the university or college to develop a carbon neutrality date in a climate action plan while submitting progress reports to ACUPCC. HEI’s are provided with publications, webinars, videos, articles, case studies and external resources, including support and information from AASHE and the National Wildlife Federation (American College and University Presidents' Climate Commitment. 2015).
**Princeton Review Guide to Green Colleges criteria.** The Princeton Review announced its Green Rating values based on data obtained through a survey of colleges and universities. In 2007, the Princeton Review developed the Green Rating criteria with non-profit, eco-America, to identify three broad categories:

- Whether the students have a campus quality of life that is both healthy and sustainable
- How well the school prepares students for future employment and citizenship in a world defined by many environmental challenges
- Overall organizational commitment to environmental issues

The survey included questions regarding the schools’ energy use, recycling, food, buildings, and transportation, as well as academic offerings and sustainability related action plans. The Princeton Review modified the data collection process in 2012 in a collaborative effort with AASHE, Sierra Magazine, and the Sustainable Endowments Institute (SEI). The goal was to streamline and standardize reporting of sustainability progress for participating institutions.

**Sierra Club Cool Schools.** The Sierra Club rates colleges and universities on 11 categories of sustainability. Participation in Sierra Magazine's Cool Schools ranking is open to all four-year undergraduate colleges and universities in the United States. Campus administrators participated by completing an extensive questionnaire on the AASHE STARS website about their school's sustainability practices. Schools were required to submit complete, up-to-date data to be eligible for each year's rankings. Sierra received 162 complete responses from qualified colleges. Once schools had submitted their data, researchers scored each response and ranked each
campus. No cost was required of participants, and the Sierra Club or its employees had no influence on the ranking process. The US has over 2,000 four-year colleges and universities. Many with environmental efforts may not be on the list. The ranking provides a guide for prospective students by which to compare colleges based on environmental efforts and commitment. However, it may not provide a complete picture due to the lack of full participation.

**National Wildlife Federation (NWF) State of the Campus Environment measures.** The three overarching goals addressed by the NWF include campus management systems, curricula, and operations. Within management systems, the presidents’ module addresses campus mission statements, goal setting and review, written policies, training, accountability mechanisms, staffing, and incorporation into planning. An assessment of the provost addresses curricula and faculty. Operations examine waste reduction, purchase of recycled materials, energy conservation, landscaping, and transportation. In order for schools to be identified as exemplary, they must accomplish positive results in each area (McIntosh et al., 2001).

**University Leaders for a Sustainable Future Sustainability Assessment Questionnaire.** The Sustainability Assessment Questionnaire was developed between 1999 and 2001 by the University Leaders for a Sustainable Future (ULSF), with input from stakeholders in many areas. It has been envisioned as an assessment tool and an educational instrument, particularly relative to the meaning of sustainability for higher education. ULSF sought to encompass a definition of sustainability that included social, economic, and environmental dimensions (ULSF, 2014).
Comparisons of Organizational Assessment Criteria in Higher Education

The campus sustainability tools fall into five broader categories. Some tools are present in all five categories, while others fall into fewer groupings (see Table 2).

The five topic areas are identified as follows:

1. Student, campus, public, and community involvement
2. Involvement
3. Research
4. Curriculum
5. Campus sustainability improvements, leadership, and modeling of environmental projects
Table 2  Categories of Questions Asked by National Sustainability Organizations

<table>
<thead>
<tr>
<th>Category</th>
<th>AASHE STARS</th>
<th>NWF State of the Campus Environment</th>
<th>Princeton Review Guide to Green Colleges</th>
<th>Sustainable Endowments Institute Sustainability Green Card</th>
<th>University Leaders for a Sustainable Future Sustainability Assessment Questionnaire</th>
<th>ACUPCC Climate Action Plan, Neutrality Date</th>
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<td>Outreach</td>
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<td>Student/</td>
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<tr>
<td>Community</td>
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<tr>
<td>Involvement</td>
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<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Research</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Curriculum</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Operations</td>
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<tr>
<td>College</td>
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<tr>
<td>Leadership in Community and Society in Sustainability Modeling</td>
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</tbody>
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The AASHE STARS rating system and the Sustainability Assessment Questionnaire from the ULSF cover four areas of sustainability, with the goals of incorporating sustainability and environmental literacy as identified in the Talloires Declaration (ULSF, 2014). The existing tools that are currently used will be assessed on effectiveness and long-term effects in the Methods and Results section, at which time the ratings of each school are compared with surveys completed by students and recent graduates who rated their sustainable behavior and perceptions of the impact of their college sustainability experience on their current environmental actions.
Issues with Current Campus Sustainability Measures

The categories of measures are represented in Figure 5 (Cortese, 2003), which is the traditional model of areas of sustainability for colleges and universities.

Cortese (2003) suggested that the four areas of sustainability measurement should focus more on the way in which each area interacts and becomes a fully integrated system (Figure 6).

Additionally, none of the tools categorize whether the timeframe for the measures is for current or future orientation. They tend to focus on numbers and rankings (Caeiro et al., 2013). Universities that conduct sustainability research also could measure whether alternate options are offered that favor the future or present (Lukman, 2010). Sustainability science has attempted to conduct more practical problem-solving approaches and to create new visions of future natural and social well being for the population (Miller, 2013). Cortese’s model points out the importance of all five aspects of university sustainability efforts, and the theoretical
framework for this study incorporates these variables as influences on attitudes that impact environmental behaviors.

Research into education for sustainable development has indicated that ESD should address the following five categories:

1. Promote and improve lifelong learning that includes knowledge, skills, and values important for improving citizens’ quality of life
2. Rethink and reformulate education
3. Raise awareness about sustainability
4. Train the workforce to better understand sustainability
5. Integrate sustainability into the curriculum

The assessment measures summarized from each of the sustainability organizations do not specifically address these educational topics in their measurement of the educational portion of the tools. Workforce training lacks many of the necessary measurement tools (Laessoe et al., 2009; Wals, 2009).

The tools do not measure student, faculty, and staff behavior, as well as the link between knowledge and action. The way in which individuals may be motivated to demonstrate sustainable behavior also is not addressed. Despite data on the state of the environment and knowledge and concern for the environment, as stated in the Gallup research, if society is unconcerned about the state of the environment, “denial of the threat is rather tempting” (Mulder et al., 2013, p. 29). This may be best described using the concept of cognitive dissonance theory (Cooper, 2007). Risks will be realized in later decades, such as climate change and depletion of fossil fuels,
allowing individuals an opportunity to deny the problems and hope that someone else will solve them in time (Mulder et al., 2013).

In order to adopt more environmental habits, individuals need choices that offer positive, rather than sacrificial, results (Hartig, Kaiser, & Bowler, 2001). Positive factors include greater autonomy; quality time with which to interact with others; time spent in nature; and opportunities for self-growth, creativity, and development (Deci, Vallerand, Pelletier, & Ryan, 1991). Unfortunately, traditional higher education lacks autonomy, in which students spend time in structured, prearranged formats. Intrinsic motivation tends to be a more effective, long-term motivator; yet, the sustainability measures used by organizations are externally based, and none measure intrinsic behavior (Mulder et al., 2013).

Sustainability education appears to resonate among only those students who previously have shown interest. For others, the state of the environment can be distressing or depressing. Mulder et al. (2006) identified four ways of motivating students toward intrinsically positive behavior regarding the environment: humor, autonomy, innovation/creativity, and real-life problem solving. The type of learning that is problem based has been shown to create conditions that are ideal for learners (Segalàs Coral, 2009).

Despite higher education’s commitment to multiple declarations over the past decades, data have indicated that they fail to reach many of the staff, faculty, student body, and stakeholders. It is doubtful whether the current sustainability efforts are impacting the culture at colleges and universities (Tilbury, 2011). A study of Canadian universities demonstrated that a major problem with sustainability efforts
was poor communication between students, faculty, staff, and stakeholders regarding their sustainability-based decisions. It follows that most of those involved with campus life, activities, and policy are unaware of many of the environmentally positive decisions and efforts occurring at their schools (Fonseca, Macdonald, Dandy, & Valenti, 2011).

National organizations’ current measures of sustainability include a category that examines curriculum. Effective education on sustainability should combine life skills with theoretical learning, going beyond lectures, and reading texts in order for the students to internalize the processes and to develop new habits (Thomashow, 2014). Current measures need to emphasize more effective learning. Thomashow (2014), former president of Unity College, observed that the most effective sustainability education provides hands-on experience in living, learning, and designing a sustainable campus. To this end, little measurement occurs relative to the way in which students and graduates live and make decisions about the environment. A need exists to better understand this behavior in order that long-term benefits of campus sustainability efforts can be efficiently managed in the future.

Finally, sustainability measures should link positive business outcomes to environmental stewardship. In a study by Thomas (2005) that measured buy-in of business students for social responsibility, results indicated that efforts need to be viewed as legitimate or as contributing to a win-win scenario, combining profitability with sustainability.

The criticisms of current sustainability measures are useful for purposes of this study in order to comprehend the degree of impact of rated campuses in
sustainability on students and graduates. It also would allow for the determination of a causal relationship between rating scores and student and graduate perceptions and behaviors. Those programs with less of these elements could have a more significant impact on student and graduate sustainability outcomes.

**Students’ Viewpoints of Sustainability at Universities**

Faculty attitudes, models, and case studies from college experiences may shape students’ thinking and may impact or constrain their actions long after they graduate and assume managerial and executive positions (Thomas, 2005). Azjen (1991) developed a general theory of planned behavior illustrating that attitudes contribute to intent, which can predict behavior when an absence of constraints diminishes an individual’s sense of control or efficacy. A key point of this model was that the individual must, not only have pro-environmental attitudes, but also must learn personal control from earlier experiences, such as academic preparation, and hold a cultural bias toward the environment.

In a situation in which an individual works in an environment that promotes short-term profit maximization, such an attitude might inhibit the desire to champion sustainability when that individual has attained a position of authority. This was confirmed by a study in 1996 by Shelton, in which it was found that an individual’s inability to convince upper management regarding economic benefits of environmental actions was the largest roadblock to managing environmental health and safety.
A follow-up study by Miller (1998) indicated that upper management continued to believe that environmental management was a nuisance, rather than an effective company strategy. In order for sustainability to be well integrated into managerial decision-making processes, both undergraduate students and business managers must be persuaded that sustainability is a legitimate business issue (Thomas, 2005).

Students, and ultimately managers and executives, must believe that sustainable decisions will help their organization, they are the “right” thing to do, and they simplify the decision-making process. Additionally, these groups must perceive that their peer groups endorse environmental decisions as well. Authority figures, teachers, and bosses must be seen as advocates who authorize decisions related to increased sustainability (Thomas, 2005). Findings from the Thomas (2005) research indicated that business students must perceive legitimate educational benefits to implementation of sustainable decisions, which would reduce ambivalence when they become managers in the workplace. College faculty must find ways to demonstrate perceived legitimacy and buy-in to a mindset of environmentally sustainable decision making when the graduates have joined the workforce.

**What Drives Sustainability at Institutions of Higher Education?**

In a Canadian study of universities, results indicated that economic development, social equity, and education in sustainability were the most influential drivers for achieving sustainability. Other variables that demonstrated less
significance were health and safety concerns, energy requirements, institutional enhancement, and interest in research and development (Waheed, 2011).

**Sustainability Measurement Effectiveness Outside of Academia**

The manner in which measures of sustainability can bring change to campuses or direct organizational or cultural mindsets, education, research, and societal impact are not well known (Ramos & Pires, 2013). The impact of sustainability indicators has not been thoroughly examined or understood on college campuses; however, the adage, “What gets measured gets done,” has been effective in corporate sustainability efforts. Despite environmental issues and disasters, organizations are making inroads into sustainability, and the effective use of measurements has been cited as important to the success of their efforts.

A study of the energy industry in Australia emphasized the importance of measuring and communicating energy usage through the utilization of several measures (Terry, 2009). Alcoa’s success in sustainability began in the 1990s with an effective measurement plan. Management set ambitious goals, measured their progress, and publicly reported results (Roper, 2006).

**Research on Sustainability in the Workplace**

The role of individuals within business organizations is a topic on which little research has been published. An SHRM study conducted in 2011 among human resource professionals revealed interesting information on sustainability in the workplace (Schmit et al., 2012). The research examined the current state of
sustainability in companies, individuals’ understanding of sustainability, that which motivates an organization, and the role of leadership. Students, academics, and international employees were deliberately omitted from the sample. A finding from that study revealed that 72% of those surveyed indicated their organization engaged in types of sustainable work practices. According to the study, 51% of the respondents claimed that sustainability efforts were driven by contributions to society or the environment, and 23% noted financial reasons for sustainability programs. Methods to demonstrate commitment included organizational goals and mission statements, Intranet and website communication, annual reports, individual performance goals, and training.

A variety of factors influence the perspectives of organizational leaders relative to sustainability. Multinational companies lean toward sustainability in global terms. Smaller organizations have, in some cases, made sustainability a priority, such as focusing on local sourcing. All need to examine the factors that influence pro-environmental behaviors at their businesses (Schmit et al., 2012). This research will determine factors that influence college graduates’ pro-environmental behaviors, as well as the influence of past experiences in college or work environment on their sustainability behavior.

**Theoretical Framework**

The Theory of Planned Behavior (Azjen, 1991) applies to environmental behavior, as seen in a study published in Advances in Consumer Research that investigated the way in which individuals translate attitudes toward the environment
into sustainability behavior (Dahab, Gentry, & Su, 1995). The model made the assumption that motivation is caused by the desire to avoid punishment and to seek rewards. Decision making is guided by an evaluation of the possible consequences of the outcomes, and attitude is an indirect determinant of behavior by more directly influencing intent. Perceived behavioral control (PBC) is an additional factor that impacts behavior. PBC is an estimate of an individual’s ability to perform a task or behavior. Social norms impact behavioral intent, examples of which are perceived social pressure and the fear of social exclusion (see Figure 7).

![Figure 7. Azjen’s Theory of Planned Behavior.](image)


The manner in which individuals translate knowledge, attitudes, and social considerations into behavioral intent may depend upon the impact of prior behavior, the perceived effort to act more environmentally responsible, and the social norms
surrounding an individual (Dahab et al., 1995). College experience can influence and mold prior behavior, reduce efforts required to act environmentally, teach methods for removing barriers, and create a culture of sustainability. Modeling of behavior can be translated into the workplace as students matriculate. Research has indicated that prior actions are important in recycling decisions (Dahab et al., 1995).

**Components of Model – Knowledge, Attitudes, and Behaviors**

Each national sustainability organization measures environmental sustainability that contributes to attitudes and can minimally, or at best, indirectly contributes to environmental behaviors. A 2014 study by Gallup indicated that a lack of formal education clearly is not a factor in the failure of Americans to be more concerned about global warming. Those who attended college, or who hold a postgraduate degree, are no more concerned than those without a degree (Newport, 2014). Aspects of college sustainability efforts that have been measured by the Sierra Club, ULSF, and AASHE include sustainability experience, knowledge about the environment, concern for the environment, and environmental awareness, which incorporate the four elements in the Ahmad, Bazmi, Bhutto, Shahzadi, and Bukhari (2014) model as influencers of pro-environmental attitudes.

Results are mixed concerning the long-term impact of education alone on students. In an article examining the environmental impact of colleges on students after they graduate, Andrews (2013) found that very few colleges measure the impact of curriculum. However, anecdotal evidence has demonstrated that the
environmentalism knowledge and information that surrounds students on campus tend to be retained after graduation.

The long-term effects of ethics education have been studied by researchers. Colleges and universities have exerted considerable efforts toward ethics education, in response to concerns about unethical behavior in the workplace among graduates. Many colleges require an ethics course to address this problem. A study conducted by Peppas and Diskin (2001) analyzed the impact of higher education on a specific topic and its impact on students subsequent to college. Comparisons may be drawn between the impact of college knowledge and attitudes on behavior, and conclusions may be inferred about the impact of sustainability education. Results are mixed relative to the impact of ethics education on college student attitudes. Several studies, including a 2½ year longitudinal study, have indicated that a single course on ethics had no significant impact on students’ attitudes toward ethics (Luoma, 1989; Wynd & Mager, 1989). Long-term exposure to business experiences was more effective than formal education in bringing about attitude changes in students. In a four-year longitudinal study, Glenn (1992) found contradicting results that teaching ethics had a positive impact on students’ ethical judgments. A survey conducted by Peppas and Diskin (2001) indicated no impact on ethical values from ethics courses. The researchers found a need for further research on the impact of subjects that are taught, the manner in which they are taught, and the length of time between the course and the survey in order to better understand the impact of ethics courses on students.

The model used for the current study, based on the research by Ahmad et al. (2014), incorporates factors in addition to knowledge, including experience with
sustainability, concern for the community, and environmental awareness. The addition of these variables may increase the impact on attitude and, ultimately, on behavior.

**Students’ Attitudes about the Environment**

In a global study conducted in 2004, 52% of respondents agreed with the statement that protecting the environment should be prioritized over economic growth and job creation (World Values Survey, 2004). According to a study by the Pew Research Center for the People and the Press (2004), 74% of G7 nations placed environmental protection above economic growth, despite the possible consequence of losing positions. Attitudinal surveys have demonstrated a willingness to accept a trade-off between economy and environment. In a 1995 study by Inglehart, Basanez, Diez-Medrano, Halman, and Luijks (2000), 62% of citizens would support an increase in taxes to improve the condition of the environment. Sixty-nine percent of citizens around the world identified their country’s laws as inadequate for protecting the environment (GlobeScan, 2002).

When consideration is given to behavior, global citizens demonstrate behaviors different from their attitudes. Household consumption is one method of determining the way that environmental values and attitudes are translated into behaviors. Household consumption in 2002 occurred within the range of 60% to 82% of country GDP (Leiserowitz, Kates, & Parris, 2004). One course of action that could be taken is to educate consumers in dematerialization, which is a process in which consumption can be modified toward less energy and material demanding methods
(Wernick, Herman, Govind, & Ausubel, 1996) Consumption mirrors affluence; therefore, as less developed countries have increased in relative wealth, in energy efficiencies gained by various producers, and growth in population, affluence has increased at a faster rate than by conservation methods (Leiserowitz et al., 2004). Another example of consumer attitudes, as opposed to consumer behaviors, is indicated by car ownership worldwide that increased from 86 per 1000 in 1993 to 113 per 1000 in 1997 (U.S. Environmental Protection Agency, 2004).

Nations with higher GDPs reported personal implementation of more efforts to conserve water, recycle, and choose products that were perceived as better for the environment. Sixty-seven percent of individuals from high income countries chose “green” products, while 30% of lower income citizens agreed to purchase “green” products (Leiserowitz et al., 2004). Forty-four percent of consumers from wealthier nations were more likely to pay an additional 10% for a more environmentally friendly vehicle, but less willing (28% of respondents) to pay 10% more for gasoline, if the money was used to reduce air pollution. Approximately half of the worldwide respondents viewed consumption and commercialism as threats to human culture and the environment, yet large majorities in both developed and developing countries found spending money to be one of their greatest pleasures (Leiserowitz et al., 2004).

Evidence has indicated that values and attitudes often do not directly translate into actual behavior for individuals and groups (Kollmuss & Agyeman, 2002). Survey research in the US found the citizens maintained strong concerns and values for the environment, with particular attention to climate change. However, the environment consistently ranked low on prioritization of national issues (Leiserowitz
et al., 2004). In another study conducted in 2001 by Gallup, the environment was rated as the least important national issue, with climate change ranking 12 out of 13 (Dunlap & Saad, 2001). Trends continue in the low prioritization of climate concerns.

A Gallup poll based on phone interviews was conducted in March 2014, using a random sample of 1,048 adults over the age of 18 in all 50 U.S. states and the District of Columbia. Americans were found to have a low level of concern regarding global warming, as compared with other environmental issues. Global warming has continued to rank last among Americans' environmental worries with all Gallup surveys on this topic since 1989. Concern about pollution of drinking water generally has been at the top of the list, which may indicate that environmental issues that are most personal tend to become the largest concern for Americans (Newport, 2014).

**Subjective norms.** Individual concern for, and knowledge of, the global environment may not overcome contextual issues such as community norms. In fact, some social contexts may discourage environmental actions. Pro-environmental action should be encouraged to increase individuals’ efforts to act in a more sustainable way, such as recycling efforts (Derkson & Cartrell, 1993). Social influence was found to be a pervasive influence on recycling behavior among 348 adults living in the western United States. Jackson, Olsen, Granzin, and Burns (1993) found that friends had the greatest effect on recycling behavior, followed by “others,” and then family members. However, the way in which these social influences were communicated was unclear in the study. In another study of recycling behavior, social
context played a role (Derkson & Gartrell, 1993). When a recycling program was highly visible, widespread in the community, and viewed as socially desirable, the norm for recycling was more likely to become accepted. The Derkson and Gartrell (1993) study to better understand recycling behaviors in Canada indicated that the link between environmental attitudes and sustainable behaviors emerged only when social contexts were included in the analysis.

Colleges and universities can be vital links for students by promoting and advocating sustainability, and by making it part of the campus culture. Institutions of higher education essentially are microcosms of society and can become a fresh, diverse, and dynamic example of living sustainably. Students can experience the benefits of a cleaner and less energy dependent culture that can influence their actions that affect the quality of life, wildlife, environment, and living standards for society in the future (MacFarlane & Pagazon, 2011).

**Environmental Behavior Compared with Attitudes and Knowledge**

Learning outcomes for students can be achieved in two ways. An empowerment perspective focuses on teaching students to become critical thinkers. The second is to focus on behavior modification (Vare & Scott, 2007). Both approaches focus on experiential learning and behaviors, and both lead to effective education in sustainable development (Læssøe et al., 2009). Each method complements the other (Vare & Scott, 2007), and research has indicated that sustainability education can be improved by linking theory and real-life problems (Barth & Michelson, 2013).
Psychological research has indicated that several other factors can impact behavior. The additional areas of influence include contextual support, such as the campus or business environment; action difficulty; and habitual behavior (Arbuthnott, 2008). The Theory of Planned Behavior should be adapted for application in sustainability behavior. If attitude changes are to be translated into pro-environmental behaviors, education must extend beyond attitudes and incorporate context, barriers to action, and overcoming barriers in order to help students develop new habits.

A theoretical framework developed by Bamberg and Moser (2007), based on a meta-analysis of research on responsible behavior, adapted Azjen’s Theory of Planned Behavior (TPB) and incorporated additional factors that impact behavior similar to those suggested by Arbuthnott (2008). Bamberg and Moser’s model was revised by adding internal attribution, feelings of guilt, and moral norms to the TPB model and allowed for the findings from the researchers that pro-environmental behavior is best viewed as a combination of self-interest and pro-social motives. This concept fits well with the research by McKinsey (2014) that indicated company image to be a key driver in pursuing pro-environmental policies by company executives. The self-interest factor and pro-social motives relate to the desire of executives to enhance company image (Dunlap & Saad, 2014). Americans are highly interested and supportive of sustainability as a means to improve the natural conditions of the planet.

**Moral norms.** Studies have shown that moral norms impact pro-environmental behavior, including energy conservation (Black, Stern, & Elworth,
1985) and pro-environmental buying (Thorgersen & Olander, 2006). A study by Hines, Hungerford, and Tomera (1986, 1987) found a correlation of $r = 0.33$ between a feeling of moral obligation toward environmental preservation and sustainable behavior. Awareness and knowledge of environmental problems are seen as precursors to moral norms (Bamberg & Moser, 2007).

**Perceived control (PC).** The definition of perceived behavioral control refers to an individual’s perception of his or her ability to perform a given behavior (Azjen, 1991). When determining behavioral intent, individuals take attitudes and moral norms into account, as well as their ability to perform that behavior (Bamberg & Moser, 2007). A 2002 study by Kals and Maes of environmental behavior and emotions revealed the importance of removing barriers for individuals to allow them to make decisions that are more favorable to long-term ecology. One key finding demonstrated an inverse factor of PC. Individuals who are more indignant about insufficient political decision making regarding sustainability were found to be more likely to demonstrate pro-environmental behavior. The investigators learned that shifts in cost-benefit outcomes had a positive impact on behavior, which strengthened the argument that perceived behavioral control is an important factor to consider when influencing sustainability behavior. The Ahmad et al. (2014) model described perceived control as infrastructure availability, costs, and time required to initiate pro-environmental behaviors. Questions regarding control are identified in Chapter III.

Perceived ethical climate within organizations was shown to influence green employee behaviors (Biga, Ones, Dilchert, & Gibby, 2010). An employee’s feelings about his or her company’s values relative to the environment may impact the
perceived control of each person on the workplace. Research by Ahmad et al. (2014) found no significant relationship between perceived control and recycling behavior, but a significant relationship was noted between each of the other factors identified in the model (see Figure 8). This study tested their findings on the relationship between perceived control and behavior with the hypothesis that no relationship exists.

Behavior intent is influenced by knowledge, attitudes, and moral and subjective norms as well as perceived control. Figure 8 illustrates the theoretical framework, and further rationale is included for its designation as the model for this study.

This model is a modification of the Theory of Planned Behavior (TPB), based on recycling behaviors described in a study of college students in Pakistan (Ahmed et al., 2014). The model accounts for a more balanced approach to education, measured and implemented by universities in the STARS measurement program, and is utilized
by ULSF and the Sierra Club. The combined model allows for findings that knowledge does not directly influence behavior, but indirectly affects behavior through an impact on attitude. The study led to the development of this model and is utilized as the theoretical framework. However, this study broadens the model to incorporate sustainability behaviors, which incorporate recycling and other pro-environmental behaviors as described in the survey questions. For these reasons, this model is the basis for the current study.

**Sustainability and Students**

A 2011 study by Emanuel and Adams of college students in Alabama and Hawaii validated the Bamberg and Moser (2007) model. The research, conducted in 2007, was intended to better understand student knowledge, attitudes, and behavior about sustainability. It was organized around three questions that were developed using focus group interviews:

1. Are students concerned about the present/future?
2. What do students know about sustainability?
3. Who is responsible for sustainability?

Regarding the question on whether the students are concerned about the future, 69% of Alabama college students and 85% of Hawaiian students were concerned about wasteful consumption of natural resources and pollution. Knowledge about sustainability was much lower. Twenty percent of the students from Alabama and 19% of the Hawaiian students stated that they knew a great deal about the environment. The third question involved responsibility for sustainability.
More than half, 56% from Alabama and 68% from Hawaii, agreed or strongly agreed that everyone in the university should support creating and implementing pro-environmental solutions on campus (Emanuel & Adams, 2011).

Despite the high proportion of students with attitudes and knowledge about environmental issues and expressed concern about the environment, behavior and behavioral intent responses were lower. Recycling was the exception, particularly among students in Alabama. In Hawaii, 83.8% of students said they recycled, compared to 38% from Alabama. Use of environmentally friendly products was 51.4% and 32.6%, respectively. Use of energy efficient transportation was 19.6% for students from Hawaii and 16.3% for those from Alabama (Emanuel & Adams, 2011).

One explanation for students from Hawaii having higher scores in each sustainability category may be that Hawaii was ranked as the 4th greenest state by Forbes when the study was conducted in 2007, and Alabama was ranked 48th (Wingfield & Marcus, 2007). Students from Hawaii were more likely to possess more environmentally favorable social and moral norms, due to the higher rankings for sustainability within the state. The fact that recycling is higher for both groups of students indicated that Perceived Behavioral Control (PBC) was stronger due to the presence of recycling bins on campus and greater availability of environmentally friendly products in recent years.

A question about behavior intent – “I do NOT feel I need to change any of my current energy use practices” (Emanuel & Adams, 2011, p. 88) – reflected differences between students from both schools. The percentages of those who strongly agreed with the statement were 10% from Hawaii and 26% from Alabama. Seventy-two
percent of Hawaiian students strongly disagreed, and 53% of those attending Alabama colleges strongly disagreed. When students were asked about the individual who was responsible for creating a sustainable campus, the majority of students from both states either agreed or strongly agreed that the entire university community should support sustainable activities. This question of internal attribution indicated the value of personal commitment to sustainability. Questions were posed regarding knowledge, intent, and behavior, and indirect questions were related to the elements of the Ahmad et al. (2014) model. The surveys did not inquire about the impact of campus sustainability efforts. Collecting information from alumni regarding the effect of their college experiences on them as independent adults and members of the workplace would have been value-added to the research.

**Long-Term Impact on Students**

As a body of knowledge, research on college students has been identified as the “single largest area of inquiry in the field of higher education” (Pascarella, 2006, p. 508). Over the past 50 years, information from a vast amounts of published studies was gleaned from and about college students. However, only a small subset of these studies involved the unique impact of the postsecondary experience for students (Pascarella, 2006). Little research exists on the impact of specific college academic and nonacademic experiences, and very few studies have measured the effect of specific experiences on individuals later in life (Pascarella, 2006). A study by Pearman (1997) found that a one-semester course on health knowledge and practices had a significant impact on knowledge and behaviors relating to health over a nine-
year period. It appeared that, if the educational experience was perceived by students as developmentally influential, the experience could have a long-term impact on students after they graduate (Pascarella, 2006).

In a longitudinal study of adults ages 22 to 30, Baxter Magolda (1999) stated that young adults view their early 20s as a time to sort out their experiences to determine their sense of self and their approach to life. The participants acknowledged that their college experience contributed to their processes of defining self and purpose; however, as society made demands on them, they had to again reflect on their sense of self in the decade following college. Although organizations have their own agendas, the study found that participants felt they were encouraged to use their own initiative and judgment in the context of their setting, which inferred that the college experience may impact young adults and their personal and work decisions after they graduate.

A study of long-term impact of service learning in college examined whether the effects of volunteer service during a student’s undergraduate years persisted after college. The sample included 12,376 students who attended 209 institutions. The graduates were contacted four and nine years after college entry. The results demonstrated that, upon controlling for any pre-college service participation, student volunteer service during undergraduate years was positively associated with outcomes measured nine years after entering college (Astin, Sax & Avalos, 1999).

Creating long-term sustainability habits. Habits are repeated behaviors that become the norm. Individuals are prone to habitual choices in many areas of consumption, including energy usage and product selection. HOT (Habits, Opportunities, and Thoughts) was seen as a key method for lasting behavioral change
The creation of pro-environmental habits that relate to the environment have been studied by many researchers (Dahlstrand & Biel, 1997).

**Understanding Sustainable Behavior in the Workplace**

A possible concern with conducting surveys to determine the impact of sustainability efforts of students and graduates is the impact of context, particularly in the workplace. It is interesting to note that pro-environmental behaviors can shape contextual factors in the workplace. Employees create and utilize various technologies; develop social structures and physical facilities; and lobby for changes in their organizations, the supply chain, and government (Dilchert & Ones, 2012).

Workplace context and its impact were documented in recent studies. A 2010 analysis conducted among 30,000 employees in 80 countries revealed that organizational support variables had a correlation in the range of 0.20. Long-term employees were influenced more by workplace factors, with correlation averages in the 0.30 range (Ones, Dilchert, & Biga, 2010), which allowed for almost 70% of behavior within employees’ control. This also emphasized the importance of managers to champion and support corporate behaviors that support the environment (Dilchert & Ones, 2012). Research has investigated the impact of executives on individual decisions and behaviors. Employees follow the direction provided to them by management, as most individuals tend to comply with the manager’s direction and emphasis (Hardcastle, Wilms, & Zell, 1994).

The role of managers in an organization further emphasizes the importance of the long-term effect on knowledge, attitudes, intent, and behavior. Colleges can play a
significant role in the formation and development of concepts about sustainability in future employees. Whether the influence lies within employees or managers, individuals “are at the root of companies’ environmental decisions (positive and negative)” (Dilchert & Ones, 2012, p. 202). In an analysis of workplace sustainability, the key take-home message from an article that reviewed a study conducted in workplaces across the U.K. (Zibarras & Ballinger, 2011) was the importance of support and encouragement of employees by management in order to encourage sustainable decisions and actions. Management’s encouragement was the most important and successful technique for inspiring pro-environmental practices in the workplace. This reinforced the role of higher education in training future industry leaders on the importance of, and commitment to, sustainability as decisions are made that will impact the workplace environment.

McDonald (2011) conducted a study in the U.K. of 220 participants who reported on the percentage of materials they recycled at home vs. at work. In nine categories of materials, including glass, paper, plastic, and metal, home recycling percentages were considerably higher than at the office. Ninety percent stated that they recycled more at home than at work; habits at home did not translate to work. Much of the reasoning was that no recycling facilities were available in the workplace. This also allowed individuals to feel absolved from the responsibility to recycle at work. This study emphasized the impact of PBC, feelings of guilt, and social norms. However, if domestic recycling habits are not brought to the workplace, the habits established in one’s college experience may impact personal habits, and may not affect future workplace habits.
In terms of economic success, the behavior of individual employees is vital to organizations. The degree to which employees contribute toward sustainability should be assessed in the same manner as other aspects of the organization (Dilchert & Ones, 2012). However, little research has been conducted regarding employee impact on sustainability at the individual level.

Four considerations are important in the development of individual measures of behavior. Public vs. private behaviors, such as those affecting change vs. personal choices, represent the first area. Second, behaviors that reduce impact are different than those that curtail non-environmental behaviors, such as conservation. Some environmental actions may not be available to some individuals, such as business purchasing decisions; and some environmental behaviors may be more difficult to achieve than others. Finally, sustainable behaviors vary in their impact (Dilchert & Ones, 2012). Each is important to discuss in the development of pro-environmental behavior measures.

Dilchert and Ones (2012) developed an environmental taxonomy model to provide a framework of positive and negative behaviors to measure and understand sustainable actions by individuals. The analysis was divided into three phases based on nearly 3,000 critical incidents, over 600 interviews in the US, and 1,008 critical incidents and 208 interviews in Europe. This analysis led to 16 specific categories of environmental behavior that were grouped into five categories, known as a meta-analysis of metrics. From these four issues impacting the consistency of measurement, the Green Five Taxonomy was established that grouped the behavioral research into five categories of measurement:
1. Conserving – reducing use, reusing, repurposing, and recycling

2. Working sustainably – choosing responsible alternatives, changing the way work is done, creating sustainable products and processes, and embracing innovation for sustainability

3. Avoiding harm – pollution, monitoring environmental impact, and strengthening ecosystems

4. Influencing others – educating and training for sustainability, encouraging, and supporting

5. Taking initiative – initiating programs and policies, lobbying and activism, and placing environmental interests first

Developed as part of a graduate thesis using descriptive norms for the scales, the Green Five survey scale was created, tested, and substantiated. The final scale was validated against the Ethical Leadership Questionnaire and Work-Family Culture scales to determine construct validity. The scaling for the Green Five Taxonomy and survey are included in Chapter III (McConnaughy, 2014).

**Gaps in the Literature**

Two articles were found on the long-term impact of campus sustainability efforts on graduates (Andrews, 2013; Humes, 2013). The findings indicated that much of the research was in its infancy, with more informal than formal data. “Only a few universities gauge where their environmental curriculum makes a difference after students graduate. But the anecdotal evidence is heartening. Story after story confirms that the environmentalism surrounding students during college sticks with
them” (Andrews, 2013, p. 1). Humes (2013) researched the efforts of three colleges relative to this issue. Oberlin College (OC) explored the possibility of a survey of alumni, while Green Mountain College (GMC) previously had added to their alumni survey the question about pro-environmental behavior. However, the survey has not been published in scholarly or popular literature. Research into impact can be costly, time consuming, and difficult to interpret. When interviewed by Humes (2013), the director of sustainability at Prescott College affirmed that the process was challenging, and asking the right questions was critical (Humes, 2013).

The Sustainability 2020 Task Force at Green Mountain College in Poultney, Vermont, initiated a process in 2013 to study the way in which college had shaped graduates, and those graduates’ impact on the world. They concluded that is was meaningful to understand alumni impact as part of the measurement of a GMC education. Thirteen questions were added to the annual survey to alumni, many involving current environmental behavior and community involvement. Seventy-two percent of the respondents replied that the way they lived their lives emulated the sustainability mission of GMC. This study included graduates of only one college, and while valuable for the administrators, staff, and students at GMC, the information may not be generalizable to other colleges and universities across the nation, particularly because GMC has been consistently near the top of all the ratings for green colleges and universities. Their practices, however, are worth acknowledging and studying to apply to other campuses and would be worth further research and understanding. Additionally, other campuses may benefit from surveying their alumni to determine the college’s long-term impact.
The current research study is timely, in that the literature on the proven, long-term impact of colleges and universities on sustainability does not appear in scholarly or popular literature. A quantitative study to examine student responses that can be generalized can benefit campus leaders working to instill pro-environmental attitudes and behaviors in their students. A comparison between the categories of campus ratings and the reported benefits from students and alumni can be helpful to campuses when prioritizing actions for sustainability strategies. The information also may be useful to organizations that wish to promote sustainability behaviors among their employees.

Limitations

Studies on the impact of a collegiate intervention or experience have potential limitations. In addition to measurement and testing errors, variability in student characteristics is difficult to determine. Socialization and self-selection for the studies are additional challenges to their integrity (Pascarella, 2006). Longitudinal studies can separate socialization effects from those of recruitment, but rarely have been conducted in the collegiate setting due to high cost, time involved in collecting and analyzing data, and difficulty in conducting research with a group that has turnover, absences during breaks, and graduation after four to five years. Most studies on the long-term effect of college on students were based on a correlation between acquisition of a degree or years of secondary education, along with income level, labor market success, physical health, voting frequency, civic involvement, and continuing education (Pascarella, 2006).
Replication also has been an obstacle to the body of research on college students. A literature review of 5,000 studies revealed hundreds of single study findings that were never replicated. The ability to reproduce results is one of the hallmarks of valid research studies. The literature review also found that replication of results was the exception, rather than the rule (Pascarella, 2006; Pascarella & Terenzini, 2005).

An additional gap found in the research was the absence of understanding the reason that an intervention might impact students. Converting the intervention to another context is quite difficult, when an understanding is lacking relative to the effectiveness of a program.

Campus rating organizations agreed to adapt a common reporting tool, to save time for the sustainability officers at universities. Instead of creating and filing multiple reports, they now complete one report that is analyzed, interpreted and weighted by each organization. The variation of their methods, may allow for enough variance among the measures, however, it is expected that there may be a high degree of collinearity among the campus ratings. In order to reduce collinearity, standard error and to achieve an accurate assessment, some independent variables were removed from the final regression as expected. The details are identified in the regression tables in the Results section.

Conclusion

Society faces an historic challenge, as nine billion individuals with increased economic output will populate the earth by 2050. Human activity is the leading cause of today’s global environmental problems (Stern, 2000a). A transformative shift in
the way in which individuals think and act is crucial. Institutions of higher education are designed to train and prepare most of the individuals who develop, lead, manage, train in, and are employed by all types of organizations in society (Thomashow, 2014).

An understanding is needed on the extent to which universities are helping to create a more sustainable society that acts in ways that benefit the environment through the actions of their students while in school and after graduation. By testing the current measures of success of programs relative to environmental behaviors, a frame of reference can be determined regarding how well such efforts are working, and suggestions can be made for ways in which to set goals and track progress.

Organizations must evolve and continue to improve sustainability actions in order to halt the pattern of progressive destruction of the natural environment. This change is possible only with the help of human resources at all levels (Dilchert & Ones, 2012). A statement written over 40 years ago continues to resonate for many: “The ecological crisis is a crisis of maladaptive behavior” (Maloney & Ward, 1973, p. 583). It is hoped that this study will shed light on human behavior, attitudes, and perceptions that are necessary for sustainability, which perhaps is the biggest challenge facing the planet.
CHAPTER III

RESEARCH QUESTIONS AND METHODOLOGY

Research Questions, Hypotheses, and Review of Theoretical Framework

The research focused on the determination of a relationship between graduates of higher rated campuses in sustainability and their self-reported attitudes and behaviors. The study also examined the graduates of higher rated HEI’s in sustainability and their perception of their college experiences in sustainability differently. The relationship between several of the behavioral predictors in the Ahmad et al. (2014) model, of later environmental attitudes and perceived behavioral control toward pro-environmental behavior was also studied.

Research Question 1

Based on the Ahmad et al. (2014) Theory of Planned Behavior as a theoretical framework, modified by McNulty in 2015, of later environmental attitudes were posited to have a significant effect on perceptions about the environment.

Research Question 1: Do graduates of colleges and universities with higher sustainability ratings express having more sympathetic attitudes towards the environment?

Null Hypothesis: The model will not be validated using campus ratings to represent knowledge and experience of graduates.

Hypothesis 1: The model will be validated due to a positive relationship between campus sustainability ratings and environmental attitudes.
**Dependent variable(s) 1:** The dependent variables were derived from questions that ask about sustainability attitudes.

1. I feel good about myself when I act in ways that benefit the environment.
2. Acting in ways that benefit the environment is rewarding.

The independent variables were the survey questions related to importance of community; sustainability knowledge; environmental knowledge; and experience with sustainability from the data identified earlier in this section from the STARS, ACUPCC, Sierra Club, and Princeton Review data. Figure 9 illustrates the relationship between campus ratings and pro-environmental attitude.

**Independent variables:**

A. Princeton Review Data. Green Score Rating (Table 9)
B. Princeton Review Data. Rated as a Green School or not by the Princeton Review (Table 8)
C. STARS Score (Table 8)
D. Talloires Data, Signed or did not sign Sustainability Commitment (Table 8)
E. ACUPCC Data on Climate Action Plans and Carbon Neutrality Targets (Table 8)
F. Sierra Club Cool Schools, Top 50% (Table 11)
The Princeton Review criteria for measuring colleges and universities is included in Appendix B. The AASHE methodology for the STARS rankings is located in Appendix C, and a description of the Sierra Club’s methods can be found in Appendix D. This study will address the relationship between the campus ratings and pre-environmental attitude. Ahmad, et al (2014) and Tonglet (2004), addressed areas of knowledge and experience’s influence on attitudes towards the environment. By testing the model using campus ratings, the ability for the campus measures to represent sustainability knowledge and experience was tested.
Research Question 2

Research Question 2: *What is the relationship between perceived control and pro-environmental behavior?*

**Null Hypothesis:** There is not a significant relationship between perceived control in the workplace and pro-environmental employee behaviors

**Hypothesis 2:** Perceived control will have a significant impact on sustainable behavior.

**Dependent variable(s) 2:** The dependent variables were the questions on the survey related to the individual’s pro-environmental behavior. The dependent variables were derived from questions 15 through 21 in the survey and asked participants about their pro-environmental behaviors, as identified in Research Question 2.

**Independent Variables:**

24. My workplace supports pro-environmental behavior.

25. Acting in environmental ways is cost effective for my workplace.

26. It is important to the leaders in my company/organization to make pro-environmental decisions.

27. It is convenient for me to recycle supplies at work.

Figure 10 illustrates the relationship between perceived control and environmentally sustainable behavior.

In Ahmad et al’s study in 2014, the model could not be verified for a relationship between perceived control and recycling behavior. The purpose
for this research question is to determine if there is a relationship when addressing environmentally responsible behaviors at work with perceived control.

Figure 10. Relationship between perceived control and environmentally sustainable behavior.

Research Question 3

The study assists in the determination of the association of higher rated schools with sustainability attitudes and behaviors among graduates of colleges with sustainability programs. This tested the linkage between knowledge and experience with sustainability, as measured by campus sustainability measures with environmentally sustainable behaviors in the workplace.

Research Question 3: Do the higher rated schools for sustainability have graduates with stronger pro-environmental behaviors?

Null hypothesis: Graduates from higher rated colleges and universities will not express demonstrating a higher degree of “green” behaviors.
**Hypothesis 3:** There will be a positive relationship between responses of graduates of institutions with higher sustainability ratings and “green behaviors” in the workplace.

**Dependent variable(s) 3:** The dependent variables were derived from questions 15 through 21 in the survey and asked participants about their pro-environmental behaviors, as identified in Research Question 3.

**Independent variables from national college sustainability rating organizations:**

A. Princeton Review Data. Green Score Rating (Table 9)
B. Princeton Review Data. Rated as a Green School or not by the Princeton Review (Table 8)
C. STARS Membership Status (Table 8)
D. Talloires Data, signed or did not sign Sustainability Commitment (Table 8)
E. ACUPCC Data on Climate Action Plans and Carbon Neutrality Targets (Table 8)
F. Sierra Club’s Cool Schools, Top 50% (Table 8)

**Research Question 4**

**Research Question 4:** Do graduates of institutions with higher campus sustainability ratings believe that their college experience impacted them environmentally?
Null Hypothesis: There will be no difference in perceptions between graduates of higher rated schools in sustainability and those who attended institutions with lower ratings.

Hypothesis 4: There will be a positive relationship between national sustainability ratings and the perception of the impact of college on sustainability perceptions?

Dependent variable(s) 4: The dependent variables asked participants about their pro-environmental attitudes on the impact of their campuses on their current self-perceptions.

This research question helped to answer the question if alumni from higher rated schools perceive their college experience as having a higher impact on them regarding environmental sustainability.

1. My college experience had a significant impact on my attitude toward further protection of the environment.

2. My time in college made me more aware of the need to take action to protect the environment.

3. My college experience positively impacted environmental actions in the workplace today.

4. My college experience positively impacted environmental actions at home today.

5. Other factors besides my college experience significantly influence my environmental actions.
10. My college experience exposed me to sustainability projects.

**Independent variables from national college sustainability rating organizations:**

A. Princeton Review Data. Green Score Rating (Table 9)

B. Princeton Review Data. Rated as a Green School or not by the Princeton Review (Table 8)

C. STARS Ratings (Table 8)

D. Talloires Data, Signed or did not sign Sustainability Commitment (Table 8)

E. ACUPCC Data on Climate Action Plans and Carbon Neutrality Targets (Table 8)

F. Sierra Club’s Cool Schools, Top 50% (Table 8)

**Research Question 5**

**Research Question 5:** *What is the relationship between perception of college impact and self-reported pro-environmental behaviors in the workplace?*

**Null Hypothesis:** There will be no difference in behaviors between graduates who perceived their college experience as impactful regarding the environment and those expressing their experience as less impactful.

**Hypothesis 5:** There will be a positive relationship between perception of college impact and “green behavior” in the workplace.
Independent variables:

1. My college experience had a significant impact on my attitude toward further protection of the environment.

2. My time in college made me more aware of the need to take action to protect the environment.

3. My college experience positively impacted environmental actions in the workplace today.

4. My college experience positively impacted environmental actions at home today.

5. Other factors besides my college experience significantly influenced my environmental actions.

6. My college experience exposed me to sustainability projects.

   This question approached the viewpoints of alumni of college influence by determining if graduates felt their college impacted their sustainable behaviors in the workplace.

Methodology

The following sections outline the ethical criterion, survey formation process, instrumentation, sample procedure, respondents, and data analysis methods.

Ethical Criterion – Voluntary Participation and Informed Consent
Consideration was given to ethical criterion for voluntary participation. Each participant provided informed consent for the study. According to Institutional Review Board submission suggestions (Creswell, 2012), each individual understood the nature of the research and could choose whether to participate in the study. No harm was caused to participants. Babbie (2001) reinforced the importance of causing no negative impact on any contributor to the study. The survey focused on environmental behaviors and actions and had a very small likelihood of causing any physical or emotional harm. The survey was anonymous, and any specific information on participants was not possible. The study was approved by the University of Colorado Colorado Springs (UCCS) Institutional Review Board (IRB) on January 20, 2015, protocol number 15-108. The study adhered to the guidelines from the UCCS IRB during the survey process. The IRB submission and approval documents are included in Appendix E.

**Study Method**

The majority of research studies that tested the Theory of Planned Behavior utilized survey methodology. Studies conducted recently utilized quantitative methods to test Azjen’s theory and accommodated the use of statistical analysis (Knabe, 2012). A 2014 study conducted by Ahmad et al. among Pakistani college students employed questionnaires to determine the correlation between college exposure to recycling experience, knowledge of recycling, concerns for the community, and environmental awareness.
The research questions and theoretical framework discussed in Chapter II are both exploratory and explanatory. An established body of literature was not found that specifically discussed the long-term impact of sustainability in higher education on alumni. Scarce research was found on causal relationships that can be generalized across multiple campuses. As this study employed a model not yet utilized to study alumni behaviors from college exposure to sustainability, the current research is most accurately described as exploratory. The study also incorporated relevant information from fields of sustainability education, as well as potential relationships found in the literature.

Independent variables were from four national sustainability assessment organizations. The STARS data from the Association for the Advancement of Sustainability in Higher Education was used. Also, the type and number of tangible initiatives, and length of time as a member of the American College and University Presidents’ Climate Commitment organizations were independent variables. The third set of variables in the model included the Sierra Club Green Colleges, whether the school was identified as a green school, and the number of years as a green college. The fourth variable was the Princeton Review Green Ratings.

No studies exist that test the efficacy of any of the three hypotheses about demographic, sustainability organization, or independent variables of the Theory of Planned Behavior relative to the long-term impact of campus exposure and education on individuals. The research addressed a methodological question in addition to the hypotheses: Does the Theory of Planned Behavior predict future sustainable behavior?
**Rationale for the survey methodology.** Survey research has provided breadth of coverage due to the ability to obtain information from large numbers of individuals from many institutions. However, specific questions must be written, of which at least two must be similar to obtain greater credibility of the answers. Surveys are perceived to be an objective method, if conducted without asking names, in order to reduce the chance of bias (Shriberg, 2002). However, surveys cannot achieve the level of depth possible with more personal methods such as focus groups or interviews. Responding to standardized questions does not provide rich context or opportunities to explore and expand unanticipated or particularly relevant areas of interest. When the research objective is very specific and the source is well defined, gathering numerical data using surveys is the appropriate method (Burns & Bush, 2010). A qualitative approach would allow for the development of theories, or when the statistical analysis does not “fit the problem” (Creswell, 2012, p. 48). The model developed by Ahmad et al. (2014) fits the research questions in this study, and the use of statistical analysis answered the questions. Surveys and statistical analysis allow for statistical analysis inference for correlation and outcome variables, of which qualitative methods do not facilitate in a straightforward manner (Schwartz, Wilson, & Goff, 2014).

**Instrumentation**

The survey instrument was developed through an extensive review of current assessment tools that assess and compare sustainability in higher education and in
industry, as outlined in Chapter II. The survey questions are based on interpretations and adaptations of the most useful and relevant questions from past surveys.

The Campus Impact Sustainability Survey that was constructed for this study followed the theoretical framework outlined and illustrated in Chapter II and measured each of the constructs identified in the first section of this chapter. The basic structure analyzed variables that impact attitude, as measured by the STARS and Sierra Club Cool Schools indicators. The constructs that impacted the model were developed using behavioral and attitudinal questions adapted from a study by Knabe (2012) that tested the Theory of Planned Behavior on the development of online public relations courses. The model also was adapted from a study by Ahmad et al. (2014) of recycling behaviors in Pakistan, using the Theory of Planned Behavior as a predictive tool. Several behavior-based questions were included from the Green Five Taxonomy developed by Dilchert and Ones (2011) through a meta-analysis of sustainability behaviors in the workplace. The questions and scales for the Green Five that were tested and revised by McConnaughey (2012) were utilized in the development of the final Campus Impact Sustainability Survey.

Fowler (1995) noted that each question on a survey should produce consistent results, in order that the respondent comprehends each question, and the research can be interpreted effectively to increase the ability to generalize the results and to ensure internal validity. Most of the constructs consisted of multiple questions to ensure accuracy and comprehension. The questions were scored on a 7-point Likert scale (1 = Strongly Disagree; 4 = Neutral; 7 = Strongly Disagree). When the respondents had
no knowledge about some of the areas covered by the survey, a “don’t know” option (9) was included, and each question allowed space for open-ended comments.

A brief cover letter preceded the survey questions and included the definition of environmental sustainability. In an attempt to reduce confusion, environmental sustainability was defined as “comprehensive, holistic initiatives oriented toward eliminating negative and increasing positive present and future ecological impacts” (Shriberg, 2002, p. 99). The definition included with the survey instrument stated:

Environmental Sustainability Definition: This survey will refer to “sustainability” which is used in many ways. The following definition may help you as you complete the survey. To meet the needs of the present without compromising the ability of future generations to meet their own needs. (Brundtland, 1987, p. 1)

The cover letter also provided background information on the study, the requirements and protections of participants, and the potential benefits of returning the survey. The letter was written to encourage participation without increasing the possibility of social desirability bias.

Demographics segmentation was shown to impact pro-environmental behavior (Jackson et al., 1993). Higher education levels were associated with recycling activities (Vining & Ebreo, 1990) and age also could impact recycling (Mohai & Twight, 1987). Income was found to be a predictor for recycling as well (Vining & Ebreo, 1990), and differences also were noted in recycling behaviors between home and the workplace (McDonald, 2011). In order to test the impact of demographic factors, questions were added at the end of the survey related to age, educational level, and income.
**Procedures.** The survey underwent “field pretests under realistic conditions” (Fowler, 1995, p. 5). Drafts of the instrument were sent to associates who were recent graduates to determine the length of time needed for completion, their opinions of the flow of questions, and wording appropriateness and duplication. The survey was submitted to the University of Colorado Colorado Springs Institutional Review Board, and the process met all requirements necessary to ensure that the participants were fully informed of confidentiality, potential benefits and risks of participation, time requirements, the right to withdraw responses, and the voluntary nature of the study. These points were included in the cover letter that can be found in Appendix E.

The sample of four Colorado universities and one Nevada university was both purposive and nonrandom (Creswell, 2012), in order to assess differences and similarities of alumni from colleges and universities in the same state. Variation between schools was controlled for through the use of characteristics about colleges and universities from *U.S. News and World Report* data. A random sample of U.S. institutions of higher education may not have provided useful results due to the number of samples needed from each school. The survey was available for 85 days in February through April 2015.

**Survey Questionnaire**

The survey was composed of 35 questions using Survey Monkey as a tool for gathering data. The instructions for the participants and the instrument are included in Appendix F, and the survey questions are located in Appendix G.
The sources for the questions, and applicable reliability and validity, are included in Tables 3, 4, and 5. The questions developed and tested by Ahmad et al. and Tonglet tested questions about norms, attitudes, knowledge and perceived control. The questions were analyzed using factor analysis to reduce the list of questions applied to each node in the model. Cronbach’s alpha alues greater than 0.7 indicated acceptable reliability for the question relating to each node in the Theory of Planned Behavior Model.

A second set of questions were based on a reduced list of 40 work-related sustainability behaviors developed by Dilchert and Ones (2012), that were tested using factor analysis (McConnaught, 2014) and reduced to 27 questions relating to pro-environmental workplace behaviors of the Green Five Taxonomy (Dilchert and Ones, 2012).

Seven classification questions were asked to control for age, gender, graduation year, major, graduate or undergraduate degree, number of years attended and institution most recently graduated from. The survey is listed in Appendix G.

### Table 3 Survey Question Source for Questions 11-14, 20-23, and 25-30 (N = 230)

<table>
<thead>
<tr>
<th>Survey Questions</th>
<th>Inter-Item Reliability/Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. I am concerned with maintaining a good place to live.</td>
<td>0.873</td>
</tr>
<tr>
<td>12. I have a strong interest in the health of the community in which I live.</td>
<td>0.873</td>
</tr>
<tr>
<td>13. I believe that my environmental behavior will reduce waste.</td>
<td>0.894</td>
</tr>
<tr>
<td>14. I feel good about myself when I act in ways that benefit the environment.</td>
<td>0.894</td>
</tr>
</tbody>
</table>
20. I have a high level of knowledge about sustainability. 0.901
22. My colleagues expect me to act in ways that benefit the environment. 0.901
23. Not recycling goes against my principles. 0.739
25. Acting in environmental ways is cost effective for my workplace. 0.810
26. It is important to the leaders in my company/organization to make pro-environmental decisions. 0.739
27. It is convenient for me to recycle supplies at work. 0.840
28. I consider myself as very knowledgeable about the environment. 0.901
29. Acting in ways that benefit the environment is rewarding. 0.901
30. My friends expect me to act in ways that benefit the environment. 0.772

Sources: Ahmad et al. (2014); Tonglet et al. (2004)

Table 4  Survey Question Source for Questions 16-19 (N = 400)

<table>
<thead>
<tr>
<th>Survey Questions, Non-Demographic in Nature</th>
<th>Subscale</th>
<th>Cronbach’s Alpha</th>
<th>Retranslation Hit Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. When there is a choice, I choose products that are better for the environment in the workplace.</td>
<td>Working Sustainably</td>
<td>0.690</td>
<td>67%</td>
</tr>
<tr>
<td>16. I suggest ways for other employees to act in a more environmentally friendly manner.</td>
<td>Influencing Others</td>
<td>0.740</td>
<td>83%</td>
</tr>
<tr>
<td>17. I have proposed new environmentally friendly programs for my company.</td>
<td>Taking Initiative</td>
<td>0.690</td>
<td>67%</td>
</tr>
<tr>
<td>18. I take extra time or energy to perform an environmentally friendly behavior over an environmentally harmful behavior.</td>
<td>Conserving</td>
<td>0.770</td>
<td>83%</td>
</tr>
<tr>
<td>19. I decrease energy consumption by turning off equipment when not in use.</td>
<td>Conserving</td>
<td>0.770</td>
<td>83%</td>
</tr>
<tr>
<td>21. I tend to throw recyclable materials into trash cans,</td>
<td>Conserving</td>
<td>0.770</td>
<td>50%</td>
</tr>
</tbody>
</table>

Source: McConnaughy (2014)
Six subject matter experts independently retranslated 40 employee green behaviors into a smaller list of behavioral categories identified and defined by Ones and Dilchert (2012a). “Results of the retranslation task were reviewed for rater agreement. An acceptable hit rate was set at four out of six raters categorizing the item correctly, i.e. 67% correct categorization for each item” (McConnaughy, 2014, p. 36). Factor analysis, using Cronbach’s alpha was implemented to reduce the list of behaviors to 27 items (McConnaughy, 2014). Questions were identified from each subgroup from the Green Five Taxonomy that had a broad application to a variety of professional jobs of the graduates taking the survey.

Table 5 Survey Question Source for Question 24 (N = 133)

<table>
<thead>
<tr>
<th>Survey Question, Non-Demographic in Nature Incidents</th>
<th>Number of Critical Incidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>24. My workplace supports pro-environmental behavior. 29% of green behaviors are required by workplace.</td>
<td>773</td>
</tr>
</tbody>
</table>

Source: Ones and Dilchert (2012)

A reliability analysis was conducted on the data and survey questions using SPSS. The Cronbach’s Alpha fell within the .6 and .8 range. As a result, the survey questions were also confirmed as reliable for this study. The data is presented in Table 6.
<table>
<thead>
<tr>
<th>Construct: Perception of College Impact</th>
<th>Cronbach's Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>My college experience had a significant impact on my attitude towards further protection of the environment.</td>
<td>.908</td>
</tr>
<tr>
<td>My time in college made me more aware of the need to take action to protect the environment.</td>
<td></td>
</tr>
<tr>
<td>My college experience positively impacted environmental actions in the WORKPLACE today.</td>
<td></td>
</tr>
<tr>
<td>My college experience positively impacted environmental actions at HOME today.</td>
<td></td>
</tr>
<tr>
<td>My college experience exposed me to sustainability projects.</td>
<td></td>
</tr>
<tr>
<td>When there is a choice, I choose products that are better for the environment in the workplace.</td>
<td>.795</td>
</tr>
<tr>
<td>I decrease energy consumption by turning off equipment when not in use.</td>
<td></td>
</tr>
<tr>
<td>I suggest ways for other employees to act in a more environmentally friendly manner.</td>
<td></td>
</tr>
<tr>
<td>I have proposed new environmentally friendly programs for the company.</td>
<td></td>
</tr>
<tr>
<td>I take extra time or energy to perform an environmentally friendly behavior over an environmentally harmful behavior.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Construct: Perceived Control</th>
<th>Cronbach's Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is convenient for me to recycle supplies at work.</td>
<td>.663</td>
</tr>
<tr>
<td>My workplace supports pro-environmental behavior.</td>
<td></td>
</tr>
<tr>
<td>Acting in environmental ways is cost effective for my workplace</td>
<td></td>
</tr>
<tr>
<td>It is important to the leaders in my company/organization to make pro-environmental decisions.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Construct: Attitude About the Environment</th>
<th>Cronbach's Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acting in ways that benefit the environment is rewarding.</td>
<td>.579</td>
</tr>
<tr>
<td>I feel good about myself when I act in ways that benefit the environment.</td>
<td></td>
</tr>
</tbody>
</table>
The constructs were utilized from the Ahmad et al. (1995) Theory of Planned Behavior, and each set of constructs was related to the key nodes in the theory developed in 2014 that focused primarily on recycling behavior. This study included broader areas in the environmental arena, based on campus programs encompassing energy usage, alternate travel, and others. The survey included sustainable decision making and energy consumption. As a result, the Theory of Planned Behavior was modified for this study and is illustrated in Figure 11.

The reliability analysis was followed by a factor analysis, also using SPSS. The information is listed in Table 7.

Table 7  *Factor Analysis of Constructs for College Perception, Attitudes, Behaviors and Perceived Control.*

<table>
<thead>
<tr>
<th></th>
<th>Component 1</th>
<th>Component 2</th>
<th>Component 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>My college experience had a significant impact on my attitude towards further protection of the environment.</td>
<td>.861</td>
<td></td>
<td></td>
</tr>
<tr>
<td>My time in college made me more aware of the need to take action to protect the environment.</td>
<td>.908</td>
<td></td>
<td></td>
</tr>
<tr>
<td>My college experience positively impacted environmental actions in the WORKPLACE today.</td>
<td>.785</td>
<td></td>
<td></td>
</tr>
<tr>
<td>My college experience positively impacted environmental actions at HOME today.</td>
<td>.852</td>
<td></td>
<td></td>
</tr>
<tr>
<td>My college experience exposed me to sustainability projects.</td>
<td>.774</td>
<td></td>
<td></td>
</tr>
<tr>
<td>My workplace supports pro-environmental behavior.</td>
<td>.420</td>
<td>.719</td>
<td></td>
</tr>
<tr>
<td>It is important to the leaders in my company/organization to make pro-environmental decisions.</td>
<td></td>
<td>.702</td>
<td></td>
</tr>
</tbody>
</table>
The factor analysis illustrated above indicated that the constructs are valid. Attitudes and behaviors are grouped together in this analysis, which might be expected because a regression analysis of the two constructs led to a significance of 0.000.

Because the constructs are validated, the survey questions for each of the constructs were averaged and a construct factor average was implemented for attitudes, behaviors, perceived control and perception of college impact for the regression analysis that is reported in the Results section.
Figure 11. Theory of Planned Behavior, adapted by McNulty, 2015. Adapted from Ahmad in Figure 8. Sustainable behavior and influences on attitude were modified.

The metrics for determining environmental awareness, knowledge about sustainability, concerns for the community, and previous sustainability experiences were derived from survey questions about self-perceptions, and from measurements from the respective colleges at the time that students were in attendance. Six
assessment organizations rated colleges and universities, and the component rated by each tool is described in the next section.

Table 8  *Sustainability Organizations and Variables Relating to Sustainable Attitudes*

<table>
<thead>
<tr>
<th>Category</th>
<th>AASHE STARS</th>
<th>NWF State of the Campus Environment</th>
<th>Princeton Review Guide to Green Colleges</th>
<th>Sierra Club Cool Schools</th>
<th>University Leaders for a Sustainable Future Sustainability Assessment Questionnaire</th>
<th>ACUPCC Climate Action Plan, Neutrality Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concerns for Community</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Knowledge Regarding Sustainability</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Environmental Awareness</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Experience in Sustainability</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Comparisons of Organizational Assessment Criteria in Higher Education**

The campus sustainability tools fell into five broader categories; some tools were in all four categories, while others fell into fewer groupings. The four topic areas and the assessment tools that fell into those categories are as follows.

1. Concerns for community
2. Knowledge regarding sustainability
3. Environmental Awareness
4. Sustainability Experience
The AASHE STARS rating system and the Sustainability Assessment Questionnaire from the ULSF covered four areas of sustainability, with the goal of incorporating sustainability and environmental literacy as identified in the Talloires Declaration (ULSF, 2014). The existing tools that were used in the current study were assessed on effectiveness and long-term effects in the Methods and Results sections, at which time the ratings of each school were compared with surveys taken by students and recent graduates who rated their sustainable behaviors and perceptions of the impact of their college sustainability experiences on their current environmental actions. The Sierra Club and Princeton reviews have adopted the STARS questions and responses in order to streamline the data gathering process, in response to time concerns from sustainability officers across the country. STARS grouped the data into the categories of Platinum, Gold, Silver, and Bronze. The Sierra Club ranks the schools that file a voluntary report, but the respondents’ list varied considerably, and few schools are on the list consistently each year, particularly institutions in the study from Colorado and Nevada.

The University Leaders for a Sustainable Future Questionnaire is used primarily for self-assessment by institutions without a broad sample, and no regular assessment or comparison between schools is conducted or over time. The questionnaire emphasizes sustainability as a process, but has no mechanism to roll up data in order to benchmark institutions. Many larger colleges and universities consider it to be to complete. “ULSF encourages institutions to use the SAQ as a group exercise – led by a ULSF staff member – with 10-15 representatives from ‘critical campus constituencies.’ The goals of the SAQ are to offer its users a
comprehensive definition of sustainability in higher education, as well as to provide a snapshot of their institutions on the path to sustainability” (Shriberg, 2002, p. 79).

The National Wildlife Federation’s State of the Campus Environment identifies barriers, drivers, and incentives for campus programs, but it uses a very small sample within each college and university (Shriberg, 2002). Certain questions in the STARS rating system request specific information about sustainability literacy, community service, learning outcomes, and immersive experience. These responses were used in the statistical regression to determine their significance toward attitude, as depicted in the Theory of Planned Behavior adapted by Ahmad et al. (2014). Data from the Princeton Review’s Guide to Green schools was evaluated as a categorical variable, with the institution considered as a green school or not during that time period.

The American College and University Presidents’ Climate Commitment organization records annual information on those institutions that have committed to the Climate Action Plan. The data is longitudinal and addresses community, knowledge, sustainability experience, and environmental awareness. The ACUPCC database provides information about each college’s progress reports on community involvement, the number of LEED buildings, the amount of money spent on their Climate Action Plans, education and awareness, and length of time for adoption of action plans. The Princeton Review includes only the top schools in their Guide to Green Schools, but the data is collected and reported on an annual basis after approximately 800 institutions have been analyzed each year. The data is categorical, but may provide insights as to the long-term impact of the identification of Green
School status. Based on these assessments and the availability of consistent data, the analysis of data was conducted using the Princeton Review’s Guide to Green Schools, AASHE STARS, and the American College and University Presidents’ Climate Commitment. Whether or not an institution had signed the Talloires Declaration was added as a comparison to the ACUPCC signatory status and commitments. This analysis led to five campus rating elements in the study.

The objective was to focus on which college sustainability rating elements had the most impact on students after they graduated. Sustainability ratings from colleges at the time that each student attended were compared with survey responses from the students. The campus rankings matched when they attended that institution for the sample of students who attended college in 2009 or later, when the ranking methods were standardized for the rating organizations.

**Participants.** Seven sets of college graduates were initially selected from Colorado and Nevada institutions of higher education. Alumni were surveyed from Colorado State University Fort Collins, University of Colorado Boulder, Colorado College, University of Denver, University of Colorado Colorado Springs, Pacific University and University of Nevada. In order to obtain a sample with adequate variance to allow for a broader study, the survey was expanded to include additional respondents to achieve a larger sample.

The initial target audience included alumni of six major colleges and universities in Colorado. As all selected alumni attended a Colorado institution of higher education, controlling for the influence of the dynamics of the state was conducted. A website link to Survey Monkey was posted in each alumni newsletter
and on the websites. The link was unique to each school in order to identify the particular institution. Respondents self-selected and, although random selection was ideal, alumni associations did not give permission to share email addresses from which a random sample could have been drawn. The link was available for a 90-day period in February, March, and April of 2015 and was designed to allow for only one response per email address. Omissions were allowed for the survey questions, but the participants had to have already graduated from an undergraduate institution to be eligible. Respondents who did not graduate, or complete information about their institution of higher education were eliminated.

The final sample included responses from 306 alumni who graduated from 61 institutions located in 24 states. A subsample of 177 graduates after 2009 was stratified for comparison purposes. Most of the campus rating organization processes became more broadly adapted, standardized, and reported at that time.

**Data Analysis Model**

A multiple regression model using SPSS determined covariance of variables, and significance of relationships between the independent variables, and the dependent variables over time. The data on each college assessment was entered, in association with the years during which the individual attended that institution.

\[ Y_i = a + b_1X_1 + b_2X_2 + \ldots + b_nX_n + E \]

Where, \( a \) is the intercept \( b_1, b_2, \ldots, b_n \) - Slope of \( X_1, X_2, \ldots, X_n \), respectively,
where Y is the dependent variable observed for individual data points, x represents the independent variables. The "b" values are regression weights and are computed in a way that minimizes the sum of squared deviations. And E is the error term.

\[ Y_i = a + b_1X_{Princeton\ Review\ value} + b_2X_{Green\ school\ designation} + b_3X_{School\ signed\ Talloires\ Declaration} + b_4X_{APCUC\ energy\ sourcing} + b_5X_{STARS\ member\ college} + b_6X_{STARS\ ratings} + b_7X_{School\ Sierra\ Club\ Cool\ School} + b_8X_{college\ demographics} + b_9X_{individual\ demographics} + b_{10}X_{responses\ to\ sustainability\ questions} + E \]

**Independent Variables**

Variables that were not covariant and were noted to be significant were identified using the value of p < 0.5. The variables that were significant are summarized in the Results section and are the foundation for recommendations. The Sierra Club value was identified as an independent variable, as it is a consistent ratio scale rating that has been conducted for several hundred universities since 2009. The Sierra Club rating of Green Schools was valuable, as the distinction requires considerable efforts by colleges to earn the status, and often it is recognized on university websites. The Talloires Declaration was the first broadly-accepted, unified effort by university leaders to commit to improved environmental practices at institutions of higher education. Energy sourcing indicated a strong commitment to changing power sourcing by universities to that of methods determined to be renewable. STARS membership indicated the presence of a campus sustainability officer and the tracking and reporting of campus environmental efforts. The demographic questions allowed for the determination of various factors on
sustainable behavior, such as gender, major, year of graduation, and university. Finally, university variables reduced the variability of values due to the college attended. The data included academic rating, graduation rate in six years, private or public institution, student/faculty ratio, average size of freshman class, and acceptance rate as control variables (http://colleges.usnews.rankingsandreviews.com/best-colleges/).

The remaining independent variables represented survey questions for each aspect of the Theory of Planned Behavior Model regarding contributing factors toward environmentally sustainable behaviors.

**Variability of the Data**

In the three sources of assessment data, variability between institutions allowed for a rich interpretation of the significance of the information. The variance between schools ranged from below 60 (not rated) to 99. The Princeton Review information was the most comprehensive and consistent rating system for college sustainability efforts, for which the Guide to Green Colleges was created to assist prospective university students and parents in the selection process. Table 9 presents information on the sustainability rankings, 2009-2015.

School ratings from the various organizations reflect education of students and the exposure that students had to sustainability projects on campus. They also rank schools higher as they reported accomplishments related to creating a more environmentally supportive campus. ACUPCC identified university president
commitment to carbon neutrality, and the reporting of continued progress towards carbon emission reductions.
Table 9  *Sustainability Rating Organizations’ Scores, 2009-2015*

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<tr>
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<th>STARS AASHE Member</th>
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Survey participants attended 61 colleges and universities. Each school in the study was identified with the ratings from the Princeton Review, Sierra Club, the Association for the Advancement of Sustainability in Higher Education (AASHE STARS Program), and the American College and University Presidents’ Climate Commitment. The data in the table were used as independent variables in the study. Table 10 depicts the Princeton Review Green School ratings used in the analysis.
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Table 10 continued

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(continued)
Table 10 continued

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</table>

Note: Scores of 60 indicate incomplete information submitted to Princeton Review in order to make a rating.

Data were obtained from the Princeton Review Guides to top colleges. Not all schools in the study had a published rating. No data was available on schools not ranked in the top 300+ colleges. Schools with incomplete data were given the lowest possible score of 60.

Institutions that were signatory schools of the Talloires Declaration indicated commitment of their university presidents in order that the schools could become
more environmentally responsible. Additionally, ACUPCC reporting information described the way in which schools created and tracked progress on environmental action plans and emission reduction goals.

Chapter IV reviews both the descriptive and regressive analyses of the surveys and illustrates the significant impact of the independent variables on the dependent variables. Recommendations to colleges and universities and implications for further research follow the statistical analysis.

**Limitations**

National reporting of sustainability efforts to AASHE and other organizations has been voluntarily submitted from the colleges and universities, and was not standardized for the Princeton Review until 2010 and 2009 for the Sierra Club. For purposes of this study, the regression was run with all graduates, followed by the subset of graduates from 2009 or later, and then compared. This information is included in Chapter IV. Because the campus rating organizations utilized a common reporting tool, the independent variables were expected to have collinearity, and led to elimination of collinear variables. The eliminated variables are noted in the tables in the Results section.

As the reporting is voluntary, the sustainability metrics and goals were based on the self-rated estimates from each HEI. In addition, institutions are not required to submit these reports to the organizations, which led to missing data for some of the years of the study. As a result, the researcher coded whether a renewable energy source was reported, rather than the actual targets. Additionally, the Princeton
Review reports only green rating data on schools that are part of the “Great Colleges” list, approximately 300 of the nearly 2,870 four-year institutions in the United States (National Center for Education Statistics, 2012). In order to conduct the comparisons between ratings and behavior, several HEIs and their corresponding surveys were removed from the regressions that compared green ratings to sustainable behaviors and perceptions.

The Sierra Club rankings list all school scores for sustainability, which varied from 138.77 to 813.51 of a possible 1,000 points in 2014. Variations for other years were similar in range. Identified schools on the list were those that were in the top half of scores, 500 or more, or 50% of the possible points or higher; each was given a rating of 1 or 0 for each time the school was in that range.

A higher proportion of education and business majors responded to the survey than the national average among students in higher education. The higher response rate was due to alumni directors from business and education departments sending out survey link information in addition to campus wide alumni directors.

The focus of the research involved asking participants what they recalled about their college experiences and influences. Respondents may have experienced recall error, or might have had biases about their own college experiences. In addition, those taking the survey self-reported their attitudes and behaviors about the environment, leading to possible respondent errors.
CHAPTER IV

RESULTS

This chapter is composed of three sections. The first identifies descriptive statistics, including demographic data, age ranges, gender, number from each major and HEI, and year graduated. The means and standard deviations are included in the second section. Following the descriptive statistics, data are presented from multiple regression analyses for each of the research questions and hypotheses identified in Chapter II.

Table 9 illustrates the breakdown of respondent demographics. The distribution of majors indicates that 51.1% of the respondents were business majors and 17.9% were education majors, resulting in a total of 69% of undergraduate and graduate responses for these majors. This data can be explained by the effectiveness of direct email “blasts” sent to education and business alumni at UCCS and business alumni at UNLV. The national average in 2011-2012 for undergraduate degrees in business and education was 26.5%, and 49.8% for graduate degrees (Institute of Education Statistics, 2013). Based on the graduate and undergraduate mix in the study, 34.5% of the respondents were education and business majors, if the demographics of the study for these majors represented national statistics.

The proportion of respondents from private HEIs was 11.3%, somewhat lower than the national average at 16%; and the percentage of public school graduates was 87% in the survey, compared to 73% of the U.S. college students (O’Shaughnessy,
The proportion of males to females was 51.5% female to 48.5% male, similar to the national average of 49% female to 51% male (Burzelleca, 2012). Respondents graduated from 61 colleges and universities located in 24 states incorporating all geographic areas of the country. Table 11 represents descriptive statistics of respondents and school variables, entire sample.

Table 11  *Breakdown of Respondent Demographics*

<table>
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<tr>
<th>Major</th>
<th>Responses</th>
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<tr>
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<tr>
<td>Education and Counseling</td>
<td>55</td>
</tr>
<tr>
<td>Liberal Arts</td>
<td>28</td>
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<tr>
<td>Communication</td>
<td>16</td>
</tr>
<tr>
<td>Engineering</td>
<td>19</td>
</tr>
<tr>
<td>Math and Science</td>
<td>12</td>
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<tr>
<td>Law</td>
<td>9</td>
</tr>
<tr>
<td>Computer Science/IT</td>
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</tr>
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<td>Fine Arts</td>
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<td>Nursing</td>
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<td><strong>Total</strong></td>
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(Double majors fell into multiple categories.)

(continued)
Table 11 continued

<table>
<thead>
<tr>
<th>Graduate, Undergraduate, and Other Breakdown</th>
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<td>Undergraduate</td>
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<td>Graduate</td>
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<td>Other</td>
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<td><strong>Total</strong></td>
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<td>Female</td>
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<td>Male</td>
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<table>
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<td><strong>Total</strong></td>
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<table>
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<td>Proprietary</td>
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Table 12  *Descriptive Statistics of Respondent and School Variables, Entire Sample*

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<th>Minimum</th>
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<td>Fresh Retention %</td>
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Table 13 *Descriptive Statistics of Respondent and School Variables, 2009 and later graduates*

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<td>93</td>
<td>49.92</td>
<td>13.265</td>
</tr>
<tr>
<td>Fresh Retention %</td>
<td>169</td>
<td>62</td>
<td>97</td>
<td>75.44</td>
<td>7.486</td>
</tr>
<tr>
<td>Faculty/Student Ratio</td>
<td>168</td>
<td>8</td>
<td>29</td>
<td>18.05</td>
<td>3.074</td>
</tr>
<tr>
<td>% Students Living on Campus</td>
<td>173</td>
<td>0</td>
<td>86</td>
<td>16.53</td>
<td>16.645</td>
</tr>
<tr>
<td>Attitude Average</td>
<td>163</td>
<td>1</td>
<td>5</td>
<td>3.788</td>
<td>.81</td>
</tr>
<tr>
<td>College Perception of Impact Averages</td>
<td>173</td>
<td>1</td>
<td>5</td>
<td>3.13</td>
<td>.99</td>
</tr>
<tr>
<td>Behavior Average</td>
<td>172</td>
<td>1.0</td>
<td>5.0</td>
<td>3.44</td>
<td>.78</td>
</tr>
<tr>
<td>Perceived Control Average</td>
<td>170</td>
<td>1.0</td>
<td>5.0</td>
<td>3.54</td>
<td>.76</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>140</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A series of multiple regression statistics were run to test each of the five hypotheses. Each hypothesis and research question are listed in order below and followed by the coefficients tables. The Beta coefficient indicates the direction of the relationship and positive or negative. The standard error for each equation is included in each table as well.

Research Question 1

Research Question 1: Do graduates of colleges and universities with higher sustainability ratings express having more sympathetic attitudes towards the environment?

Null Hypothesis: The model will not be validated using campus ratings to represent knowledge and experience of graduates.

Hypothesis 1: The model will be validated due to a positive relationship between campus sustainability ratings and environmental attitudes.

Table 14 illustrates coefficients and multiple regression, Research Question 1, green ratings, and the Environmental Attitude Survey question, “I feel good about myself when I act in ways that benefit the environment.”
Table 14  Coefficients Table, Multiple Regression, Research Question 1, Green Ratings, and Environmental Attitude Survey Questions.

<table>
<thead>
<tr>
<th>Attitudinal Outcome</th>
<th>Standardize Coefficient, Beta</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus sustainability measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td># times Sierra Club Cool School 50% or better</td>
<td>-0.06</td>
<td>0.515</td>
</tr>
<tr>
<td>STARS Rating/Platinum/Gold/Silver/Bronze/None</td>
<td>1.149</td>
<td>0.110</td>
</tr>
</tbody>
</table>

Note. Included independent variables were enrollment, public or private school, acceptance %, 6-year graduation %, freshmen retention %, faculty/student ratio, % students living on campus, years since graduating, undergraduate degree, years attended, age and gender. Column heading identifies the construct of pro-environmental attitude. Coefficient estimates represent the estimated effect of a higher response of behavioral control with environmental attitude. Other independent variables were eliminated due to collinearity with VIF >10.

Using the sub-sample of recent graduates, the model was not significant, and the independent variables, Princeton Review Average, Number of times a Princeton Review Green School, Talloires Signatory School, and both ACUPCC ratings, were eliminated due to collinearity, with a VIF factor greater than 10. Because the organizations utilized a common reporting tool to ease the burden of data gathering for the sustainability offices, the likelihood of collinearity significantly increased.

This could not provide confirmation to campus ratings in the modified Theory of Planned Behavior, representing knowledge, experience, concern for the community, and environmental awareness. It could not be confirmed that graduates from higher rating schools in sustainability could report having higher pre-environmental attitudes than graduates of schools with lower ratings.
Research Question 2

Research Question 2: *What is the relationship between perceived control and pro-environmental behavior?*

Null Hypothesis: There is not a significant relationship between perceived control in the workplace and pro-environmental employee behaviors

Hypothesis 2: Perceived control will have a significant impact on sustainable behavior.

Table 15 illustrates coefficients and multiple regressions for Research Question 2, entire sample, perceived control construct and the dependent variable construct from the survey about self-identified sustainable behaviors among the participants.

Table 15  *Impact of Perceived Control on Pro-Environmental Behaviors, Research Question 2, Entire Sample.*

<table>
<thead>
<tr>
<th>Behavioral Outcomes Construct</th>
<th>Perceived Control Survey Questions</th>
<th>Standardized Coefficient, Beta</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Control Construct</td>
<td></td>
<td>0.486</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Note: Included independent variables were enrollment, public or private school, acceptance %, 6-year graduation %, freshmen retention %, faculty/student ratio, % students living on campus, years since graduating, undergraduate degree, years attended, age and gender. Column headings identify the environmental behavior under consideration. Coefficient estimates represent the estimated effect of a higher response of behavioral control with environmental behaviors.

The size of the effects for the significant variable were considerable, with high significance at 0.000, and a Standardized Beta Coefficient of 0.511, meaning that for
every point increase in response to the perceived control average, the behavior response increased by approximately one half of a point on a five-point scale.

Research Question 3

Research Question 3: Do the higher rated schools for sustainability have graduates with stronger pro-environmental behaviors?

Null hypothesis: Graduates from higher rated colleges and universities will not express demonstrating a higher degree of “green” behaviors.

Hypothesis 3: There will be a positive relationship between responses of graduates of institutions with higher sustainability ratings and “green behaviors” in the workplace.

Table 16 illustrates the coefficients and multiple regressions for Research Question 3, graduates 2009 or later, campus sustainability ratings and self-reported pro-environmental behaviors among participants.


Table 16  *Coefficients Table, Multiple Regression, Research Question 3, Green Ratings, and Pro-Environmental Behaviors.*

<table>
<thead>
<tr>
<th>Behavioral Outcomes Construct</th>
<th>Standardized Coefficient, Beta</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus sustainability measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td># Times Sierra Club Cool School 50% or better</td>
<td>-.028</td>
<td>.744</td>
</tr>
</tbody>
</table>

*Note.* Included independent variables were enrollment, public or private school, acceptance %, 6-year graduation %, freshmen retention %, faculty/student ratio, % students living on campus, years since graduating, undergraduate degree, years attended, age and gender. Column heading identifies the construct of pro-environmental attitude. Coefficient estimates represent the estimated effect of a higher response of behavioral control with environmental attitude. Other independent variables were eliminated due to collinearity with VIF >10.

Using the sub-sample of recent graduates, the model was significant. However, several of the campus measures were eliminated as independent variables, Princeton Review Average, Number of times a Princeton Review Green School, Talloires Signatory School, and both ACUPCC ratings due to collinearity, with VIF factors greater than 10. This was expected because the campus rating organizations adopted a common reporting tool. This could not provide confirmation to campus ratings in the modified Theory of Planned Behavior, representing knowledge, experience, concern for the community, and environmental awareness. It could not be confirmed that graduates from higher rating schools in sustainability could report demonstration of more pre-environmental behaviors in the workplace.

**Research Question 4**

**Research Question 4:** *Do graduates of institutions with higher campus sustainability ratings believe that their college experience impacted them environmentally?*
**Null Hypothesis:** There will be no difference in perceptions between graduates of higher rated schools in sustainability and those who attended institutions with lower ratings.

**Hypothesis 4:** There will be a positive relationship between national sustainability ratings and the perception of the impact of college on sustainability perceptions?

Table 17 presents the coefficients and multiple regression for Research Question 4, graduates 2009 or later, dependent variables, “My college experience positively impacted environmental actions in the WORKPLACE today”.
Table 17 *Coefficients Table, Multiple Regression, Research Question 4, Green Ratings and sustainability experience in college, and perceptions of respondents on how college impacted their environmental actions.*

<table>
<thead>
<tr>
<th>College Perception Construct</th>
<th>Standardized Coefficient, Beta</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus sustainability measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td># Times Sierra Club Cool School 50% or better</td>
<td>0.308</td>
<td>.074</td>
</tr>
</tbody>
</table>

*Note.* Included independent variables were enrollment, public or private school, acceptance %, 6-year graduation %, freshmen retention %, faculty/student ratio, % students living on campus, years since graduating, undergraduate degree, years attended, age and gender. Column heading identifies the construct of pro-environmental attitude. Coefficient estimates represent the estimated effect of a higher response of behavioral control with environmental attitude. Other independent variables were eliminated due to collinearity with VIF >10.

Graduates who responded in the survey who graduated from colleges and universities that were ranked in the top 50% of Sierra Club Cool Schools had a moderate to low significant impact on their perception of how college influenced them towards the environment. The Beta coefficient was 0.31, indicating that for every incremental increase in college sustainability experience, belief of the impact of college on pro-environmental behaviors increased by 0.3 points on a five-point scale.

Several of the campus measures were eliminated as independent variables, Princeton Review Average, Number of times a Princeton Review Green School, Talloires Signatory School, and both ACUPCC ratings due to collinearity, with VIF factors greater than 10. The rating organizations utilize a common reporting tool, which explains the high collinearity.

**Research Question 5**
Research Question 5: *What is the relationship between perception of college impact and self-reported pro-environmental behaviors in the workplace?*

**Null Hypothesis:** There will be no difference in behaviors between graduates who perceived their college experience as impactful regarding the environment and those expressing their experience as less impactful.

**Hypothesis 5:** There will be a positive relationship between perception of college impact and “green behavior” in the workplace.

Table 18 presents the coefficients and multiple regressions for Research Question 5, entire sample, with the dependent variable construct representing self-reported pro-environmental behaviors at work, and stated viewpoint of the impact of college on them regarding the environment.
Table 18  *Coefficients Table and Multiple Regression for Research Question 5, entire sample, perception of college impact on behavior and self-reported behaviors.*

<table>
<thead>
<tr>
<th>Behavioral Outcomes Construct</th>
<th>College Perception Construct</th>
<th>Standardized Coefficient, Beta</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception of college impact on respondents regarding the environment</td>
<td>.274</td>
<td>.000</td>
<td></td>
</tr>
</tbody>
</table>

Note. Included independent variables were enrollment, public or private school, acceptance %, 6-year graduation %, freshmen retention %, faculty/student ratio, % students living on campus, years since graduating, undergraduate degree, years attended, age and gender. Column headings identify the environmental behavior under consideration. Coefficient estimates represent the estimated effect of a higher response of behavioral control with environmental perceptions.

When the respondents expressed their college experience as impactful on them regarding the environment, they reported using pro-environmental behaviors to a greater degree than those who did not feel the same way about their alma maters. Two sustainability leadership behaviors had significance. Beta coefficients were almost 0.3, with high significance.

**Conclusion**

In summary, the null hypotheses for some of the research questions were rejected based on the multiple regression analyses identified in the Results, and primarily regarding perceived control in the workplace and perception of the impact of college on their viewpoints towards the environment. The number of times a college or university was ranked in the top 50% as a Sierra Club Cool School had moderate to weak significance towards college perception. In other words, graduates of higher ranked Sierra Club Cool Schools were more likely to believe that their college experience had a positive impact on their viewpoints towards the environment.
The role of campus rating appears to have little impact on environmental attitudes and behaviors. The measures are intended to determine how effective campuses are at implementing sustainable activities, instilling knowledge on the environment and the exposure students have to sustainability efforts. The findings here indicate that either the ratings are not accurately accounting for knowledge about the environment and sustainability, concern for the community and environmental awareness, (see Figure 8), the education and exposure students had about the environment and sustainability does not lead to lasting effects, or perceived control in the workplace is a stronger force on behaviors than the education respondents encountered in college.

Chapter V includes a summary by hypothesis of the statistical and theoretical findings. These are followed by implications to professionals and researchers and suggestions for further research.
CHAPTER V

DISCUSSION

This chapter contains a review of the significant findings of the study, relationship to the theoretical framework, assessment of hypotheses, limitations, and recommendations for further research. The purpose of this study was to determine whether sustainability rankings of colleges and universities were related to long-term pro-environmental behavior. In essence, do graduates from higher rated HEIs act in more sustainable ways than alumni from lower ranked schools, and do they think their college experience contributed to those actions?

In this study, the null hypothesis was not rejected regarding campus sustainability ratings and responses from participants concerning their pro-environmental attitudes and pro-environmental behaviors in the workplace.

The relationship between perceived control and behaviors in the adapted Theory of Planned Behavior was confirmed, and the null hypothesis can be rejected. This will be discussed in more detail later in this chapter. The adapted theory is illustrated in Figure 11.

Regarding perceptions of the impact of college on sustainable behaviors, there was a moderate to weak relationship between graduates from higher rated Sierra Club Cool Schools and perceptions that college had impacted them in a positive way about the environment.
Hypothesis One

The first hypothesis examined the relationship between the higher rated sustainable schools, as measured by national campus rating organizations and pro-environmental behavior. None of ratings from national sustainability organizations for recent graduates were stated as being impactful on the pro-environmental attitude construct. The data is summarized in Table 12.

Campus ratings may not be an accurate representation for knowledge about the environment and sustainability, concern for the community and environmental awareness, for graduates. They may or may not be representative for current students and this may be worth exploring further to determine if the absence of a relationship is related to the measures not being able to measure influence on students, or a time effect on graduates, where the knowledge level has decreased.

Hypothesis Two

Perceived control was tested in the model to determine whether a relationship existed between control as an independent variable and pro-environmental behavior in the workplace. Perceived control had a moderate impact on self-reported pro-environmental behaviors, demonstrated in Table 13. When the participants perceived their workplace as supporting pro-environmental behaviors and that they were cost effective, the impact was significant for four reported environmental behaviors in the workplace. Two of the behaviors require leadership, risk taking and decision making
by the employees, suggesting ways for other employees to act and choosing products that are more environmentally friendly.

If the respondents perceived that their company leaders supported pro-environmental decision or if recycling was convenient, then only decreasing energy consumption and not throwing recyclables away were significant. These behaviors do not demonstrate leadership, but tasks initiated by the participants.

Research from Dilchert and Ones (2012) indicated the importance of individual sustainable behaviors in the workplace and examined the amount of control by employees. When employees believed that the company and its leaders found pro-environmental decisions to be important, they reported to have demonstrated more individually sustainable behaviors.

Furthermore, when employees perceived pro-environmental actions as cost effective for the company, they were more likely to make suggestions for more environmentally friendly projects.

The relationship between perceived control and sustainable behavior was examined for the second research question. Research by Ahmad et al. (2014) could not prove the existence of a significant relationship. However, in this study, the hypothesis of a relationship was supported. The study by Ahmad et al. focused on current students in a university setting in Pakistan, and specifically focused on convenience of available recycling. The researchers concluded that, as Pakistan was a collectivist society, social standards had a strong influence on individuals’ attitudes and would be a stronger influence on recycling behavior than access to recycling
infrastructure. American society tends to be more individualistic and would react different from social norms.

The model was confirmed in this study among American college and university graduates. Further research may be warranted to test and compare perceived control with pro-environmental behaviors across nations with collective and individualistic characteristics.

It may be of value for organizations to communicate their support of pro-environmental behaviors and to establish processes and procedures that support employees in making decisions that lead to more sustainable business practices. Companies should report sustainability improvements and any cost savings as a result of pro-environmental efforts, and should recognize the employees who contributed to these successes.

In a study conducted in 2011, sustainability was found to be part of the organizational goals of 57% of the companies, with 729 HR professionals and 72% of organizations reporting the implementation of sustainable business practices. Due to the significance of the relationship between perceived control and pro-environmental behaviors, it is important that these percentages increase in all organizations (Schmit et al., 2012).

**Hypothesis Three**

Colleges’ sustainability efforts do not appear to be an accurate gauge of the long-term impact, of sustainability efforts made by colleges and universities. None of the campus measures were significant, and several of the independent variables
eliminated due to high collinearity. The highly collinear data was not surprising because the institutions determine their values using different methods, but with the same data for the Common Reporting Tool.

It could beneficial for university leaders to start examining the long-term impact of their efforts on graduates, and to determine if providing more opportunities for students to become involved in sustainability lead projects may lead to longer and greater impact. It might also be constructive to communicate to current students and graduates about ways they can contribute to the well-being of the environment. Administrators could begin gathering data among their alumni to drill down and determine what specific aspects of their sustainability efforts on campus have positively impacted students and graduates.

Campus rating organizations should consider examination of the common data collector to see if additional questions need to be asked to see how these efforts might be impacting students and graduates.

A factor impacting two of the questions within the behavior construct were behaviors involving others. The average amount of time subsequent to graduation for this sample was three years. Those who are new to the workplace or to the work environment in general may be more apprehensive about making suggestions and coaching others until they become more experienced. Recent graduates are more likely to be in junior positions in an organization, and may not feel they possess the formal authority to make suggestions to others about their behaviors and policies regarding sustainability. This provides an opportunity for organizations to encourage
suggestions for improving pro-environmental procedures and actions, particularly for new hires.

These findings may be reflected in the emphasis of the sustainability measures around the work of the faculty and staff in promoting sustainability, knowledge, skills, and disposition among students. Despite the nobility of the measures, none have a parameter for student leadership and initiatives. The adage, “What gets measured, gets done,” may be useful for colleges. The Campus Sustainability Data Collector (CSDC) could be modified to include questions about student leadership, suggestions, and implementation of projects, which may encourage HEIs to examine sustainability on campus and to encourage more student leadership and involvement.

Student involvement in sustainability projects may provide leadership opportunities. Research on service learning has indicated that community involvement improved both communication and leadership skills (Eyler & Giles, 1999).

**Hypothesis Four**

Another area of the research was to better understand whether graduates from higher rated schools in sustainability perceived an impact from their college experiences. Overall, responses from graduates in the study did confirm a moderate to weak relationship between the campus ranking, Top 50% of Sierra Club Cool Schools, and their belief that college experience made a significant difference in their desire to further protect the environment, indicating a weak impact in general.
The methodology used by the Sierra Club to calculated the scores for campus ratings may be the best system to use. It might save the other organizations time and effort if they used one summarized factor, instead of publishing multiple sets. Then, the campus rating organizations could focus on student involvement, long-term impact and reaching out to graduates to keep them involved in pro-environmental behaviors both at home and in the workplace.

**Hypothesis Five**

The final research question attempted to determine the existence of a relationship between perception of college impact and pro-environmental behavior. In the larger sample, four of the models on pro-environmental behaviors were found to be significant. When graduates had a higher rating of college experience on environmental attitudes, they expressed greater utilization of pro-environmental leadership practices at work.

In other words, when the respondents felt that their college experience was significant relating to environmental sustainability, they tended demonstrate more pro-environmental behaviors at work, including behaviors involving others: suggesting ways for other employees to be more environmentally friendly and to propose programs that benefitted the environment and individual conserving behaviors.
If the participants believed college had a significant impact on their attitudes about the environment, they are more likely to make efforts in their organizations towards greater protection of the environment.

When students participate in environmentally friendly projects in college, it is imperative that instructors and project leaders discuss with the students what they have learned, the impact the project made on the environment and themselves and discuss how they might apply the concepts later in life in the home and in the workplace. The reinforcement of their learning may impact their behaviors later in life.

**Implications for Current Theory**

The Theory of Planned Behavior was confirmed as an appropriate tool for measurement of understanding sustainable behavior in some of the areas of the model. One of the areas tested in the model was to determine whether campus ratings were significantly related to attitudes about the environment, and the null hypothesis could not be rejected. It is suggested that the tool with which to gather data should include more questions on student involvement and leadership in sustainability projects, and to research what aspects of campus sustainability efforts may lead to long term attitudes and behaviors are more important to the environment. Once these are determined, these metrics should be added to the Common Reporting Tool.

The model adapted by Ahmad et al. (2014), as modified by McNulty (2015), represents the larger scope of sustainability, rather than recycling. The validity of the efforts to measure sustainability could not be supported. These measures, along with
survey questions on knowledge, community concern, environmental awareness, sustainability, and experience, were not found to be related to individual attitudes or behaviors toward the environment.

Perceived control was confirmed as a determinant in pro-environmental behaviors. Dilchert and Ones (2014) also indicated that perceived control has a strong impact of behaviors in the workplace regarding sustainability. The model can be confirmed regarding perceived control.

**Recommendations for Further Research**

A longitudinal study, beginning with freshmen and continuing for the next 5-10 years after graduation, may provide interesting information on trends and factors that influence students, as they become professionals in organizations. A better understanding of trends may result through the use of a fixed-effects model.

Exploring variation within the top 50% of Sierra Club Cool Schools would yield interesting information on areas within the program that have the most lasting impact on students and alumni regarding perceptions of college.

A broader sample could be assessed if campus-rating organizations included the current survey in materials sent to HEIs, requesting that each alumni director survey their graduates. This larger database could be narrowed to determine additional differences among demographics. In addition, representatives from each campus rating organization might discuss combining into one measure, with additional metrics for student involvement and perceptions, and factors possibly leading to greater alumni impact regarding both behaviors and attitudes.
Conversely, a study performed among only business majors or education majors may provide insights into the involvement and educational efforts made for a particular major.

The entire model could be analyzed with more questions asked in the knowledge construct so that a factor analysis could be performed on each area of the Theory of Planned Behavior and the survey could be modified to ensure that knowledge questions could be combined into a common construct to test.

Another area for more research could involve similar research at a large international corporation, in order to control for company influence on individual sustainability behaviors. It also could assist in gathering international information about sustainability practices among individuals throughout the world. This type of research could be effective in determining whether a significant difference exists between perceived control and pro-environmental behavior in collectivist and individualistic societies.

**Implications of the Study for Professional Practice**

School administrators, business leaders, campus sustainability leaders, and national sustainability organizations can benefit from the findings of this study to make improvements in their processes. The results suggested that graduates’ perceptions of college resulted in a decided difference in sustainable behaviors. Administrators can work to involve students on initiating, implementing, leading, and reflecting upon sustainability efforts on campus and in the community, which may
increase the likelihood that graduates perceived college as impactful to them regarding the environment.

Additional results about perceived control and pro-environmental behaviors indicated that, when employees believed the company supported and valued pro-environmental actions, they should communicate their support and encourage employees to make and implement suggestions. Business leaders can measure efforts and initiatives, set goals, and present the information throughout the company. Campus administrators can do the same at their institutions, as well as network with organizational leaders in the community to establish joint projects and to stress the importance of leading by example regarding continued environmental sustainability.

Campus sustainability leaders should encourage student involvement and leadership, and should begin to measure these efforts. They could share best practices that involve students. Administrators also could participate in and support a survey of students and alumni regarding their sustainability attitudes, knowledge, and concern for the community, involvement, and behaviors when they begin their college education and several years following graduation.

Eyler and Giles (1999) found that deeper service learning occurred when students were emotionally and intellectually engaged in community projects. Service projects have been found to motivate students and to increase learning. Similar conclusions could be drawn regarding the impact of engaging students in sustainability projects in nearby communities. In order to assure that service learning is successful, the type of service should be meaningful, linked to the curriculum, and should allow for reflection to blend affective and cognitive learning (Kaye, 2004).
Simply discussing or presenting information on sustainability projects in the community may not create lasting impact and should be coordinated into the curriculum to reinforce learning and reflection.

The study of moral development of college students produced similar results. Borzak (1981) established the concept that experiential learning was a powerful educational tool. Other literature supported this concept. Researchers at Bethel College, driven by moderate growth among business students, found that seniors had below average empathy scores (Rest & Narvaez, 1994). Personal involvement in sustainability projects may generate greater appreciation for the environment and greater empathy for natural resources. Colleges and universities can work to instill a deeper appreciation toward the environment by involving students in university and community projects, but linked to the curriculum with time set aside for reflection.

Finally, campus-rating organizations can inspire a survey process for students and alumni, with a particular focus on behaviors and leadership. Institutions can reach out to alumni in order to develop ongoing educational plans for the future and to utilize the numerous non-profit environmental organizations to support businesses in the continuing process of environmental sustainability.
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Appendix A

The Talloires Declaration

We, the presidents, rectors, and vice chancellors of universities from all regions of the world are deeply concerned about the unprecedented scale and speed of environmental pollution and degradation, and the depletion of natural resources. Local, regional, and global air pollution; accumulation and distribution of toxic wastes; destruction and depletion of forests, soil, and water; depletion of the ozone layer and emission of "greenhouse" gases threaten the survival of humans and thousands of other living species, the integrity of the earth and its biodiversity, the security of nations, and the heritage of future generations. These environmental changes are caused by inequitable and unsustainable production and consumption patterns that aggravate poverty in many regions of the world.

We believe that urgent actions are needed to address these fundamental problems and reverse the trends. Stabilization of human population, adoption of environmentally sound industrial and agricultural technologies, reforestation, and ecological restoration are crucial elements in creating an equitable and sustainable future for all humankind in harmony with nature. Universities have a major role in the education, research, policy formation, and information exchange necessary to make these goals possible. The university heads must provide the leadership and support to mobilize
internal and external resources so that their institutions respond to this urgent challenge. We, therefore, agree to take the following actions:

1. Use every opportunity to raise public, government, industry, foundation, and university awareness by publicly addressing the urgent need to move toward an environmentally sustainable future.

2. Encourage all universities to engage in education, research, policy formation, and information exchange on population, environment, and development to move toward a sustainable future.

3. Establish programs to produce expertise in environmental management, sustainable economic development, population, and related fields to ensure that all university graduates are environmentally literate and responsible citizens.

4. Create programs to develop the capability of university faculty to teach environmental literacy to all undergraduate, graduate, and professional school students.

5. Set an example of environmental responsibility by establishing programs of resource conservation, recycling, and waste reduction at the universities.

6. Encourage the involvement of government (at all levels), foundations, and industry in supporting university research, education, policy formation, and information exchange in environmentally sustainable development. Expand work with nongovernmental organizations to assist in finding solutions to environmental problems.
7. Convene school deans and environmental practitioners to develop research, policy, information exchange programs, and curricula for an environmentally sustainable future.

8. Establish partnerships with primary and secondary schools to help develop the capability of their faculty to teach about population, environment, and sustainable development issues.

9. Work with the UN Conference on Environmental and Development, the UN Environment Programme, and other national and international organizations to promote a worldwide university effort toward a sustainable future.

10. Establish a steering committee and a secretariat to continue this momentum and inform and support each other's efforts in carrying out this declaration.

11. College and university leaders have taken the initiative to help to create organizations that demonstrate environmental sustainability. Recently, an increasing amount of these institutions have put greater emphasis on promoting and supporting sustainability. Environmental factors such as energy concerns, and a desire to educate students on the impact of their behaviors on the environment(Aber, 2009). Colleges and universities are ideal learning laboratories for demonstrating sustainable actions and both short and long term commitments to the environment. Examples of short-term commitments include more energy-efficient technology systems and
long-term options would include investments into renewable energy sources (Horhota, 2014).
Appendix B

Princeton Review Rating Criteria

We assembled a panel of experts in higher education green practices to produce a survey for school administrators. The panel then selected key questions and weighted them for the rating. As with all our research, nearly all 4-year colleges and universities are invited to participate early in the year. We then produce the rating for each participating college based on their responses.

This rating, on a scale of 60–99, provides a comprehensive measure of a school's performance as an environmentally aware and prepared institution. Specifically, it includes 1) whether students have a campus quality of life that is both healthy and sustainable, 2) how well a school is preparing students for employment in the clean-energy economy of the 21st century as well as for citizenship in a world now defined by environmental concerns and opportunities and 3) how environmentally responsible a school's policies are.

Additionally, The Princeton Review, the Association for the Advancement of Sustainability in Higher Education (AASHE) and Sierra magazine has now collaborated on an effort to streamline the reporting process for institutions that choose to participate in various higher education sustainability assessments. The intent of this initiative is to reduce and streamline the amount of time campus staff spend tracking sustainability data and completing related surveys.
To address this issue, these four groups have worked to establish the Campus Sustainability Data Collector (CSDC). The CSDC is based on the STARS Reporting Tool and is available for all schools (free of charge) that would like to submit data to these groups in one single survey. Please find more information here: http://www.princetonreview.com/green-data-partnership/.

We asked all the schools we annually collect data from to answer questions about their efforts to provide (and continually develop) an environmentally beneficial student experience. The questions were created in consultation with ecoAmerica, a research- and partnership-based environmental nonprofit that convened an expert committee to design this comprehensive ranking system. Questions it covered are included on the website: http://www.princetonreview.com/green-schools-full-list.aspx

What is the percentage of food expenditures that goes toward local, organic or otherwise environmentally preferable food?

"Purchasing local and especially local organic food provides healthier dining options for students, local economic support and reduced global warming and pesticide pollution. And it's just one example of how what's good for you is good for the community and the planet."

Does the school offer programs including mass transit programs, bike sharing, facilities for bicyclists, bicycle and pedestrian plans, car sharing, a carpool discount, carpool/vanpool matching, cash-out of parking, prohibiting idling, local housing, telecommuting, and a condensed workweek?

"It's simple: Do you want to go to a school that forces you to drive everywhere and spend 20
minutes looking for a parking spot in hazy air or somewhere that makes it easy for you to get around and enjoy a clean campus without the hassle and cost of a car? By providing public or shared transportation that increases access, schools can improve the college experience while reducing pollution."

Does the school have a formal committee with participation from students that is devoted to advancing sustainability on campus?

"Opportunities for involvement in key school decisions mean that you can both improve school quality of life and get valuable experience for your career. Even if you're not on the committee, you and your peers can get involved in the student groups that participate in the process and have a voice. And schools with an inclusive approach, with participation from administration to faculty and staff to students, ensure more dynamic, long-lasting solutions."

Are school buildings that were constructed or underwent major renovations in the past three years LEED certified?

"Building according to high LEED standards means more fresh air, natural light and fewer toxins. Studies show improved health, a better classroom experience and reduced energy costs over the long term. The LEED rating program provides a credible, respected measure of building energy efficiency and environmental design for schools to build sustainable structures."

What is a school's overall waste-diversion rate?

"It boils down to this question: Piles of trash outside the dorm and dining hall or less waste and lots of easy recycling bins? A waste-diversion rate measures both the reduction in waste
output and a school's rate of recycling."

Does the school have an environmental studies major, minor or concentration?

"Students want to get good jobs and lead responsible lives, lives that make a positive
difference for society. To do that, undergrads need access to environmental studies courses
that provide an understanding of how the global ecosystem works and prepare you for future
opportunities. Even if you don't major in environmental studies, a school's commitment to
the field means you have more course options to ensure you get the background you need."

Do the school's students graduate from programs that include sustainability as a required
learning outcome or include multiple sustainability learning outcomes?

"Environmental literacy is becoming a core necessity, regardless of career or interest, as
companies are increasingly asking employees to consider the bigger picture. Working as an
economist or in the business sector? You'll need to look at the price of carbon. Entering the
computer science field? You'll have to think about reducing energy use. Designing
buildings? Know the wood that has the least environmental impact and think about where
the trash goes."

Does the school have a formal plan to mitigate its greenhouse gas emissions?

"Climate change will affect every aspect of our lives. Leading climate scientists say that a
minimum of 80 percent reduction in carbon emissions midcentury will be necessary to avert
the worst impacts of climate change. A school that has an inventory and a plan is not only
taking responsible action, it is more likely to have the experience to deliver the training you
need for your life and your career."

What percentage of the school's energy consumption is derived from renewable resources?

"No school will be able to reduce its energy consumption to zero. But every university can make sure that the energy it does use is healthier for students and the planet by being clean and renewable. So in addition to efficiency improvements and conservation efforts that cut energy use, campuses should make sure the remaining power they do use comes from renewable sources."

Does the school employ a dedicated full-time (or full-time equivalent) sustainability officer?

"Ensuring a school is healthy for students and for the planet takes focused and continuous attention. Schools that are serious and sincere about sustainability simply can't succeed without hiring professionals to coordinate campus-wide efforts that improve the student experience."

Colleges that did not supply answers to a sufficient number of the questions for us to fairly compare them to other schools received a Green Rating of 60*. The schools have an opportunity to update their sustainability data every year and will have their ratings recalculated and published annually.

All italicized quotations are from Jared Duval, a fellow at Demos, where he helped found the Emerging Voices Initiative. He is the author of Next Generation Democracy: What the Open Source Revolution Means for Power, Politics, and Change.
Appendix C

STARS Rating Methodology

STARS only provides positive recognition. Participating in STARS, which includes gathering extensive data and sharing it publicly, represents a commitment to sustainability that should be applauded. Therefore, each level of recognition represents significant sustainability leadership.

There are four STARS ratings available (Bronze, Silver, Gold and Platinum). The table below summarizes the scoring thresholds corresponding with each rating. Only participants with a full access subscription may submit a report to earn one of these rating levels. Any institution that wishes to participate in STARS but does not want to pursue a rating or make their scores public may participate as a STARS Reporter (see below).

<table>
<thead>
<tr>
<th>STARS Rating</th>
<th>Minimum Score Required</th>
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<tbody>
<tr>
<td>Bronze</td>
<td>25</td>
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<tr>
<td>Silver</td>
<td>45</td>
</tr>
<tr>
<td>Gold</td>
<td>65</td>
</tr>
<tr>
<td>Platinum</td>
<td>85</td>
</tr>
</tbody>
</table>

Once earned, a STARS rating is valid for up to three years, however an institution may submit for a new rating as often as once a year.
Scoring

An institution’s score is based on the percentage of points it earns by pursuing credits across four categories: Academics (AC), Engagement (EN), Operations (OP), and Planning & Administration (PA). Some credits do not apply to all institutions. For example, the credits about dining services do not apply to institutions that do not have dining services operations. Institutions will earn a score based on the percentage of applicable points they earn. In other words, credits that do not apply to an institution are not counted against that institution’s overall score. For example, the credits that are applicable to Model Community College total 180 points. The college earns 90 points (50% of available points), for a total score of 50, making Model Community College eligible for a STARS Silver rating. Although all applicable credits count toward scoring, participants have the option to decide which credits to pursue and which not to pursue.

In addition to the credits in the four categories outlined above, institutions may earn up to 4 Innovation credits for new and path-breaking practices and performances that are not covered by other STARS credits or that exceed the highest criterion of a current STARS credit. Innovation credits are not required to be specific to any category and are scored separately. Each earned Innovation credit increases an institution’s overall score by 1 point. The STARS Technical Manual outlines all of the points available under the current version of STARS.

Point Allocation
Credits vary in the number of points they are worth. Points were allocated by a panel of STARS Steering Committee members and AASHE staff using the following considerations:

1. To what extent does achievement of the credit ensure that people (students, employees and/or local community members) acquire the knowledge, skills, and dispositions to meet sustainability challenges?

2. To what extent does achievement of the credit contribute to (a) human and ecological health and mitigate negative environmental impacts; (b) secure livelihoods, a sustainable economy and other positive financial impacts; and (c) social justice, equity, diversity, cooperation, democracy and other positive social impacts?

3. To what extent are the positive impacts associated with achievement of the credit not captured in other STARS credits?
Appendix D

Survey and Scoring for Sierra Club Cool Schools

By Avital Andrews

PARTICIPATION

Participation in Sierra magazine's Cool Schools ranking is open to all four-year undergraduate colleges and universities in the United States. This year, campus administrators could participate by going to stars.aashe.org to complete an extensive questionnaire about their school's sustainability practices. Schools that submitted complete, updated data starting on June 2, 2013 or thereafter were eligible for this year's rankings.

Sierra received 162 complete responses from qualified colleges. Once schools submitted their data, researchers scored each response and ranked all the participating institutions. There was no cost for participation, and no affiliation or relationship between a school and the Sierra Club or its employees, past or present, influenced the ranking.

SURVEY

The survey, officially called the Campus Sustainability Data Collector, is the result of the collaborative efforts of four organizations: the Sierra Club, the Association for the Advancement of Sustainability in Higher Education (AASHE), the Sustainable Endowments Institute (SEI), and the Princeton Review. It is something of an amalgamation of all four organizations' questionnaires of recent years. Its questions
center on measurable environmental achievements and goals, with priority given to achievements. (Schools did not need to be members of AASHE's STARS program to use the collector if they chose to share their data with Sierra.)

The purpose of this collaboration was to reduce the amount of time campus staffers spend completing separate surveys. Together, the groups sought to streamline the schools' reporting process to more closely resemble the way campuses already collect and report sustainability data. Another benefit of this collaborative questionnaire: It allows for a broad, deep investigation into a wide variety of environmental efforts while aiming to reduce college administrators' reported "survey fatigue" of years past.

EVALUATION

Evaluation was based primarily on schools' responses to the survey but when appropriate, we made follow-up inquiries by phone and e-mail and used publicly available outside sources to verify and complement survey responses. Final ranking decisions, however, were based on our scoring key, a rubric which emphasizes the Sierra Club's environmental priorities and rewards schools that do a good job of measuring and mitigating their impact. When it came to survey responses, all submitted materials were considered, though where answers were blank, unclear, or inconsistent, institutions were not awarded full credit.

RESULTS

The resultant Cool Schools ranking is an index that provides fair, comparative information about the most important elements of campus sustainability. The results suggest that while many universities are making admirable progress, no school has yet attained complete sustainability. The top-rated university scored 850 (out of a
possible 1,000 points), indicating much work completed and also room for improvement.

The United States has more than 2,000 four-year colleges and universities, so there are, of course, schools that care about the environment that don't appear on Sierra's list. That said, the magazine's ranking aims to act as a guide for prospective students who seek a way to compare colleges based on their commitment to environmentalism. It also serves to spur competition, create aspirational standards, and publicly reward the institutions that work hard to protect the planet.
Appendix E

IRB Documents

Institutional Review Board (IRB) for the Protection of Human Subjects
Date: 1/20/2015
IRB Review
IRB PROTOCOL NO.: 15-108
Protocol Title: How sustainable are campus sustainability efforts? : A study of the long-term impact of college and university sustainability programs on graduates.
Principal Investigator: Margaret (Peggy) McNulty
Faculty Advisor if Applicable: Dr. Marcus Winters
Application: New Application
Type of Review: Exempt Category 2
Risk Level: No more than Minimal Risk
Renewal Review Level (If changed from original approval) if Applicable: N/A No Change
This Protocol involves a Vulnerable Population: N/A (No Vulnerable Population)
Expires:N/A
*Note, if exempt: If there are no major changes in the research, protocol does not require review on a continuing basis by the IRB. In addition, the protocol may match more than one review category not listed.
Externally funded: ☒ _No □ _Yes
OSP #: Sponsor:
Thank you for submitting your Request for IRB Review. The protocol identified above has been reviewed according to the policies of this institution and the provisions of applicable federal regulations. The review category is noted above, along with the expiration date, if applicable.
Once human participant research has been approved, it is the Principal Investigator’s (PI) responsibility to report any changes in research activity related to the project:
• _The PI must provide the IRB with all protocol and consent form amendments and revisions. o The IRB must approve these changes prior to implementation.

• _All advertisements recruiting study subjects must also receive prior approval by the IRB.
• _The PI must promptly inform the IRB of all unanticipated serious adverse (within 24 hours). All unanticipated adverse events must be reported to the IRB within 1 week (see 45CFR46.103(b)(5). Failure to comply with these federally mandated responsibilities may result in suspension or termination of the project.
• _Renew study with the IRB prior to expiration.
• _Notify the IRB when the study is complete

If you have any questions, please contact Research Compliance Specialist in the Office of Sponsored Programs at 719-255-3903 or irb@uccs.edu
Thank you for your concern about human subject protection issues, and good luck with your research.
Sincerely yours,
Sonja B. Braun-Sand, PhD
IRB Reviewer
Dear Participant:

The following survey is intended to help to better understand your viewpoint of your campus sustainability program and how it did or did not impact you. This survey is part of a project on Sustainability Impact of Higher Education. The survey can be completed in 10-12 minutes and no specific knowledge of or interest in environmental issues is required. For purposes of the survey, a definition of sustainability is listed at the bottom of the page.

Strict confidentiality will be maintained for you and your institution at all times. Each survey response will be identified only with a number only and will not be shared with anyone outside the of the researcher. The results will be reported in an aggregated way only. Your participation is voluntary; you may withdraw your survey at any time, and you may skip over any questions.

The survey allows you to reflect on your campus’ environmental initiatives. Your participation will help determine the effectiveness of campus environmental efforts. Contact Peggy McNulty with any questions, concerns or suggestions. We greatly appreciate your participation.

Sincerely,

Peggy McNulty  mknock@uccs.edu
Doctoral Candidate and Visiting Professor
University of Colorado Colorado Springs and University of Nevada Las Vegas
Sustainability Definition

This survey will refer to “sustainability” which is used in many ways. The following definition may help you as you complete the survey. “To meet the needs of the present without compromising the ability of future generations to meet their own needs.” The Brundtland Commission (United Nations), 1987
Appendix G

Campus Impact Sustainability Survey

Survey Directions:

Below are a series of statements about behaviors that can occur in the workplace. Read the question prompt and, for each item, use the response scale to indicate your experience of others in your workplace. Fill in the circle that corresponds to your preferred response option.

1 a. What college or university did you most recently graduate from?

1 b. What year did you graduate?

1c. Which degree did you receive?

1d. Undergraduate _______ Graduate ____________

1e. How long did you attend this university?

2. What major did you receive?

3. What is your age? ____________

4. What is your gender? ______

Rating Scale: (1) Strongly Disagree - (7) Strongly Agree or N/A

These questions relate to your college experience with sustainability.

5. My college experience had a significant impact on my attitude towards further protection of the environment.

6. My time in college made me more aware of the need to take action to protect the environment.
7. My college experience positively impacted environmental actions in the workplace today.

8. My college experience positively impacted environmental actions at home today.

9. Other factors besides my college experience significantly influence my environmental actions.

10. My college experience exposed me to sustainability projects.

11. I am concerned with maintaining a good place to live.

12. I have a strong interest in the health of the community in which I live.

13. I believe that my environmental behavior will reduce waste.

14. I feel good about myself when I act in ways that benefit the environment.

The following questions are about your workplace. If the questions do not apply, please skip them.

15. When there is a choice, I choose products that are better for the environment in the workplace.

16. I suggest ways for other employees to act in a more environmentally friendly manner.

17. I have proposed new environmentally friendly programs for my company.

18. I take extra time or energy to perform an environmentally friendly behavior over an environmentally harmful behavior.

19. I decrease energy consumption by turning off equipment when not in use.

20. I have a high level of knowledge about sustainability.

21. I tend to throw recyclable materials into trashcans.

22. My colleagues expect me to act in ways that benefit the environment.
23. Not recycling goes against my principles.

24. My workplace supports pro-environmental behavior.

25. Acting in environmental ways is cost effective for my workplace.

26. It is important to the leaders in my company/organization to make pro-environmental decisions.

27. It is convenient for me to recycle supplies at work.

These questions relate to your personal perspectives on environmental sustainability.

28. I consider myself as very knowledgeable about the environment.

29. Acting in ways that benefit the environment is rewarding.

30. My friends expect me to act in ways that benefit the environment.