Summer 2015

A Mixed Methods Assessment of the Development, Use, and Educational Effectiveness of University Campus Sustainability Tours

Ellen R. Barringer
Western Kentucky University, ellen.barringer354@topper.wku.edu

A MIXED METHODS ASSESSMENT OF THE DEVELOPMENT, USE, AND EDUCATIONAL EFFECTIVENESS OF UNIVERSITY CAMPUS SUSTAINABILITY TOURS

A Thesis
Presented to
The Faculty of the Department of Geography and Geology
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
of the Requirements for the Degree
Master of Science

By
Ellen Rachel Barringer

August 2015

A MIXED METHODS ASSESSMENT OF THE DEVELOPMENT, USE, AND EDUCATIONAL EFFECTIVENESS OF UNIVERSITY CAMPUS SUSTAINABILITY TOURS

Date Recommended May 14, 2015

Dr. Leslie North, Director of Thesis

Dr. Jeanine Huss

Dr. Margaret Gripshover

Dean, Graduate School

8-21-15
Date

ACKNOWLEDGEMENTS

In your hands, reader, is the final product of a long saga in which many unique characters have played a part. It takes the experiences, opinions, and involvement of many knowledgeable and willing individuals to help a graduate student complete a degree. I would like to express my many, many thanks to all of the incredible people who have helped me complete my journey. These persons have seen me grow, fall down, and learn along the way, and have provided me the hands that have guided me and pulled me to my feet.

I would first like to express my gratitude to my advisor, mentor, and friend, Dr. Leslie North. As my advisor, she has counseled me through many situations from conquering my comprehensive exams to convincing me to include or remove make-or-break portions of my thesis. The experiences I have been given would never have occurred without your involvement, and they have helped me grow in ways I could never have imagined. I have learned just as much from your direct input as I have from observing your determined, compassionate, and generous nature. Thank you.

The guidance I have received from my committee members, Dr. Margaret Grisphover and Dr. Jeanine Huss, has been insightful. Having never ventured into the world of environmental education, you have helped me to make sense of a new and sometimes overwhelming sphere of knowledge. Thank you for keeping me on the right path. My thesis would not be complete and I would have missed incredible opportunities had it not been for Ms. Christian Ryan and Mr. Kevin Cary. Christian, your understanding of the realm of campus sustainability has floored me, and the incredible initiatives you have brought about on the WKU campus amaze me daily. Without your

dogged determination to green our campus and create passionate, sustainable citizens, this thesis would not exist. Mr. Cary, thank you for your patience and willingness to share your immense knowledge – much of this thesis would not exist without your help and direction. I would not be where I am without either of you.

There are dozens of others who have aided in this journey. Dr. Jason Polk – thank you for the many opportunities you have given me! From GSA in Denver to Iceland to working at Crumps Cave, I have had experiences I could never dream of because of your work. To Wendy DeCroix, the best office manager – thank you for keeping my world running smoothly! And for the fun, friendships, joy, frustrations, tears, anxiety, jokes, smiles, and laughter you have shared with me and the sanity you have given me, I'd like to thank my fellow graduate students and the undergraduate students I have shared my time with here. Thank you all for making this experience unforgettable.

And to all of my many family and friends who have supported me these two years: thank you from the bottom of my heart. You have given me the support I needed to complete this research. You have comforted me, provided me a sounding board, and been a place for me to find sanity for the last two years. Without all of you, this would never have been possible. Thank you for your strength and support.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

A MIXED METHODS ASSESSMENT OF THE DEVELOPMENT, USE, AND EDUCATIONAL EFFECTIVENESS OF UNIVERSITY CAMPUS SUSTAINABILITY TOURS

Ellen R. Barringer August 2015 213 Pages

Directed by: Leslie North, Jeanine Huss, Peggy Gripshover

Department of Geography and Geology Western Kentucky University

Campus sustainability tours are available at dozens of colleges and universities across the United States. These tours are considered a vital tool in interpreting the environmental and sustainable aspects of a campus to educate the campus community. Minimal quantitative data have been collected regarding their development, use, and effectiveness. In order to develop a dataset regarding the use of campus sustainability tours, surveys and interviews were sent to universities with such tours to discuss use and methods of development. A campus-wide electronic survey was sent to the Western Kentucky University (WKU) main campus community to determine their experiences with the WKU Green Tour. Pre- and post-tests were distributed to students at WKU before and after their experience with the tour to establish whether learning occurred. Professors were surveyed to determine the current use of the tours within classrooms.

Best practices regarding the development of campus sustainability tours are not available. There is virtually no quantitative information available on the tours' use and effectiveness. The WKU Green Tour, which relies upon campus signage to gain attention, sees little use since the signs tend not to capture attention. According to collected data, members of the campus community who do notice the signs find them interesting and learn new information. The guided tour, self-guided tour, and Green Tour lecture all saw significant knowledge gain in students, demonstrating educational

effectiveness. Many barriers prevent professors from using the tours, but some supplemental tour items are suggested to improve classroom use.

Based on data collected and analyzed as part of this study, tour developers should target the existing campus community rather than focusing solely on campus visitors. Relying on passive signage to capture attention reaches few members of the campus community. The significant knowledge gain demonstrated in classroom use of the Green Tour creates a strong argument for targeting professors as a user group. WKU faculty would likely increase their use of the Green Tour if provided with supplemental tools such as brochures, a virtual tour, and pre-made assignments. These tools should be made available to instructors with guidance in usage and incorporation.

CHAPTER ONE: INTRODUCTION

1.1 Research Overview

Human systems are placing immense stress upon the natural world, leading to damaged ecosystems, changing climates, species extinction, pollution, and unsustainable resource consumption (Goudie, 2013; Middleton, 2013). As these effects surface, it is becoming clear that human interaction with the earth must begin to change. A shift towards sustainability must occur if human impacts on the globe are to be reduced.

Human behavior is, unfortunately, difficult to change, and more than the provision of information is needed to guide people towards sustainable choices. Environmental education has the opportunity to contribute to a knowledgeable populace aware of the importance of sustainability. By providing information and increasing awareness, environmental education seeks to change individuals' attitudes and provide motivation for behavior change towards environmentally sound and sustainable actions (National Environmental Educational Advisory Council, 1996). Many methods, including formal, non-formal, and informal educational opportunities, can be used to disseminate environmental and sustainable messages to learners by reaching different populations.

The university campus is an exceptional tool for environmental education. Universities mostly control their built environment and, therefore, can develop unique approaches to environmental issues. These initiatives can be used to educate the campus community if learners are aware of their existence. A "gray" literature search will reveal that over 60 universities and colleges in the United States conduct sustainability tours on their campuses. These tours, using various supplemental materials to improve their visibility and participant experiences, convey sustainability and environmental messages

relevant to the campus in order to educate faculty, staff, students, and visitors. Campus sustainability tours have the ability to solve the problem of a 'hidden curriculum', value messages presented by the campus itself, by alerting learners to campus projects and the invisible aspect of the campus (Orr, 1996). These tours can be used in formal, non-formal, and informal capacities, allowing them the flexibility to reach many campus populations. In a formal setting, the tours can be used within classes by professors and integrated into the curriculum. Non-formal opportunities include guided tours for interested individuals (American University, 2015; Portland State University, 2015). Self-guided tours and passive signage can be made available as informal learning options (Arizona State University, 2012; Purdue University, 2013).

The mechanisms behind using sustainability tours in conjunction with the campus as a learning tool have not been well researched. In fact, it is unknown whether such tours are well used by campus communities if they are not actively guided toward the tours. Virtually no quantitative information is available regarding the use of sustainability tours by campus communities. Equally unknown is whether participants learn after the tours capture their attention. Yet, research into the use and educational effectiveness of these tours is vital to understanding and improving how learners interact with this unique educational tool.

This research project utilized surveys, interviews, and pre- and post-tests to discover the use and development of campus sustainability tours across the United States, and the use and effectiveness of the WKU Green Tour, a case study subject. This study sought to answer the following research questions:

- How do universities develop and use campus sustainability tours?

- How are campus sustainability tours used by campus communities?
    - Do students learn from the WKU Green Tour when offered as a guided tour, self-guided tour, or lecture?
    - Do professors at WKU use the Green Tour in their classes? How can this use be improved?
- How can Geographic Information Systems be used to improve sustainability tours and their use?

By answering these questions, the researcher was able to determine how sustainability tours were developed and used, whether they are effective learning tools, and how use of these educational opportunities can be improved. This thesis present the findings of this research in the form of two articles, formatted for an academic journal. Within this introduction, a detailed literature review is provided, with each successive chapter containing a brief introduction with literature prior to reviewing the results and findings of the research process.

1.2 Sustainability and Environmental Education

As scientists begin to understand more about human impacts on Earth's systems, they are learning that current human systems and ways of life are unsustainable. The ways in which many societies and individuals use resources cannot be maintained while populations increase and people seek higher standards of living (Keck et al., 1994; Davis, 1998; Pimentel et al., 2000). These facts have led to researchers seeking sustainable alternatives to the products, actions, and systems humans have created.

Sustainability has been defined in many ways but, in its simplest form, it is the ability of a resource to be used for long periods of time without destroying or diminishing

its abundance (Merriam-Webster, 2015; United States Environmental Protection Agency, 2015). One of the most commonly used definitions of the term comes from the Brundtland Report developed by the United Nations, wherein sustainable development is, ". . . development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987, 1). Many groups and individuals have created their own definitions of sustainability, and it is often difficult to find one definition that encompasses the entirety of the sustainability idea, though most agree sustainability is complicated.

The complexity of sustainability and all of the components that impact it can lead to a lack of understanding of what the concept means and what actions can begin to lead to its realization. In addition, achieving a sustainable society requires people to understand its necessity in order to support and engage in sustainable actions (Cortese, 2003). For these reasons, education and communication about the environment and sustainability are important for future sustainable development (Tilbury, 1995). Environmental education specifically, in its role as a possible umbrella term for other types of education, can contribute to sustainable development (United Nations Educational, Scientific and Cultural Organization, 1992).

A vital aspect of environmental education is terminology. This discipline is still evolving, and terminology is still being developed and confirmed (Heimlich, 1993; Sauve, 1996; Jickling, 1997; Jickling and Spork, 1998). Many other terms, such as sustainability education, education for sustainable development, environmental studies, education for the environment, and environmental learning have been used interchangeably with environmental education, though they may have subtle differences.

This thesis uses the term environmental education as inclusive of other terms as ". . . the commonalities outweigh the differences, and this justifies the use of the term" (Elder, 2003, 7).

To understand how campus sustainability tours can contribute to environmental education, it is necessary to define environmental education and its goals. One of the first definitions of environmental education was developed by the International Union for the Conservation of Nature and Natural Resources (IUCN) in 1970 (Palmer, 1998). This definition states that environmental education is a process that creates learners who recognize values and clarify concepts in order to develop skills and attitudes about the environment. This allows learners to understand the interconnections between humans, culture, and the natural environment. Learners obtain decision-making skills and the ability to formulate a code of behavior based on beliefs about the environment (International Union for the Conservation of Nature, 1970). This definition is comprehensive, addressing the development of values, understanding, behavior, decision-making, and skills regarding the environment, rather than simply imparting knowledge to learners. At its core, environmental education is the method of learning about environmental processes, human impacts on those processes, and how individuals relate and affect the interconnection between humans and the environment (Saveland, 1976; Palmer, 1998).

Throughout the 1970s, understanding of environmental education expanded. In 1972, the United Nations Conference on the Human Environment confirmed the status and importance of environmental education, which led to the establishment of the United Nations International Environmental Education Program (IEEP) in 1975 (United Nations,

1972; Palmer, 1998). The program led to the first inter-governmental statement on environmental education in the form of a comprehensive document called the Belgrade Charter, which listed aims, concepts, objectives, and principles of environmental education (Barry, 1976; Palmer, 1998). A follow-up meeting resulted in the Tbilisi Report, which contains recommendations for environmental education and establishes guiding principles for environmental education (United Nations Educational, Scientific and Cultural Organization, 1977; Palmer, 1998; Lee and Williams, 2006). In this same decade, the National Environmental Education Act was passed in the United States (Palmer, 1998; Lee and Williams, 2006).

In 1987, the Brundtland Report was created from a conference of the World Commission of Environment and Development (WCED) and called for a global agenda on sustainable development, with environmental education playing a key role (World Commission on Environment and Development, 1987). The Earth Summit, held by the UNCED in Rio de Janeiro in 1992, led to the creation of Agenda 21, in which nations agreed to certain actions towards achieving sustainable development, including environmental education (Palmer, 1998). With these new documents, environmental education was given a key role in the creation of a sustainable future. Given its ability to create informed, interested, and caring citizens, it is essential that environmental education affects change and improves society to create a sustainable, healthy world.

1.2.1 Formal, Non-formal, and Informal Education

The term ‘education’ typically conjures the image of a classroom of students with a teacher at the head. This represents a limited view of the term. Much of what a person

not only learns, but retains, is not gleaned from an educational institution, but from personal experiences and through other informational outlets (National Research Council, 2009). There are generally considered to be three types of learning: formal, informal, and non-formal learning (Dib, 1987; Ainsworth and Eaton, 2010). Campus sustainability tours can be used in all three capacities.

Formal education is characterized by a highly structured environment created expressly for education, where learning can be evaluated and is governed by strict curricula (Marsick and Watkins, 1990; Schugurensky, 2000; Ainsworth and Eaton, 2010). Learning is controlled and directed by a teacher, and an overarching institution dictates what will be learned, setting requirements and standards for students (Heimlich, 1993; Jurin et al., 2010). This format benefits from required attendance, creating a captive audience dynamic.

In non-formal education, an overarching institution and organization is present, and there is a clear goal of learning; attendance is not required, but neither are mandatory evaluations (Schugurensky, 2000; Ainsworth and Eaton, 2010). In this case, students control some of what is learned, and they choose to learn interesting or useful information beneficial to them personally (Dib, 1987). These aspects tend to make non-formal learning more effective and appealing to learners, as they feel that it will provide them with information that they see as valuable and useful in their life (Dib, 1987).

Informal learning occurs completely outside the control of teachers, instructors, and institutions and does not always include traditional curricular subjects (Schugurensky, 2000; Ainsworth and Eaton, 2010). There is no outside control over learning activities, no outside guide to aid in interpretation and understanding, no

objectives or evaluations, and no requirement for attendance. Though the institution or media control content and how much information is provided, the learner chooses to attend or ignore the messages, giving the learner ultimate control (Schurgurensky, 2000; Livingstone, 2001). These approaches are compared in Table 1.

Table 1. *Formal, Non-formal, and Informal Education.*

Formal Education	Non-formal Education	Informal Education
•Attendance required •Learning is evaluated •Structured curriculum present •Learner has little to no choice in what is learned •Learning is controlled by an instructor •Rigid structure •e.g. A college writing course taken for credit	•Attendance is not required •Learning is often not evaluated •Learner has choice in what is learned •Learning can be guided •Flexible structure •e.g. A visit to a museum or nature preserve	•Attendance is not required •Learning is not evaluated •Learner has complete control over what is learned •Learning is self-guided •Flexible structure •e.g. Reading a newspaper

Informal and non-formal method effectiveness improves when combined with formal methods, because it improves student interest and knowledge in the classroom. For example, museum visits can improve student understanding of basic science principles, experiences in local nature areas improve animal classification skills, and visits to industries improve understanding of industrial processes (Braund, 1991; Dierking and Falk, 1994; Falk and Dierking, 2000; Parvin and Stephenson, 2004). Not only do these experiences improve understanding and interest, but they aid students in seeing learning as a broader enterprise than simply the formal school environment (Nundy, 2001; Braund and Reiss, 2006). This allows students to make connections

between school learning and other areas in their lives, increasing interest and imparting critical thinking skills about relationships with the world. Given these improvements in educating students when combining these methods, it is vital to understand how universities can create these effective educational combinations to educate students on sustainability topics. The ability of a campus sustainability tour to transition between these types of learning can make it a valuable tool for educating the campus community on sustainability.

1.2.2 The Hidden Curriculum

In essence, the 'hidden curriculum' of a university consists of those values which are taught to students throughout the institution through choices in curriculum, the physical environment, and instructors' or lecturers' personal views (Cotton et al., 2013). Any disparity between what is taught to students and what they actually learn can likely be attributed in some part to this hidden curriculum. In terms of what the campus itself informally teaches students about sustainability, the curriculum evident in the physical university campus can either support or contradict what is being formally taught to students, leading to either a deeper understanding of the concept or conflicted views (Orr, 1990; Cotton et al., 2013).

Most students experience hidden curricula in an informal way as they live and work on the campus, rather than within the formal setting of a course. Recognizing that links exist between the informal curriculum and the formal education students receive in courses, however, can reduce the contradictions students may see between their formal curriculum and the values the university demonstrates informally throughout its campus

(Winter and Cotton, 2012). Even if contradictions are not removed, this recognition of the hidden curriculum of a campus as a teaching tool and informal education conduit can lead to conversations about sustainability for students. The campus hidden curriculum can be a 'subject-neutral' forum within which to discuss sustainability and contribute to student understanding of sustainability as an interdisciplinary subject (Jucker, 2002; Kagawa, 2007; Winter and Cotton, 2012).

A study at Plymouth University in the United Kingdom sought to determine what students learned about sustainability from the physical campus in an informal learning setting (Cotton et al., 2013). Students were engaged as researchers to create a video log regarding their interactions with and views of their campus in regards to sustainability. Analysis showed that students, in some cases, were confused regarding whether certain practices were sustainable, and some questioned university commitment to sustainability after viewing the actions occurring on campus. Some students were critical of how the university communicated sustainability through the campus environment, and these students felt that this communication should be given a greater priority. Students did not identify sustainability as a part of the projected campus identity due to a lack of purposeful communication about sustainable initiatives. The following quotes by students discuss their view of a need for purposeful communications regarding campus sustainability (Cotton et al., 2013):

> " 'All the things I found...it's not like students would realise that is sustainable ...I don't feel like there is a big message being sent or anything (Geography student).'
>
> 'I didn't see much information around the uni, in fact I did not see anything and I was looking specifically for things

> so you have to make it more obvious for people to realise (Geography student).'
>
> 'The university should work on promoting what it is doing to students rather than just having it going on in the background, all the external stuff seems to be a priority (International relations student).'"

"Learning through the campus has the potential to promote sustainability literacy in students from a range of different disciplines" (Cotton et al., 2013, 9). The use of a campus sustainability tour or accompanying signage has the potential to remedy many of the concerns identified by the students participating in the Cotton et al. (2013) study, by providing a method of communicating campus sustainability and clarifying concepts. These tours can further the promotion of the campus as a learning tool and can identify sustainable aspects of campus for the campus community.

1.2.3 Interpretation

A vital part of environmental education is the communication of information and concepts. Campus sustainability tours take advantage of interpretation, a specific type of communication. Interpretation is a type of communication that seeks not only to impart information, but to reveal to learners the importance and meaning of the information, as well as to describe relationships between that information and the person's life, often through firsthand experiences (Ham, 1992; Tilden, 2008). This type of communication provides educators the opportunity to communicate facts, information, and explanations to the public nested within the learner's own life experiences, rather than as isolated facts and figures, making the information more applicable and interesting (Ham, 1992).

Interpretation is an important part of environmental education, as it draws attention to features that may not be noticed.

Environmental interpretation has been used many times to successfully promote environmental stewardship, understanding, and action (Knapp, 2007). Because interpretation in non-formal and informal instances takes advantage of the substantial time in a person's life not spent on formal education, it is a vital resource for educating the public and changing behaviors (Knapp, 2007; National Research Council, 2009).

1.3 The University Campus as a Learning Environment

The university campus is a unique environment; it is a self-contained community of its own, but also studies and connects to global society. The uniqueness of a university campus, and a university's complete control over the built environment of a campus, creates an invaluable arena within which to study environmental education and sustainable development. According to Brabson (2010, 48), ". . . educational institutions provide a microcosm of the world, [where] the potential for environmental literacy . . . is unbounded," and a campus can act as an analogy of the larger world. The buildings and grounds through which the campus community moves on a daily basis constitute its "hidden curriculum" (Orr, 1990). The layout of a campus, its energy use, its use of food, and waste generation all serve to communicate the environmental ideals and values of the university.

The campus itself is an informal and non-formal education tool through which a university has the ability to educate students and community members alike (Capshew, 2010). A university, by participating in composting, for example, is modeling this

behavior to students, thus guiding questioning and learning. Students who have not had the opportunity to engage in green practices at home, in their own community, or even in the classroom are given the opportunity to do so through their campus community or are inspired or educated to do so at home.

Students and community members must be informed of sustainability initiatives by the university since the projects could easily be overlooked. If students and the community are unaware of the various programs and projects occurring on campus, minimal education will take place, and this unique opportunity will be missed (Cotton et al., 2013). Tours and their complementary materials aid in uncovering the campus curriculum, making information available to all groups through guided tours, self-guided tours, virtual tours, signage, or other means.

1.4 Educational Tours

Research on educational tours and their accompanying supplements such as signs and brochures has been predominantly conducted within the tourist industry and park systems. Within these fields, informal and non-formal use has demonstrated benefits, but minimal research has been done on the usefulness and effectiveness of university campus tours. Ecotourism studies have demonstrated the benefits of informal and non-formal learning through interpretation (Weiler and Ham, 2001). These studies show that education about the places visited provides meaning and builds relationships, creating a richer, more fulfilling experience for tourists. Further, environmental education has the potential to change tourist behavior not only on the site of the attraction, but also once the tourist has left the location (Tisdell and Wilson, 2005). Changes in human behavior are

very difficult to achieve, and if non-formal and informal education are effective in changing behavior, they become valuable tools (Gudgion and Thomas, 1991).

Numerous studies show that, after participating in non-formal education programs, patrons increased intentions to change their behaviors, based upon questionnaires (Orams, 1996; Tisdell and Wilson, 2005). Other studies demonstrated a significant difference in actual increased environmental behaviors between tourists who received education and those who did not, indicating that education programs can impact behavior and not just intentions (Orams, 1996). Another study found that involvement in non-formal and informal education was a main predictor of environmental behavior and literacy in adults. Informal learning also creates involvement, activism, and confidence in learners (McGivney, 1999; Digby, 2013).

The ability of non-formal and informal interpretive learning to affect behavior and beliefs of learners in the long-term demonstrates its importance. Campus sustainability tours offer interpretive services with the capacity to change behavior in a familiar area, where the campus community works and lives. By educating individuals regarding areas where learners live and work every day, the impact on the environment could be much greater than in a tourist area where people only interact with their surroundings temporarily.

1.4.1 Campus Sustainability Tours

"Gray" literature research uncovered over 60 universities in the United States with campus sustainability tours. These tours take various forms, from an online brochure available for self-guided tours to in-depth virtual and guided tours with interpretive

signage. Supplemental materials provided for use with campus sustainability tours include brochures, interpretive signage, maps, interactive online maps, online assignments, Quick Response (QR) codes, websites, and videos. Tours are often offered in guided, self-guided, and virtual tour formats.

Few articles have been published about campus sustainability tours, though some literature mentions their existence in passing or mentions campus history tours (Ribble, 2013). One exception is the Emory University campus walking tour. The walking tour is discussed as an opportunity to increase awareness of the campus environment and create within students a connection to place (Bartlett, 2002). This is a self-guided tour in which a brochure acts as a guide for participants to visit sites that represent green building efforts, campus history, information about campus forests, and issues of health and quality of life. The idea for the tour arose when a group charged with increasing environmental awareness on the campus realized they knew little about the campus itself in terms of its environmental history and initiatives. Initially given as guided tours, the group decided that the tour could reach more people if provided as a self-guided tour with the help of a brochure. The goal of the tour is for participants to build connections to place and create an emotional bond with the campus (Bartlett, 2002).

Anecdotal findings from the Emory University tour indicate participants find the tour interesting and often react emotionally, including expressions of fascination, anger, shock, and gratitude. Observations also indicate the length of the tour may result in participants not finishing the tour, and that it may be more effective to have shorter tours. According to this publication, however, there is no way for the University to know the impact of the walking tour (Bartlett, 2002). For a tool promoted as an element that, ". . .

should be central to any interpretive strategy," the lack of published research and quantitative data is unfortunate, and creating these datasets should be seen as a vital next step in the further development and improvement of these tools (Thomashow, 2014, 190).

1.5 The Use of GIS to Improve Tours

Geographic Information Systems (GIS) have the opportunity to contribute to improving campus sustainability tours in many ways. Though GIS has been used in the tourism industry and on university campuses, the tool has not been used to specifically improve or enhance campus sustainability tours. Due to the potential ability of GIS to eliminate issues of time, access, language barriers, and weather in regards to campus sustainability tours, GIS should be further assessed as an additional tool for the improvement of campus sustainability tours.

The use of GIS has increased in the tourism industry in recent years by improving tours for nature parks (Shams et al., 2007; Chang-Jie and Jin-Yun, 2008; Huang et al., 2010; Chu et al., 2011; Ryle, 2012). Other than the use of GIS as a method for determining efficient tour routes, GIS helped develop virtual and mobile tours, often utilized through mobile devices or PDAs (Chang-Jie and Jin-Yun, 2008; Chu et al., 2011). The design and features of tours vary widely.

Many of the developed mobile GIS tours are personalized, allowing users to select certain pre-planned routes or to prioritize sites (Sun and Lee, 2004; Niaraki and Kim, 2009; Chu et al., 2011). These options allow users of the tour to select pre-planned routes that cover those areas that interest them and allow them to choose tours based on time constraints. Based on surveys provided to users of these personalized tours, pre-

planned route options were considered an effective mechanism to improve efficiency by the majority of users (Chu et al., 2011). Data also indicate GIS applications for tours should focus on prioritizing visiting stops rather than finding the fastest route (Sun and Lee, 2004). Most of these personalized tours can be found in the tourism industry, though some have been designed for park areas. Few personalized tour applications have been developed for campus tours; more common are navigation tools and online maps.

Little data have been collected on the reactions of users to these mobile tours or the educational effectiveness of the tools. Data that are collected on this subject show that students gained knowledge from their virtual tour experience and students respond positively to the use of technology in their tours utilized in an educational setting (Kingston et al., 2012; Wolf et al., 2013). Some students demonstrated a preference for the technology guided tour over traditional human-guided methods (Kingston et al., 2012; Wolf et al., 2013). The myriad applications of GIS use for tours and preliminary data that demonstrate its effectiveness indicate GIS should be discussed as a tool to be used in campus sustainability tours.

CHAPTER TWO: DEVELOPMENT, USE, AND EDUCATIONAL EFFECTIVENESS OF CAMPUS SUSTAINABILITY TOURS

2.1 Introduction

Campus sustainability tours are available at dozens of universities across the United States. These tools have the potential to be useful for environmental education and are often advocated as such, even endorsed as ". . . central to any interpretive strategy," for a sustainable campus (Thomashow, 2014, 190). They can fulfill formal, non-formal, and informal educational roles and can reach diverse audiences. Despite this, there is little research on campus sustainability tours, though they are widely used and convey important information to the campus community.

The research discussed herein seeks to uncover why sustainability tours were developed at multiple universities and how they are used at one university through surveys and interviews. Surveys and interviews conducted with multiple sustainability professionals at universities with sustainability tours are discussed to uncover how such tours are developed and used. A case study of one university is then presented to unveil how one campus community interacts with its campus signage installed as part of its tour, how effective the tour is in a classroom setting, and how faculty members use the tour in their classes. The research is discussed within the framework of each dataset, with methods, results, and conclusions sections provided within each dataset section. A final concluding section details how all the data create a picture of how campus sustainability tours are developed and used.

2.2 University Campus Sustainability Tour Survey and Interviews

2.2.1 Methods

In order to establish an understanding of how tours were developed and used at other universities across the United States, a survey was sent out to universities and colleges with sustainability tours. The researcher obtained Institutional Review Board approval on August 25, 2014, as required by Western Kentucky University. After approval, a survey consisting of multiple-choice and short answer questions was entered into Qualtrics survey software. The researcher identified universities with campus sustainability tours through visits to university websites, and the emails of sustainability professionals at these universities were collected. The survey link was sent to over 60 sustainability professionals through email. Participants (n = 16) who agreed to interviews were contacted through the email provided by the participant. Participants (per their request) responded to interview questions by email; responses were compiled and analyzed.

2.2.2 Results

Of over 60 professionals to whom the survey was sent, 42 complete responses were received, representing 30 universities and colleges. Only completed surveys were analyzed. Sustainability professors, managers, coordinators, directors, and associates responded to the survey.

When asked whether they believed the physical environment of their campus was used as a teaching tool for promoting understanding and awareness of sustainability, 89% of participants responded ‘yes’. The campus was most often referred to by the

respondents as a 'living lab' that can relate what students are learning with the places they work in every day. Some participants mentioned that the potential of the campus as a learning tool is not fully realized and there exists a lack of faculty understanding regarding how to use the campus as a teaching tool.

Interpretive signage was used on all of the responding campuses. Regarding signage, respondents mentioned that interpretive signage is for the most part used to 'unveil' campus initiatives. The respondents were asked if they felt this signage was effective in increasing awareness, understanding, and knowledge of campus sustainability initiatives. Many respondents stated 'yes' for each of these goals, but many answered 'unsure' or had 'no basis to judge' regarding each question.

Table 2.1. *Sustainability Professionals' Views on Sustainability Tour Signage Effectiveness.*

	Yes	No	Unsure	No Basis to Judge
Do you believe these signs are effective in increasing **awareness** of campus environmental and sustainability issues?	54%	0%	24%	22%
Do you believe these signs are effective in increasing **understanding** of campus environmental and sustainability issues?	34%	8%	42%	16%
Do you believe these signs are effective in increasing **knowledge** of campus environmental and sustainability issues?	51%	3%	30%	16%

A lack of information seems to be a hurdle to analyzing the use of sustainability signage, as 84% of participants indicated no data regarding the use of interpretive signs.

The information provided by respondents when asked about the effectiveness of interpretive materials supports this observation. Many stated receiving positive feedback in the form of questions or comments, but there was no mention of quantitative data. All evidence provided by respondents was anecdotal. Comments that they "can't assess effectiveness" or have "no information" were also a consistent response. From the survey, it is clear more data collection must be pursued to establish use and educational effectiveness of tour supplements, such as signage.

When the survey was completed, the researcher contacted willing survey participants for interviews about their goals, preparation, and use for the campus sustainability tours. The initial motivation for creating the tour fell in two main categories for the respondents (n=16). Approximately two-thirds of respondents noted the main impetus for the creation of their tour was to make visible efforts or aspects of campus which many did not know about. Many discussed aspects of campus that were 'hidden' or 'overlooked' that they wished to 'showcase' or 'highlight'. The tours arose as part of a class, as a student project, from numerous requests and, in one case, as a continuation of a successful concurrent conference session.

Levels of preparation and research varied among institutions. Many developers partnered with existing groups on campus, such as visitor's centers, horticulture departments, landscape architects, facilities management, and building architects. Those who engaged students in the development of the signs had the students read appropriate texts, identify sites, and determine routes, while professor checks on the developed content provided quality control. Many developed their tours from existing models at other universities. In determining whether to use Quick Response (QR) codes with the

tour, one group conducted a successful trial run that resulted in the inclusion of the QR codes as part of the tour. No respondents mentioned surveys of the campus as a tool for determining knowledge or interest of the campus community. Many participants mentioned a lack of information on developing sustainability tours and that they 'went with what we knew'.

Goals for the tour were similar for some respondents to their initial motivation in that they sought to make visible many campus sustainability sites that could be easily overlooked. Many groups hoped to target certain audiences, including guests, visitors, and prospective students; none mentioned targeting current students or the campus community. A few of the professionals mentioned that they sought to put the ability to educate and learn within the hands of the campus community itself, either for reasons of empowerment or to save time for staff, since many sustainability offices maintain a small number of employees.

When asked how anticipated use of the tour compared with actual use, most respondents to the survey stated that they had 'no way of tracking' the data, that it was not measured, or that it was 'hard to say'. One participant stated that the number of tours had increased, while others had hoped for greater involvement. One respondent mentioned that the tours, ". . . have likely only netted a nominal raise in awareness," but that it was still a valuable tool for engaging visiting groups which come on campus; none mentioned the availability of quantitative data.

Respondents stated that the tours had been a worthwhile investment as an educational tool. The development of the tours aided in the creation of new and valuable partnerships for some campuses. Few groups wished they had acted differently in terms

of their development process. Respondents wished that they had installed a mechanism for tracking use, had not used QR codes, and had been able to shorten development time. Multiple respondents, stating the trendy nature and minimal use of QR codes in recent times, noted regretting the QR codes.

Most participants did not mention a desire for future improvements, because of lacking monetary resources and/or staff. Those who did look to future improvements hoped for improved messaging and promotion of the tour. One respondent mentioned a desire to track use of existing signage, though seemed unsure about how to execute this goal. From this survey and the resulting interviews, there seems to be a lack of data regarding use of tours and accompanying signage. Development is reliant upon published literature regarding general tour best practices and researching campuses with campus sustainability tours. Anticipated use and actual use simply could not be compared by most participants due to an absence of data.

2.2.3 Discussion

The most common trend present in the survey and interview data is a lack of information about the use of campus sustainability tours by the campus community. The data available to sustainability professionals is limited to anecdotal and observational data. These data can be valuable, but quantitative data regarding use by the campus would allow specific improvements to be made to these tours where they are needed. Being able to pinpoint needed improvements and removing guesswork is vital to many campus sustainability offices, as they often have few staff members to take on multiple sustainability challenges. Respondents who did not seek improvement of the tour cited

this lack of resources and staff as the most common reason. Those who are interested in improving their tours seek promotion of the tour and the ability to track the tour; both improvements focused on obtaining and counting viewers rather than improving content and learning. If universities developed datasets on how the campus uses the tour and what participants learn, content and presentation could be amended to provide a better learning tool and campuses could better understand how to improve reach of the tour.

Sustainability staff mentioned visitors, prospective students, and guests as the main audiences targeted for their tour, while none mentioned current students, faculty, or staff. This could be partly because tours may be developed as an advertisement for the university. As an advertisement, tours would focus on the audiences looking to 'buy' their product. Instilling the values of sustainability as part of campus culture is useful when introducing new students to the campus, but continuing to develop those values in current students should also be considered a priority. Not all students tour a campus prior to entering college and so may miss the opportunity to experience the sustainability tours. By not focusing on current university members, sustainability tours limit their audience and their influence. Those who reside on campus for longer periods of time can likely benefit more from learning about their campus and how they can be involved in campus initiatives than a student or guest who may never come back to the campus. In developing a campus sustainability tour, professionals should include all audiences in their development so that tours have maximum reach and impact.

The majority of respondents stated that their university campus was used as a tool, or living lab, to educate their campus community. Respondents suggested the potential of the campus as a learning opportunity was not fully realized or understood by faculty.

Since these are valuable learning tools, that are presently mainly marketed to visitors and can be guided by only a few busy employees, faculty should be empowered and taught to utilize the campus as a learning tool. This improved ability would take pressure off sustainability staff to teach about the campus, allow faculty to integrate the tour in their courses, allow students to see sustainability from multiple subject lenses, increase reach, and educate faculty on campus sustainability and students' issues.

Preparations for developing a tour were varied, and included developing partnerships, reading about best practices, and learning about sustainability tours at other universities. These preparations likely resulted in improved tours. Sustainability tours are still a new learning tool, and there are few books, best practices, or data available for guiding the specific development and implementation of a campus sustainability tour rather than a general campus tour or nature walk. Many campuses cannot simply mirror others, as their environment, student base, size, or budget may be entirely different. Because of this lack of information and because most developers are undertaking a project of this nature for the first time, the development process must be well defined and fully thought-out, as there are no specific best practices available for reference. Many tours grew from other projects started at the universities, such as student classes. In this case especially, the importance of developers understanding their goal in creating the tour and their primary audience is evident. Few campuses demonstrated a well-defined creation process. Based on the information provided through these surveys and interviews, the following questions should be asked prior to development:

- What are your goals in forming this sustainability tour?
- Who is your audience?

- How will the tour be used by your audience?
- How can your audience be alerted to the existence of the tour?
- How will you facilitate use by your audience?
- How will you collect data on the use of the tour by participants?

These questions, if asked prior to development, could reduce many of the problems faced by other tours and have the potential to improve campus sustainability tours.

2.3 WKU Green Tour General Campus Use

2.3.1 Methods

After determining how universities developed their tours, the researcher sought to quantify tour use on a specific university campus, as the scientific community has not yet done this. The Western Kentucky University (WKU) Green Tour was chosen as the case study since it is an established campus sustainability tour and makes use of many supplemental materials including interpretive signage, QR codes, and guided tours. The WKU Green Tour is not entirely representative of all campus sustainability tours, as these differ from campus to campus, though it has many features of other existing tours.

Because signage is a major component of the Green Tour and the hope for reaching the campus community was that the signage would capture the attention of passersby, a main goal of the survey was to determine if this aim was being realized. A digital Qualtrics survey was distributed to the entire WKU main campus community, including all faculty, staff, and students, using mass university email (see Appendix A). The surveys asked participants about their experience or lack of experience with the WKU Green Tour. A total of 1,064 participants responded, and 851 completed the

survey. Only completed surveys were analyzed. Sample demographics did not correspond to population demographics in terms of gender, and so were weighted using the Qualtrics software.

2.3.2 Study Area

WKU is a public university located in Kentucky. The university typically enrolls more than 20,000 students, including undergraduate, graduate, and doctoral students (Western Kentucky University, 2014). The university also employs over 3,000 full-time and part-time faculty and staff members (Western Kentucky University, 2014). Over half of the students and staff are female, and racial and ethnic minorities make up approximately 14% of students and staff. Six distinct colleges are established on the WKU campus: College of Health and Human Services, College of Education and Behavioral Sciences, Gordon Ford College of Business, Ogden College of Science and Engineering, Potter College of Arts & Letters, and University College. The WKU main campus employs one full-time sustainability staff coordinator, and many sustainability initiatives have been enacted on campus, even leading to the university becoming a Green Ribbon School (Western Kentucky University, 2014; WKU News, 2015).

The Western Kentucky University Green Tour is a campus sustainability tour located on the main campus of WKU in Bowling Green, Kentucky. The Green Tour provides the campus community with a guided tour, conducted by the campus sustainability coordinator. The main feature of the Green Tour is a series of interpretive signs highlighting the sustainable initiatives present on the campus. The initial impetus for creating the tour and accompanying signage in 2008 was to highlight visible

sustainability features of the campus in order to catch the attention of the WKU community. Developers hope eventually to supplement the tour with a brochure, map, and virtual tour (Ryan, personal communication, 2014).

The WKU Green Tour signs were developed by first identifying features to showcase and then contacting partners who could contribute to the design and content of each sign. University professors, the campus landscape architect, facilities management, and students created the signs. Students designed the signs through classes as a learning experience and used best practices for designing interpretive signage for parks (North, personal communication, 2014). Other research done for the tour signs was minimal, as examples of such signage on other campuses at the time of initial development were few. Placement was carefully considered, and the University's sustainability coordinator, whose time working with the National Park Service was helpful in creating interpretive materials, assessed design (Ryan, personal communication, 2014). QR codes were embedded in the signs in the hopes that they could guide students to a website where more information could be found. Increasing campus awareness of sustainability initiatives was seen as the main goal for the tour through the signs (Ryan, personal communication, 2014). Current tour content includes campus rain gardens, permeable parking lots, xeriscaping, LEED buildings, LED lighting, and solar heating.

Sign proponents hope that the passive signage of the Green Tour can catch the attention of passersby and could then take advantage of that time to communicate information on campus sustainability before providing them with a link to additional information (Ryan, personal communication, 2014). Guided tours are also offered for interested parties or for classes, though these take place only a few times per month. As

well, the guided tours are limited by weather, lack of staff, and class time limits. No quantitative information has been collected regarding the effectiveness of the signs in capturing the attention of the community, and it is not known whether passersby notice or read the signs.

2.3.3 Results

In a case study of the Western Kentucky University campus community, faculty, staff, and students were surveyed on their experiences with the WKU Green Tour signs in order to determine the actual use of the tour by the community. Because a self-guided tour brochure was not available at the time of data collection, and guided tours are mostly used by small classes, a survey regarding the tour signage was deemed most appropriate, as it is the main conduit through which it is hoped the campus community can be reached.

A final sample of 811 participants completed the survey. The demographics of the sample were comparable to campus demographics, but gender was skewed, as more than twice as many females (n = 589) than males (n = 213) completed the survey. Using the online Qualtrics survey software, appropriate weights were given to each gender to create a more representative sample. Only these complete and weighted samples were used for analysis.

Initially, participants were asked about demographic information, as well as their interest in sustainability. In considering whether they felt themselves well-informed about campus sustainability practices, respondents were split 51% to 49% between ‘yes’ and ‘no,’ respectively. When asked about their personal interest in sustainability, 72% replied

that they were personally interested in sustainability. This disparity indicates that an interest exists, but that much of the campus community does not consider itself well-informed, meaning there is room and interest for environmental educational opportunities to be provided.

Interaction with the Green Tour signage was assessed by asking participants if they had heard of, seen, or read any of the signs. One third (33%) of respondents said that they had heard of the signs, and when asked how, mentioned classes, campus events, campus outreach activities, and happening upon the signs while walking. This percentage decreased slightly when asked if they had seen the Green Tour signs to a 31% affirmative answer. Of those who had seen the signs, 85% stated that they discovered them while walking around campus. When asked if they had ever read any of the signs, 27% of participants had, but 60% of those only read part of the sign. Less than half of the sign readers fully read the sign. Of those who had read the signs, 72% of respondents indicated that they read only between 1 and 3, while less than 1% had read 7 to 9 signs.

Despite few students reading the signs, the majority only reading part of the signs and/or having read relatively few signs, 81% of these readers found the signs interesting and 85% said they had been exposed to new information through the signs. Only 3% of readers used the QR codes provided on the signs. These figures indicate that using passive signage to grab the attention of the campus community reaches between a third and a quarter of the campus, and that most of those who noticed the signs by happening upon them while walking campus. Those who were interested enough to begin reading were not captured by the sign long enough to read the entire message, and typically read less than a third of the available signs. When the signs were read, no matter if they were

only read in part or only a few were read, the majority of respondents stated they found the information interesting and they had learned something new.

2.3.4 Discussion

The majority of the WKU survey respondents stated they would consider sustainability one of their interests, but only 51% consider themselves well informed about campus sustainability. This indicates that there is enough interest and need for knowledge in sustainability for the WKU Green Tour to be a useful tool.

Only about one third of respondents to the survey had ever heard of the Green Tour, and even fewer had ever seen or read a Green Tour sign. This finding suggests the signage and tour do not have a very wide reach and few members of the campus community are being educated through the Green Tour. As aforementioned, the majority of respondents who have heard of, seen, and read the Green Tour signs have discovered them by walking through campus. This lack of intentional interaction suggests that most participants did not actively seek out the signage to learn about campus sustainability. Participants also did not likely experience any kind of advertising for the tour that drove them to seek it out. This suggests there is likely room for further advertising and promotion of the tour and its signage on the WKU campus. Promoting the Green Tour to the campus could increase interest and could lead to more individuals reading and learning from the signs.

Further analysis of sign placement is a possible area to help improve sustainability tours. Currently, WKU Green Tour signs are placed where the action being discussed is happening, which is reasonable. Placing the signs in other areas may, however, be more

beneficial, especially in areas that may get more traffic. A further consideration would be to place signage not in high traffic areas, but in areas where people wait. This might reduce the number of readers who only read a portion of the sign and then hurry on their way to their next destination.

The WKU Green Tour content also needs assessing. Most of the tour signs discuss actions being taken by WKU to 'green' the campus. The signs are intended to reveal to others what WKU is doing and what is happening on the campus. In this way, the tour serves as an advertisement to those visiting the university and to members of the university. Though this focus on WKU's actions is relevant and useful, it constrains the tour by discussing only those items on the campus and limits the signs to certain locations where the signs are relevant. Signage and education about other items, especially items not defined by a campus location, would be useful in that they could be placed anywhere and could address any topic. In addition, signage should call students to action in addition to bringing items to their attention and providing knowledge. Calls to action would give learners a next step, rather than leave them with information without knowing what to do with it.

There appears to be a disparity between the campus community interest in sustainability and its lack of interaction with the Green Tour signage; the signage may not be grabbing and holding the attention of readers. Over half of sign readers read only a portion of the sign at each stop. This could also be the result of most participants finding the signs by just happening upon them while walking to another destination and likely having little time or intent to stop and read an entire sign. Respondents failing to read more than one to three signs could be a result of not having a self-guided tour brochure to

link the signs together as a whole. An inset map showing the locations of other signs could alleviate this issue and alert readers to the fact that the sign is part of a group. The lack of use of QR codes by the respondents supports the statements by sustainability professionals at other schools that they regretted using QR codes because they went unused; tour developers may assume technological savvy on the part of their audience and use such items as QR codes in light of these assumptions.

Though the use of the tour is low and few people have read an entire sign or read more than three signs, over 80% of respondents found the provided information interesting and new. The interest indicated by those who read the signs again demonstrates that there is a place for the Green Tour on campus as a learning tool, but that it may need to be promoted more effectively.

2.4 WKU Green Tour Effectiveness

2.4.1 Methods

Though the WKU Green Tour was established in the hope that signage would draw the attention of passersby, the Green Tour has also been used as a guided tour, both for classes and as a service through the WKU Sustainability Office. The researcher sought to determine whether these guided tours were effective in educating participants. In addition, the planned future development of a self-guided tour encouraged the researcher to test the educational and entertainment effectiveness of a self-guided tour. Finally, this study sought to understand if the provision of the information as a lecture would be as interesting and effective to students as a guided or self-guided tour.

Pre- and post-tests were used in this portion of the study discussed herein. To

acquire participants, the researcher requested assistance from instructors of 100- and 200-level courses that were open to all majors so as not to skew results with science students who may be more familiar with sustainability concepts. Some instructors provided the researcher with a class period, and others offered students extra credit for participation. Once participants were acquired, the researcher provided them with pre-tests prior to their educational experience. Pre-tests requested demographic information, whether the individual had prior experience with the Green Tour, and tested subjects on their knowledge of sustainability content presented in the Green Tour (See Appendix A).

Three educational experience options were available: a self-guided tour, a guided tour, or a lecture of the WKU Green Tour. Within classes, students were randomly assigned to one of the three options through numbers written on the back of their pre-tests. When provided as an extra credit opportunity, students were given dates for their tours but not told which option would be offered on that date. These options exist on the continuum between non-formal and formal learning, as attendance was required, but learning would not be evaluated for a grade. The lecture option was formal learning, taking advantage of the classroom atmosphere and a captive audience, while the guided tour was meant to simulate a non-formal learning event where students are guided but not evaluated. The self-guided tour was more informal than the other options, though the brochure guide did add more structure to the tour. This is similar to how the options might be used in courses, though if professors gave grades for the self-guided and guided tours they would lean more towards the formal end of the educational spectrum. In addition, each option varied considerably in terms of the amount of information provided within a class time frame. Again, this is similar to the reality of how each option would

be used by instructors within classes.

Self-guided tour participants were given a brochure created by the researcher that contained a map showing the locations of each Green Tour sign on the WKU campus. The brochure also contained spaces for participants to record how many signs were visited, in what order signs were visited, whether they took the tour alone, and how the route was determined. They were then given instructions to view as many of the signs as possible before returning to class to take the post-test, with the order of the signs to be determined by the learner. Most students had between 30 and 50 minutes to visit the signs. The number of signs visited, and therefore content acquired, varied.

Guided tour participants were taken on the typical WKU Green Tour route by an experienced guide. These tours visited 10 locations on campus, including seven Green Tour signs and three sites without signs. Due to time and distance restraints, these tours were not able to visit all signs and, therefore, students were not provided information on all Green Tour subjects. Students had the opportunity to ask questions of the guide.

Class participants received an in-class PowerPoint lecture from the researcher that discussed all subjects presented within the WKU Green Tour. Students watched videos and were able to view pictures that described the concepts presented. Students could ask questions of the lecturer. After participating in the educational experience, participants were given a post-test. These post-tests provided the same content questions presented in the pre-test, as well as asking participants about their reactions to the Green Tour. Self-guided participants also answered additional questions regarding how they determined their tour route and the number of signs visited.

2.4.2 Results

After determining that the informal use of the WKU Green Tour reached no more than a third of campus through passive use of signage, whether non-formal classroom use of the tour would prove effective in educating students was questioned. Students completed pre-tests prior to experiencing the WKU Green Tour through guided tour, self-guided tour, or lecture to determine pre-existing knowledge. Post-tests were then provided to determine changes in content knowledge as well as to obtain students' reactions to the tour. Data were tested for normal distribution and then analyzed. None of the data were normally distributed, and so a Wilcoxon signed-rank sum two-tailed test was chosen over a paired T-test. Data were analyzed using SPSS. A total of 135 pairs were analyzed, including 39 self-guided pairs, 43 guided pairs, and 51 lecture pairs. Data were analyzed for score changes overall, within each presentation type, and for differences between presentation type within classes.

When all 135 data pairs were analyzed, the Wilcoxon test showed statistically significant differences between respondent pre- and post-tests ($p<0.001$). The self-guided tour pairs ($n=39$), guided tour pairs ($n=43$), and lecture pairs ($n=51$) each showed statistically significant differences between respondent test pairs when analyzed using the Wilcoxon test ($p<0.001$). Improvement was seen in all methods, but the lecture appeared most effective in improving student scores. Lectures also showed the greatest average change in score between pre- and post-tests.

Table 2.2. *Student Score Improvement Between Pre- and Post-tests.*

	Score Improvement	Score Ties	Score Decline	Mean Score Change
All Methods	84%	3%	13%	+14%
Self-guided	77%	8%	15%	+10%
Guided	81%	2%	16%	+11%
Lecture	92%	0%	8%	+20%

Potential reasons for the differences noted in Table 2.2 are many. Lecture participants gained information on all of the subjects presented in the tour, as time was less of an issue because participants did not need to walk from location to location. Guided tours are only able to reach a certain number of signs within the time frame of a class. Self-guided students may miss a sign or may take more time getting to signs because they do not know where they are. Further, lectures offer fewer distractions for learners, or may simply be a more familiar learning environment to students.

Gender and student major did not have an effect on score changes. Those whose primary language was English showed a greater increase in their scores than did those whose primary language was not English - an expected result as the signage, lectures, and tests were provided in English.

Student reactions to their experience were also analyzed from short answer questions asked on the post-test. Students found the experiences interesting because the Green Tour related places with actions, but the most common answer given for why they

were interested was that the tour discussed initiatives about which they stated they were unaware. Some students mentioned they were proud of being part of a school that takes actions to be sustainable; the learning experience had engendered a feeling of pride and ownership in these students. A couple of students were simply interested because the tour had allowed them to go outside and walk instead of sit in a classroom.

Students were asked which format (lecture, guided, or self-guided tour) they thought they would have preferred. In almost all cases, students preferred the guided tour, no matter in which format they had participated (see Table 2.3).

Table 2.3. *Student Preferred Tour Method by Method Participation.*

	Preferred Self-guided	Preferred Guided	Preferred Lecture
Took Self-guided	9	22	8
Took Guided	0	27	6
Took Lecture	0	21	18

Students preferred guided tours due to the following stated reasons: self-proclaimed visual learners, self-proclaimed hands-on learners, connecting practices with places, and providing them with more knowledge. Interestingly, students who participated in a particular format were more likely to choose that format as preferred than those who participated in other formats; those who participated in lectures preferred lectures more than other groups preferred lectures, and those who participated in the self-guided tour preferred the self-guided tour more than the other groups. However, only self-guided participants were found to prefer self-guided tours. Those who did prefer a self-guided option did so because it was at their own pace and they could spend time

where they wished. Participants who preferred lectures stated they could focus better in lectures and would not have as many distractions as they would on a tour. Poor weather was mentioned numerous times as a reason for wanting to participate in the lecture. Students participated in tours in numerous types of weather, including cold and windy, rainy, hot, and nice sunny days. The weather on each day was assessed as a potential indicator of preference (Table 2.4).

Table 2.4. *Student preferred tour method by weather*.

	Cold/Rain	Hot	Sunny, Warm
Preferred Self-guided	9	0	0
Preferred Guided	14	18	16
Preferred Lecture	7	6	0

On sunny, warm days, all participants preferred a guided tour, while hot and cold days saw an increase in preference for the lecture, likely to escape the heat or cold. Weather was often mentioned when students would re-enter the classroom after their tour. Thus, weather is potentially a hurdle in conducting campus tours, but can be overcome by creating virtual tours.

2.4.3 Discussion

All methods of providing the Green Tour demonstrated significant improvement in scores between the pre-test and post-test, demonstrating the Green Tour is indeed an effective educational tool. The score improvement differences between each method could be impacted by a number of factors. Lectures, which demonstrated the most improvement, may have been more effective because students were exposed to more

content. The lecturer did not have to spend time walking from place to place, losing time to discuss content. The lecturer was able to cover all Green Tour content, while the guided and self-guided tours were unable to do so due to time constraints. The classroom also presents less distraction for students than an outdoor walk and is a familiar learning environment to students. Due to these factors, the lecture was a successful method of educating students, but was not preferred by most students over a guided tour.

The guided tour also proved effective at improving knowledge in students; it may have been less effective than the lecture because students were unable to visit all the signs within the allotted time frame and faced the potential of becoming distracted in the outdoor setting. The guided tours were shown to be more effective than self-guided tours, likely because a knowledgeable leader provided students guidance, both in terms of location of signage and content. Students were more efficiently guided and spent less time searching for signs and more time learning content when they were guided. Content could be clarified and expanded upon by the guide, increasing content understanding. Answers to lingering questions could also be immediately sought when a guide was present. Guided tours were by far the most preferred option for students, as they felt it connected what they were learning with place and felt they learned better in a more hands-on environment. This data suggests students are interested in incorporating the guided Green Tour in their classes and enjoy the experience.

The self-guided tour demonstrated the least improvement between scores, though improvement was still made. The students who participated in this method were not provided with guidance in regards to content or efficient routes as guided tour participants were and, therefore, typically saw fewer signs. Students stated they were

more distracted on this tour format as well. The lack of a knowledgeable guide and fewer signs visited likely led to the difference in improvement between this tour mode and the others investigated in this study. Guided tours, given their time restrictions, are, however, not necessarily representative of a self-guided tour provided outside of class with unlimited time.

Collected data demonstrate that a lecture was the more effective vehicle to provide information to students for numerous reasons, including the amount of information able to be conveyed and lack of distractions. Despite this, many universities use tours to provide information on sustainability to their students rather than lectures, though providing tours is more expensive. This is possibly attributed to a belief that tours are more effective, hands-on, or fun for students or that the 'advertising' aspect of tours is not possible through lectures. This research, which only takes into account one university campus sustainability tour, is limited in scope and is preliminary. The effectiveness of lectures over tours in conveying information, however, is worth noting and requires future assessment.

In addition to this note regarding lectures compared to tours, the data are clear that a lecture is more effective in providing information to students. Effectiveness, however, especially in environmental education, is not limited to imparting knowledge. Environmental education in the end seeks action from its learners, through the process of improving awareness, imparting knowledge, instilling attitudes, developing skills, and growing capacity for action (Elder, 2003). This research only assessed the knowledge aspect of this ladder. Is a tour more effective than a lecture at inspiring action? Which format is better at changing attitudes and why? What aspects of a tour would inspire

action or attitude change? Thus, though this research demonstrated a lecture, in one case, was more effective in providing information, it does not mean lectures are most effective for all areas of environmental education.

Because action is an end goal of environmental education, tours should seek to inspire learners with calls to action or next steps. Some students participating in this research mentioned feeling pride or interest after the tours and lectures, and some requested more information on involvement in campus sustainability. In this case study, some students demonstrated interest in more information or involvement. Instead of forcing learners to seek out the next steps on their own, tours should point to actions they can take, areas with more information, or involvement opportunities.

Multiple barriers to effective use were identified in the collected surveys. Weather impacted student enjoyment, time spent at signage, and method preference. Time limits present within classes reduce the number of signs that can be visited by guided and self-guided walking tours, reducing the amount of content to which participants are exposed. This can be addressed by providing lectures instead, though this method may take up valuable class time. Language barriers to improvement were also seen in students whose primary language was not English. Virtual tours could aid in avoiding many of these issues, as weather would not hinder a virtual tour, multiple languages could be provided, and tours could be taken outside of classroom time.

Significant relationships between participating in a Green Tour exercise of some kind and improved knowledge of content indicate that this campus sustainability tour is an effective learning tool when used in a classroom setting. The majority of students improved their scores after participating in all formats of the tours. That said, these data

are preliminary and address one aspect of a single sustainability tour. Information on attitude change, behavior change, and other tour methods still needs to be gathered, along with other research. Despite its ability to successfully convey information to learners, how many WKU faculty members actually use the tour in their classes and why was it largely unknown at the time of data collection. Without getting the tours into the classroom, the tour as a learning opportunity cannot be utilized.

2.5 WKU Green Tour Professor Use

2.5.1 Methods

After determining that using the Green Tour as an educational tool in classes was effective in increasing student knowledge in guided, self-guided, and lecture form, the researcher sought to determine whether professors on the WKU campus actually used the tour in their classes and, if not, how use could be expanded. This was done using an online survey sent through mass email to university faculty. The survey asked participants whether they had ever used the WKU Green Tour as a teaching tool within their courses and what additions to the tour would increase their chances of using the tour in class. A total of 23 participants completed the survey out of 1,251 total faculty (Western Kentucky University, 2014). Though the low participation numbers are a limit to the study, these data were able to provide information for future studies and recommendations, especially as this aspect of sustainability tours has not been assessed prior to this research.

2.5.2 Results

A little over a third of participants, 36%, had heard of or seen the tour or signs. The majority of respondents, 91%, answered that they had never used the WKU Green Tour as a part of any of their classes, and the same percentage stated that they have never known any professors who have used the tool as part of a class. When asked if they would be interested in using the tour in the future, 36% responded 'yes', stating that their interest stemmed from the fact than many sustainability topics are taught in their classes.

Of the 64% of participants who responded that they would not be interested in using the tour, reasons included that it would be off-topic for their course, that they lack time, or that they currently teach online courses. Challenges that might prevent them from using the tour were similar, and included online classes, irrelevancy, lack of time, and making the tour meaningful to the course.

Respondents were asked whether certain additions to the tour would make them more likely to use the tour in their classes. The options provided were an online virtual tour, themed tours (such as campus 'water' or 'energy' tours), ready-made assignments available online, a guided tour schedule, self-guided tour brochure, and a phone-accessible guide. Participants showed most interest in a brochure for self-guided tours (63%), an online virtual tour (58%), ready-made assignments (53%), and themed tours (47%). Only 32% were interested in a guided tour schedule and 16% in a phone accessible guide. Participants suggested that the self-guided brochure could be provided as a homework or extra credit assignment to students. Those with interest in the virtual tour felt it would be better suited for their online courses. The ready-made downloadable assignments appealed to respondents as they could save the course prep time, could

provide a framework from which to adapt assignments, would be easy to use, and could be used as an extra credit opportunity. Themed tours were of interest to instructors because they felt the themes might make the information more relevant to their courses.

The topics taught by interested professors ranged from religious studies to community organization, and many mentioned ways to incorporate sustainability in their courses, indicating that professors understand sustainability as an interdisciplinary subject. The disparity between those who use the tour compared to those actually interested in using the tour as a teaching tool indicates that professors should be provided with information about the tour, including examples of how it could be used in courses, especially in varying disciplines. Campus sustainability tours should also be supplemented with tools that can encourage professor use and make the tour easy to incorporate into classes.

After discovering this lack of use by professors at WKU, the researcher sent out an additional interview question to the sustainability professionals (n=16) from other universities asking about the degree of use of the tours on their campuses by professors. The sustainability professionals noted that they either had few professors use the tour or that, more often, they were not aware of any tour use by professors. None of the respondents mentioned specifically identifying or targeting the university professors as users of the tour.

2.5.3 Discussion

Because the Green Tour was found to have limited reach when relying on signage, yet was shown to be effective in educating students when used in the classroom,

the researcher suggests that the Green Tour be promoted as a classroom tool. There is a disparity in interest and use by professors, as indicated by less than 10% of respondents having used the tour, while 36% were interested in using the tour in the future. Professors also understood how the tour could be used across disciplines, as professors of such diverse courses as religious studies and ornithology were all interested in the tour. Classroom use of the sustainability tour can connect students with sustainability issues and allow them to view the subject through an interdisciplinary lens.

For the campus sustainability tour to be used widely and successfully in the classroom, the tour should be specifically promoted as a learning tool for class use and professors should be aided in their use if they find the tour applicable to their course. In the initial survey of sustainability professionals, one respondent stated that professors lacked understanding in using the campus as a teaching tool. The majority of the interviewees also stated that professors and instructors had not been specifically targeted for use of the tours as visitors had been. It is possible that the lack of promoting the tour for professor use is related to this mentioned lack of understanding of using the campus as an educational opportunity. Sustainability tour developers should seek out course instructors and guide them in how to use the tours in their classes, as they have shown to be effective in educating students and could enrich the courses by providing relevant content in a unique way.

Tour developers could increase classroom use by providing instructors with supplemental tools and making the tour usable in multiple classroom settings. A brochure for self-guided use would allow instructors to send students on the tour on their own, eliminating the issue of lacking time within the class period for the tour. Professors can

send students out on their own, whether as a course assignment or as extra credit. The brochure would also be useful for visitors and others who may be interested in taking the tour at their own pace. The brochure could be placed online or be available in print form around campus. An online virtual tour could remove the challenges of poor weather, online courses, and lack of time. Many professors suggested they would require students to take the virtual tour on their own time. Though a virtual tour was not tested for effectiveness, it is likely that it would follow a similar pattern as the other presentation methods. Pre-structured Green Tour assignments or questions could be made available for teachers online. Such assignments could save instructors time and provide a framework for developing their own assignments. When used in conjunction with virtual tours or a self-guided brochure, these assignments would be useful for when professors must cancel class or the university shuts down, such as for a snow day. These easily accessible assignments could be a back-up plan for professors, and could lead to greater use. Themed tours, such as a water tour or a campus building tour, would allow professors to choose information that they find relevant to their course, rather than spending time on content that they do not find relevant. Finally, a prepared lecture could be provided to professors if they find the content applicable and if they have time in their courses, as lectures proved to be effective in communicating Green Tour information to students.

2.6 Conclusion

This research sought to answer many questions about a minimally researched and poorly understood tool: the campus sustainability tour. Based upon research of tours and

interpretation in tourism and nature parks, these tours are likely to be successful in educating their communities (Orams, 1996; Weiler and Ham, 2001; Knapp, 2007). Though research into educational tour experiences has indicated that they should be effective, campus sustainability tours can vary in many ways from the tours researched in the literature. No research has been conducted specifically on campus sustainability tours until this time. The author collected information regarding the development, use, and effectiveness of these campus sustainability tours to jumpstart research into these unique educational opportunities.

In order to discover how campus sustainability tours were developed and used, the researcher approached the research questions from many angles. Surveys and interviews were conducted with staff at universities with sustainability tours to discuss how their tours were developed and the level of tour use they were seeing on their campus. A case study was selected for a more detailed assessment of a tour at Western Kentucky University. A survey was sent to the entire WKU main campus community regarding its interactions with the Green Tour to determine general use of and attitudes towards the tour. Students in 100- and 200-level courses took pre- and post-tests to determine educational effectiveness of the tours themselves. For these courses, the tour was provided in three formats in order to discern any differences in educational effectiveness between formats. Finally, WKU faculty were solicited for information about their knowledge and use of the Green Tour through a survey.

Combining all of the collected information together, many trends emerged from the data that have implications for the future use and development of campus sustainability tours. One trend discovered in the WKU case study, and supported by

anecdotal evidence from sustainability staff, is that the campus community demonstrates interest in the tours, and that these tours have a place at universities for developing a knowledgeable campus community. The disparity in interest in the tours when compared to self-reported use of the tours or sustainability knowledge indicated that students and faculty would like to know more than they currently do about sustainability, or engage with the tours more. This interest in sustainability by the campus community has been a growing trend in recent years, and many students consider sustainability when determining which college they will attend (Berman, 2009). This interest in sustainability by prospective students may have been the driving force behind many campuses' development of a tour as an advertising platform and is likely the reason why visitors and guests are the targeted audiences, but this research demonstrates that the current campus community is also interested and should be targeted as well. Campus sustainability tours can fill a need identified by current students and instructors.

This research has demonstrated that, in the case of the WKU Green Tour, campus sustainability tours are effective in educating students in both non-formal and formal educational environments in every format tested. These results were not entirely unexpected, as educational tours in nature parks and the tourism industry have proven effective as educational tools (Orams, 1996; Weiler and Ham, 2001; Knapp, 2007). Despite this similarity with previous research findings, the discovery that guided and self-guided tours are effective in a non-formal setting when provided through a class is important. Though these types of tours are similar to those presented in previous research, equal degrees of effectiveness cannot be assumed, as the audience, their motivations, the subject matter, the learning environment, and the methods through which

the tour is provided are all unique to the campus tour. This research suggests campus sustainability tours are effective teaching opportunities for universities, as significant score increases were seen between pre- and post-surveys, though more research must be conducted at different universities to determine if this trend holds true in the case of other sustainability tours. This research demonstrates that traditional lecture formats should not be discounted or replaced by tours, as students found the lecture interesting and it appeared to be more effective than guided and self-guided tours.

As an effective tool, tours have the ability to expose the hidden curriculum of a campus and enable it to be used in courses and can be used to bridge the gap between formal and informal learning. Connecting what students are learning in their courses through formal learning environments with what goes on in the informal learning arena outside of class can demonstrate content relevance to students and guide them to make links between what they learn in school and what they learn outside of the classroom. This can create a richer experience for students and make connections that promote thought about sustainability in their everyday lives. In addition, the tour has been shown to be effective across the range of the formal, non-formal, informal spectrum from the formal lecture method to the more informal self-guided method. This flexibility can be useful for reaching various audiences.

Through this research, the notion that campus sustainability tours, as a relatively new arrival on most campuses, are in need of specific best practices to guide their development and assure quality has become clear. When discussing the development of their tours, most sustainability professionals mentioned their use of best practices developed for the tourism industry and nature park tours, as well as modeling tours after

those of other universities. These practices are a good starting place, but campus sustainability tours need to determine specific best practices that are better suited for its unique place on the university campus. Audience motivations, subjects covered, and methods of presentation differ between campus sustainability tours and other educational tours, and should be treated as such.

The literature that currently exists to guide the formation of educational tours is minimal, and best practices are not available for overarching tour design; instead the research is segmented. Research exists regarding such aspects as the training of tour guides, tour route development, development of virtual tours, and interpretation (Black and Ham, 2005; Xiao-Long, 2005; Cho et al., 2008; Tilden, 2008; Weiler and Ham, 2001). But no best practices exist to lay the ground work for those just beginning to design a campus sustainability tour. What would a campus sustainability coordinator need to consider prior to creating a sustainability tour? As it stands, the literature offers little guidance, as these segmented aspects are further separated into disciplines. Information on nature park tour guides does not necessarily translate for guides of city walking tours. Signage placement in urban areas differs from signage placement in nature parks. Unfortunately, not all aspects are covered for all tour situations, and so best practices are patchy. Some best practices have been developed for specific tour situations. Young (2013) discusses the best practices for city walking tours, and Gay (1999) discusses the best practices needed for designing tours specifically for seniors. Both of these authors lament the lack of information on tour design and the lack of interest in the subject. Gay (1999, 90) calls tour design literature a "black hole" that "few academics have considered . . . worthy of their thought." These authors represent the tourism

industry and city walking tour perspectives; no research on campus tour design best practices is available.

Based on the research presented herein, the lack of research related to general tour design and specific campus tour design in the published literature, and the advocating of campus sustainability tours themselves as a best practice, best practices for design and implementation of campus sustainability tours, should be considered of great importance (Thomashow, 2014). One crucial aspect that was demonstrated in the collected data was a need to identify the tour audience. In most cases, tours were designed for visitors or guests, and not for the current campus population, though many research participants mentioned that they hoped the campus would utilize the tours. The tours must be designed for their audience. If a group is hoping to reach its current students and staff, it must target that audience, rather than designing the tour for visitors and hoping the tour 'catches' others. The audience would also impact the supplements chosen for the tour. If it is hoped that visitors will be the main users, it can likely be assumed that most tours will be guided or virtual, meaning that only a virtual tour and trained guides are needed. If the audience includes groups like current students or instructors, signs could be useful or supplements, such as pre-made assignments or themed tours, could increase use.

Thought should also be given to location of the tour sites, whether accompanied by signage or not. This research revealed that self-guided tour participants most often missed the signed located on the periphery of the WKU campus. When asked how they determined their route, the majority of respondents noted that they based their choices on location, visiting the closest signs. Designers should consider this when choosing their locations or placing signage. This research also suggests that readers of signage were not

intentionally seeking to read the signs, but instead just happened upon them, leading to them not reading the entire sign in their haste. Signs should be placed in areas where people wait rather than high traffic areas of transit, so that readers will not be in a rush and can read the entire sign.

Advertisement is another consideration for tour development. How will the audience be alerted to the tour? The WKU case study demonstrated passive signage alone is not enough to reach the university campus. Use of the tours cannot be assumed. Universities could advertise days when they will have guided tours through email, could place brochures in offices, or could reach professors through workshops in how to use the tours in classes.

One of the clearest trends demonstrated by collected data is the need for data collection regarding campus sustainability tours. As a best practice, data collection and continual evaluation of specific tours should be considered a priority even before the development of the tour itself. If and how participants are using the tours must be known. If they are using the tour, how are they learning about it? In what capacity is it being used? If they are not, why and how can its use be improved? In addition to use, understanding its effectiveness through various methods is necessary. Are participants learning? What are they learning? Which presentation methods work best? By including data collection and evaluation into development best practices, campus sustainability tours can justify their importance and can efficiently improve based on data. Without these data, sustainability coordinators are "flying blind" when developing tours.

Not only is data collection necessary as a best practice to be implemented at specific universities, but data are needed across all aspects of sustainability tours to guide

their development. Research on virtual sustainability tour effectiveness is lacking and was not addressed in the case study as it is not available at WKU. If the virtual tours are not effective in educating or recruiting, campuses may need to consider whether they are worth the time. If they are effective, campuses should be encouraged to use them. Professor use, professor perspectives, the tours as a tool for building a community, and the effectiveness of informal use of the tours, all are future aspects of these learning tools that could contribute to the literature.

CHAPTER THREE: POTENTIAL APPLICATIONS OF GIS AS A TOOL TO SUPPORT AND IMPROVE CAMPUS SUSTAINABILITY TOURS

3.1 Introduction

Geographic Information Systems (GIS) and other platforms such as Google Earth are becoming widely used in the tourism industry, in natural areas, and increasingly for campus sustainability tours to create personalized mobile tours, virtual tours, and mobile navigators. Research has shown GIS applications are effective in educating students and that students are interested in using GIS technology in their educational tours – often more so than traditional interpretive methods (Kingston et al., 2012; Wolf et al., 2013). Despite this, GIS is not being utilized to its full capacity to supplement campus sustainability tours. Many universities with sustainability tours use online virtual tours, providing many benefits to users. The author suggests that GIS can be utilized in further capacities to improve sustainability tours.

This segment of research addresses how GIS can be used to improve sustainability tours. Based on data from the previously described surveys, interviews, and pre- and post-tests and by conducting GIS analyses in ArcMap, suggestions for the potential use of GIS in improving campus sustainability tours are provided.

3.2 Use of GIS as a Tool for Campus Sustainability Tours

3.2.1 Online Virtual Tours and Mobile Guided Tours

Many opportunities are available for incorporating GIS use into campus sustainability tours. The application most often found currently is that of the online

virtual tour; these can vary between universities. For some campuses, the virtual tour simply consists of an online map that reveals the locations of various sustainability initiatives. Others use no map at all and provide content-rich web pages for each 'stop' on the tour. Some tours utilize a more interactive map, which can provide users with video, audio, photographs, or other content as map features are selected. A few tours provide a set route for interested parties to follow if they seek to also physically take the tour. Some of these virtual tours were developed through GIS, but many use other platforms.

Virtual tours can be incredibly useful in educating the campus community because they remove many of the barriers present to participating in a campus sustainability tour. Weather is a non-issue with virtual tours, as they can be taken from anywhere at any time, while a physical campus tour may have to be cancelled due to bad weather. Even if a scheduled in-person tour must be cancelled, a virtual tour could be suggested as a replacement if available. Virtual tours increase accessibility to all participants, including off-campus students, those taking online courses, or those with physical disabilities. Virtual tours can be changed quickly with minimal expense, particularly when compared to the time and monetary resources needed to uninstall or edit an interpretive sign or print new brochures. Virtual tours can reduce the need for staff guides, which is a burden for sustainability offices that are often understaffed on many campuses. Finally, virtual tours can communicate to audiences across language barriers by offering their content in many languages; these barriers, which might prevent guided or self-guided tours, are a non-issue for virtual tours.

Though campus sustainability virtual tours provide many benefits, most are not designed for targeted incorporation into more formal educational experiences, such as for

classes. Instead they are targeted for general use, especially for prospective students. This is likely related to the targeting of visitors and campus guests rather than the current campus community, as demonstrated in interviews with sustainability professionals (see previous chapter). Indeed, guests and visitors should be targeted, but features should be provided that would increase the use of the tours by university instructors, as surveys in the WKU case study demonstrated that virtual tours would encourage use. Instructors can be empowered to use the tours in their courses by making use easier, especially by using aspects identified by instructors as a useful tool such as pre-made assignments and virtual tours (see Chapter 2).

Virtual tours can be used in class, assigned as extra credit or as a homework assignment, or can provide instructors with ideas for their own tour or assignment while avoiding the barriers present on standard tours. They can remove the need for scheduling a guided tour; class time is not necessarily needed to have the students take the tour if it is assigned outside of class. Pre-structured assignments can be provided online on the same webpage as the tour for instructor use. Virtual tours can also make evaluating the use and effectiveness of the tour easy, as a pop-up survey could be provided when a new user uses the tool, thereby greatly improving the quality of a campus sustainability tour. If virtual tours are developed for campuses, it is possible that campus sustainability tours may see more use since they remove barriers and increase ease of use for professors.

Mobile guided tours are used in the tourism industry for nature parks, and many models have been created for their development (Chang-Jie and Jin-Yun, 2008; Chu et al., 2012). They also have the potential to be of great use when used in conjunction with sustainability tours, as research has demonstrated that such technology is considered

interesting by students and resulted in significant knowledge gain (Kingston et al., 2012; Wolf et al., 2013). These tours are similar in their use to online virtual tours; they can sidestep many of the same barriers. They reduce the need for staff to conduct tours, can be easily and cheaply edited, and allow instructors to assign tour-related activities outside of class.

Mobile tours make use of smart phones or PDAs to guide a participant through a tour. These mobile tours provide guidance and information to the participant as a guide would, but without the need for a human guide. As smart phones are commonly used and these mobile tours can be easily accessed on these devices, the possibilities for reaching more people increases.

Many universities use QR codes in their tours, which are, or could be, linked to mobile or virtual tours. Based on the WKU Green Tour case study and sustainability professional observations, these QR codes are used minimally. If these virtual or mobile tours are made available, it is important that the university actively provide information about their availability through other conduits, as the case study demonstrated that relying on passive signage reaches very few and even fewer use the QR codes.

Overall, like the virtual tours, mobile guided tours can collect data from users (e.g. online survey), make professor use easier, increase accessibility, and reduce needed staff. Such mobile tours could be flexible and provide users with consistent information through what is essentially a guided tour, minus the tour guide.

3.2.2 GIS to Create Efficient Routes

GIS can be used not only to supplement tours with further learning options, but also to improve existing tours. Through network analysis, the most efficient tour route can be found for a campus sustainability tour, whether guided or self-guided. By improving efficiency, tours can save time, reach more sustainability locations, and provide participants with more information.

As a case study, the WKU Campus Green Tour current guided tour route was mapped by placing stops on the campus map, with sidewalks as the network, and ordering the stops in the order currently used for the tour in the attribute table (Figure 3.1). After this map was created, network analyst was run to create a route that visited the same stops by the most efficient route, starting from a specified point. In this case, the original route used was, in fact, the most efficient; this may not be the case for all guided campus sustainability tours, so using GIS could improve efficiency.

After analyzing the WKU Green Tour, the author developed the most efficient self-guided route through network analyst, using all sign sites. The resulting map was used in brochures for the WKU Green Tour to demonstrate the most efficient route for participants. As this route will allow participants to take their tour in their own time, time limits were not a factor (Figure 3.2).

These analyses could greatly benefit any university with a campus sustainability tour. Prior to developing a tour, determining the most efficient route through GIS could save much time and effort put into determining tour routes. In addition, tour participants would be able to see more or be able to ask more questions of the guide within a shorter time limit if the campus tour route is the most efficient route available.

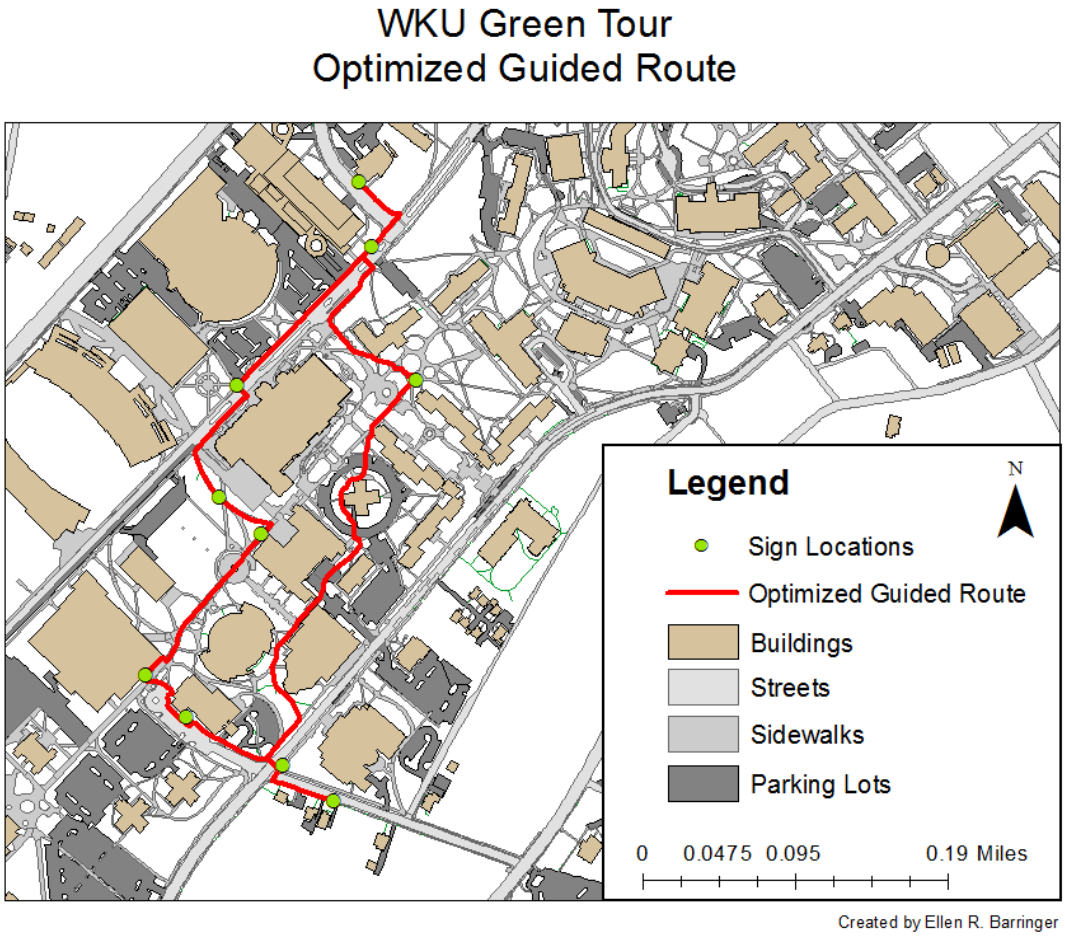


Figure 3.1. WKU Green Tour: Optimized Guided Route.

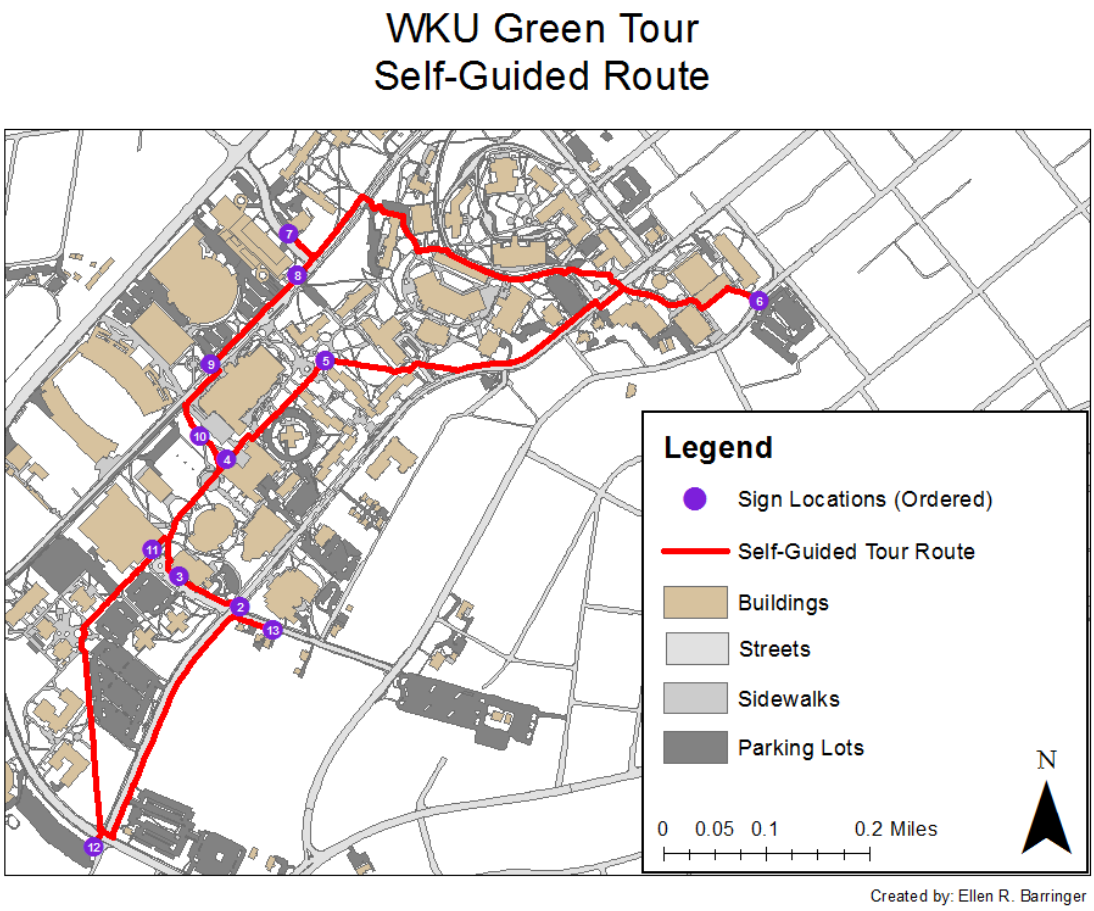


Figure 3.2. WKU Green Tour: Optimized Self-Guided Route.

3.2.3 GIS Online Webmap for Creating Themed and Personalized Tour Routes

The development and use of themed tours was an aspect cited by surveyed WKU professors necessary to increase their use of the WKU Green Tour. Themed tours can provide an instructor with multiple options and make the information more relevant to a particular class. By providing multiple themed routes to professors, the likelihood of use may increase. The researcher, using the WKU Green Tour as a case study, created and mapped three possible themed tours based on the WKU Green Tour using ArcMap: a water tour, energy tour, and buildings tour (Figures 3.3, 3.4, and 3.5, respectively).

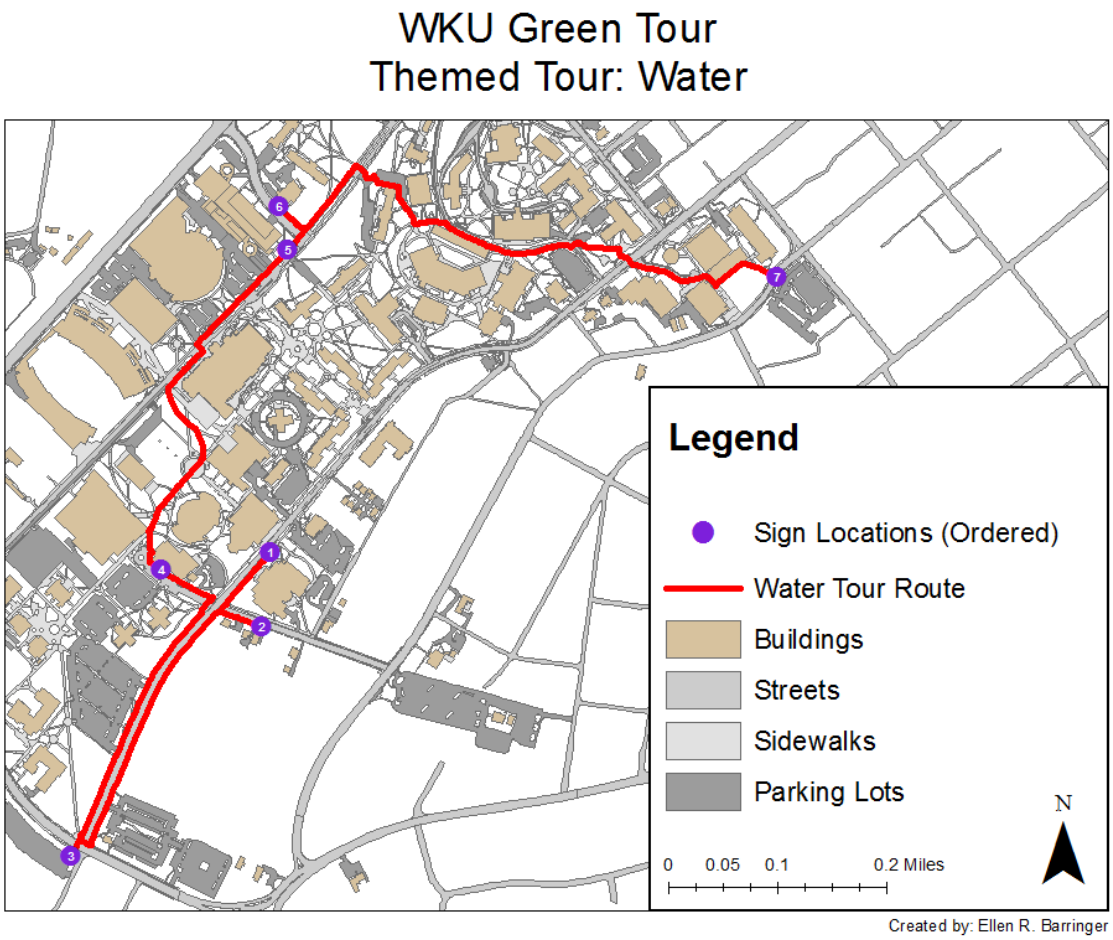


Figure 3.3. WKU Green Themed Tour: Water.

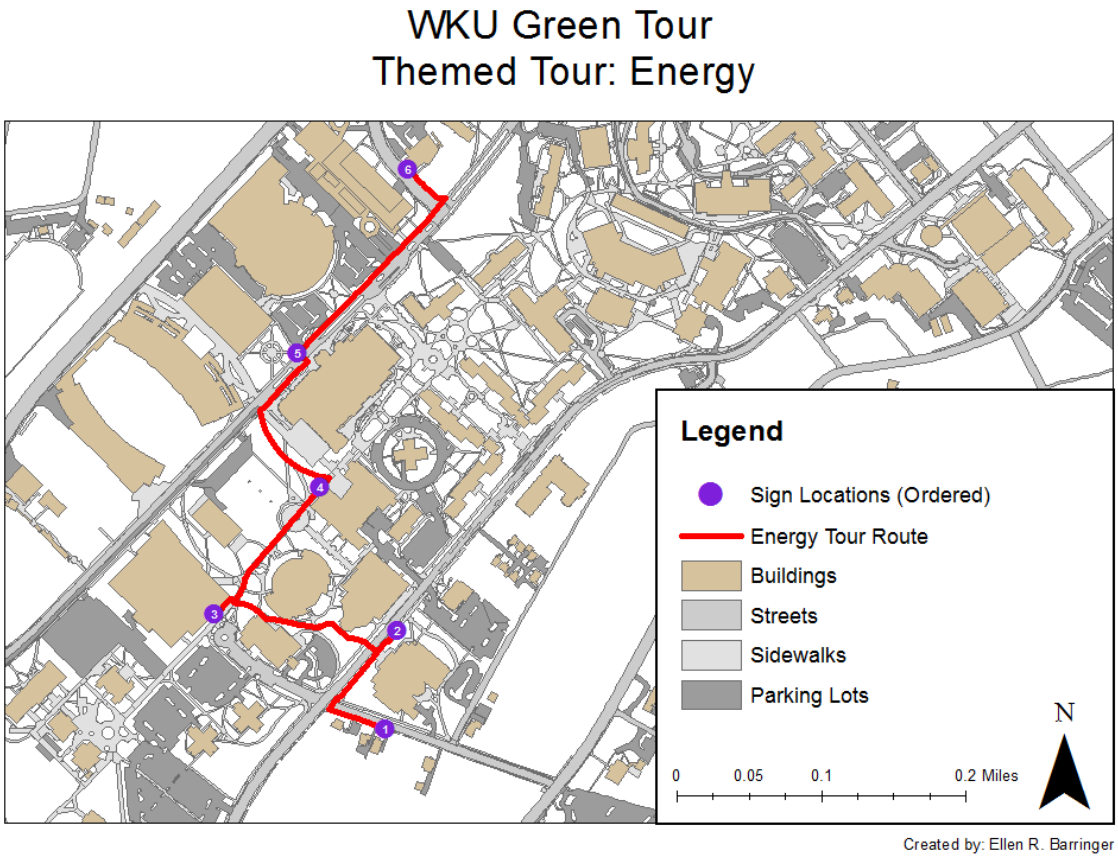


Figure 3.4. WKU Green Themed Tour: Energy.

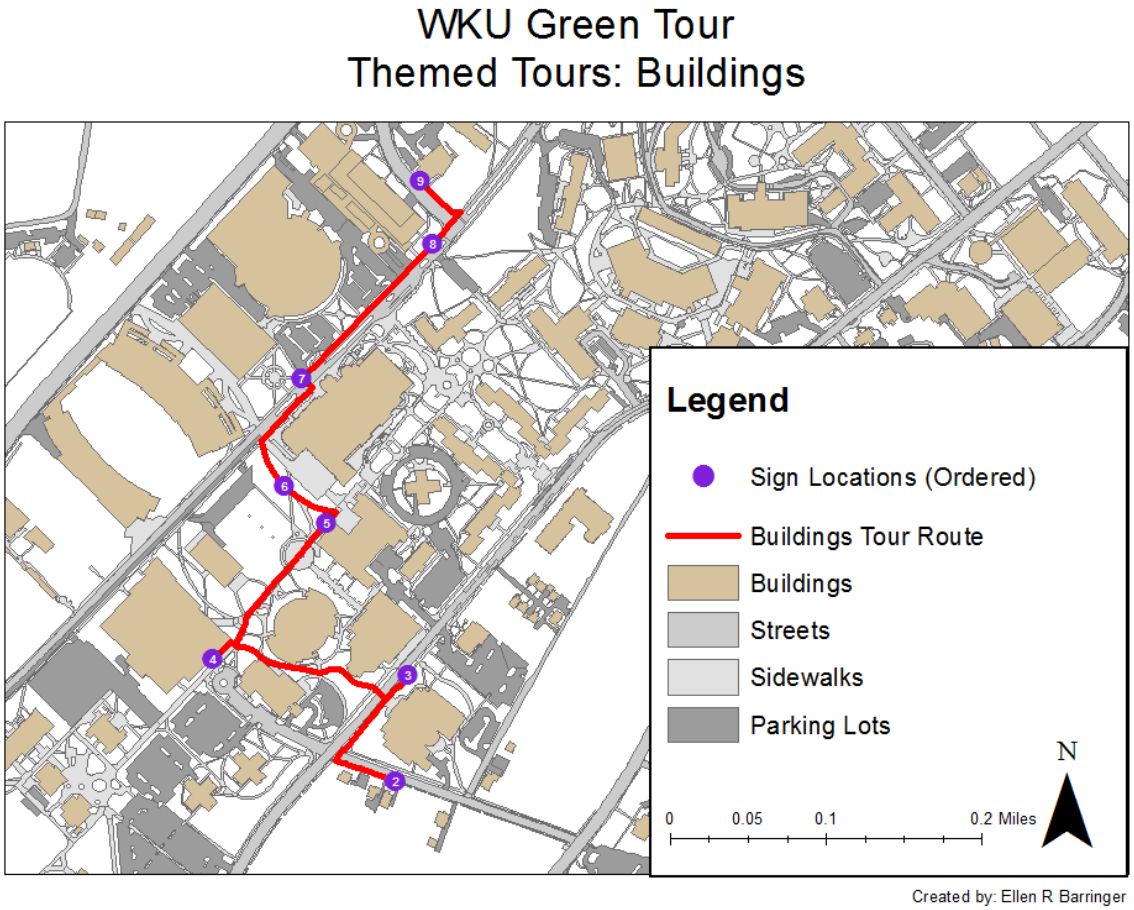


Figure 3.5. WKU Green Themed Tour: Buildings.

Though these themed tours are useful, if an instructor wishes to use them in class, they must be cognizant of their time frame. Some of the tours are simply not doable in their entirety within a single class period. Every conceivable tour route, varying by theme, time frame, and distance, could be possibly mapped and timed to provide many options for professors; this is time consuming for both the analyst and the professor who would have to discern which tour would best suit their course.

A new tool should be developed to aid professors and all users in using campus sustainability tours. Using GIS Online, a tool could be developed which allows inputs of site destinations in conjunction with a time limit to develop personalized tour routes for users. Users could select the sites they wished to visit, ranking them to prioritize the stops, and then be able to input a time limit over which the developed tour could not extend. GIS Online would be able to create tours that fit exactly what is needed for a particular course, visiting as many sites as possible within the time frame. This would take much less time for learners to determine their own route, and they would be able to self-select what they find relevant and interesting. This user-controlled route development tool could be linked with the online virtual tour or mobile tour to create a multifaceted tool, which could be used to create unique, learner-centered, interactive tours. It may even be possible to link the tool with a mobile device so that the participant can view the personalized route while walking.

3.3 Challenges

Despite the many benefits of using GIS for a campus sustainability tour, some drawbacks do exist. Maintaining an extensive GIS system that remains up-to-date on content changes requires a full time position for an expert in managing such systems and data. Some campuses may already maintain a large GIS department with enough individuals to maintain such a system. Some universities may not have such an option, possibly limiting the applicability of GIS to campus sustainability tours.

Campus sustainability tours are still a new campus tool, and little research has been done on their effectiveness – especially the effectiveness of virtual tours and mobile

tours. Just as evaluation and data collection will be critical for the development of campus tours, evaluation and data collection must be a cornerstone of these GIS supplements. There is no significant evidence that these GIS applications would greatly improve the effectiveness of the campus sustainability tours, though preliminary data suggests that they may (Kingston et al., 2012; Wolf et al., 2013).

3.4 Conclusion

GIS has been used in many cases in the development of virtual tours and mobile tours (Shams et al., 2007; Chang-Jie and Jin-Yun, 2008; Huang et al., 2010; Chu et al., 2011; Ryle, 2012). Typically, these applications are used for tourism or nature parks. Virtual tours allow participants to experience the tour virtually from a computer or other device and sometimes to interact with the tour. Mobile tours take advantage of the wide availability of smart phones and PDAs to provide what is essentially an electronic guide for tour participants. Studies have demonstrated that students enjoy virtual tours and that they seem to be effective as an education tool (Kingston et al., 2012; Wolf et al., 2013).

Virtual tours are most often used in conjunction with sustainability tours, and are found in many formats. Some consist of interactive maps joined with videos, articles, and photos, while others are not mapped and simply provided information about each tour stop. Mobile tours are not widely used in campus sustainability tours, though they have the potential to be quite useful.

These tour supplements have the ability to counter many of the challenges faced by using campus sustainability tours. Poor weather is not an issue for virtual tours, users not in the area can still participate in the tours online, language barriers can be removed

by providing the virtual tour in multiple languages, fewer staff are needed for tours, edits to content are easy, use and effectiveness data can be easily collected, and these formats make use easy for instructors. These tools should be considered by universities as a tool to improve their sustainability tours.

Despite the ability of virtual tours to overcome many of the hurdles presented by in-person tours, little data have been collected regarding the educational effectiveness of virtual tours. Data must be collected about learner experience and education from virtual tours in order to determine whether these tools would be a sensible investment for sustainability tours. Whether virtual and mobile tours are shown to be a useful tool or not, GIS can improve campus sustainability tours. As demonstrated in this chapter, GIS can be used to create efficient tour routes and to create themed tours. As themed tour routes have been suggested as a feature that might increase instructor use and has the ability to provide choices to a participant, these developed routes can be useful in promoting sustainability tours. By giving participants choices in subjects they would like to learn, the tours would be able to present more relevant information to the learner and may be able to retain greater interest. Efficient and themed routes have the ability to improve campus sustainability tours at all universities.

The ability of GIS to develop themed routes is useful, but for an individual to develop all possible routes for participants to choose from would be overly time-consuming. Participants would likely not want to take the time to research which route, of hundreds possible, they would like to take. Instead, the researcher proposes that a new tool be created, using GIS Online, that would enable the user to have control over formulating their own route by choosing stops and being able to impose a time limit. This

ability would reduce the need for sustainability staff and could empower students or instructors to seek out information which is relevant or interesting to them.

CHAPTER FOUR: CONCLUSIONS AND FUTURE RESEARCH

Campus sustainability tours are being used on dozens of college and university campuses across the United States. These tours are used to call attention to and advertise sustainability initiatives on the university campus, and to educate visitors, students, faculty, and staff. These tours can be expensive and time consuming to create, and yet most sustainability professionals assume they are worth the investment. Prior to this research, no data had been collected on the development, use, and effectiveness of campus sustainability tours. For such widely used tools, which are advocated as a best practice for sustainable universities, data are needed to determine how universities develop the tours, how the tours are used, and whether the tours are effective in educating their participants. This research used surveys and interviews with sustainability professionals, and surveys and pre- and post-tests for the Western Kentucky University campus community to collect information about campus sustainability tours.

Based on data provided by sustainability professionals, there is a lack of research and best practices for guiding the development of campus sustainability tours. With no guidance, these tours are developed using the fragmented information on tour design gathered from the tourism industry and nature park areas, as well as what little can be found on how other universities developed their own sustainability tours. Campus sustainability tours have needs unique from those of other groups, as their audiences, locations, content, and staff capabilities are quite different. Universities differ greatly from one another as well, so it cannot be assumed that what works for one campus may work for another. No data exist on designing campus sustainability tours specifically, leaving developers in the dark despite the widespread use of these tours. Best practices

need to be developed for campus sustainability tours in order to guide future developers. Some trends present in the data have suggested the following best practices: identification of goals for the tour, audience identification, need for data collection and evaluation, planning for tour advertisement, strategic locating of tour stops, and the development of supplemental materials. Given the current state of sustainability tours, data collection and evaluation could be considered the most important step, as many tours already exist and information on them would be valuable tools in developing and improving current and future tours. In order to develop these best practices with more certainty, further research must be conducted regarding all areas of sustainability tours.

Not only are sustainability campus tours neglected in the literature, but sustainability professionals at universities with these tours have no quantitative data on the use of their tours or accompanying materials. All examples of use data provided were anecdotal in nature. Without data, it cannot be known whether these tours are being used and the reasons why or why not. Lacking these data, effective improvements cannot be made to the tour. Data collection and evaluation must be considered vital to the development of these tours and should be considered a best practice in development.

The WKU Green Tour case study supports the necessity of data collection; whether the campus community was being reached through the passive signage placed on campus to call attention to sustainability initiatives is unknown. The data have shown that these signs are not very effective in capturing the attention of passersby. Less than a quarter of the campus has read the signs. With these data, the WKU Office of Sustainability can begin to determine why this is the case and how it can be remedied. In addition to understanding the use of the tour or signage, data can provide an

understanding of the attitudes the campus community may have regarding signage. In the case of the WKU community, there was great interest in sustainability but a lack of knowledge, indicating that there is a place for a campus sustainability tour at WKU.

The WKU Green Tour, provided in guided tour, self-guided tour, and lecture format, were significantly effective in increasing participant knowledge across all formats. Students improved their scores no matter what method they participated in, but preferred guided tours over the other options for numerous reasons. In addition to increasing knowledge, some students suggested that they felt pride in their school because of the initiatives they learned about. The effectiveness of this tour within a classroom setting suggests that the Green Tour should be encouraged as a classroom tool; however, the case study also determined that professors do not use the tour very widely in their courses, but that some would like to incorporate the tour. The reason for this lack of use was that most of the campus community members did not know that the WKU Green Tour existed or that they were unsure how to use the tour in their courses. Given the tour's effectiveness and the lack of use, it is suggested that the WKU Office of Sustainability actively target campus instructors and encourage Green Tour use in courses by alerting instructors to the Green Tour's existence, encouraging its use, and enabling instructors to use the tour by providing supplemental materials such as a brochure, pre-made assignments or themed tours.

Advertising and using creative methods and venues to provide tours are necessary, in the WKU Green Tour case, to reach more learners. At WKU, most incoming freshmen are required to take a University Experience course, which familiarizes students with the campus and resources and teaches students important skills

for success. This course would be an excellent platform for the WKU Green Tour to use to reach students. The Green Tour could be used to familiarize students with the campus, instill the values of the university, and demonstrate holistic and systems thinking to students. Housing and Residence Life teams could also be made aware of the tour and could use it as an activity for their halls or to familiarize their students with campus. WKU has Green Toppers, sustainability ambassadors for the school, who could aid in conducting the tours or in giving lectures. These students could provide brief talks in classes at the beginning of the school year about the tour and campus sustainability and could reach many students. WKU has a well-used bus system on campus, which takes students around campus and off-campus to other locations. As a place of waiting, where a captive audience is available, these buses provide the perfect opportunity to advertise the Green Tour or provide information on sustainability. Learners are not in a rush, and so have time to read all available information. On certain occasions, it might even be possible to have a tour guide on the bus providing information as the bus makes its way around campus. Campuses must seek out creative ways to use and advertise their sustainability tours.

GIS should be employed to improve the use of tours by conducting analyses to determine efficient tour routes or developing themed tours. GIS could also make improvements through virtual tours and mobile tours, as these tools can avoid many of the barriers to use, such as weather or language. GIS Online could be used to allow tour participants to create their own tour routes, reducing work load for employees and allowing participants to choose those aspects of the tour they find relevant to themselves and that fit into their tour timeframe.

This preliminary research emphasizes the need for future research into campus sustainability tours. The research also has implications regarding the development of new campus sustainability tours, as it provides basic best practices that should be followed, stresses the need for data collection, suggests that the tours are effective educational tools, and emphasizes the use of GIS and the use of the tour in the classroom environment. Though much of what was learned about these tours was discovered within a specific case study, the changes that must now be made to the tour as a direct effect of the collected data reinforce the clear need for data collection at all universities with these tours.

4.1 Future Research

As a pioneering and preliminary study, which discusses a phenomenon as of yet poorly addressed, this research has raised numerous questions. This research was limited in scope; only one case study was conducted. Despite the numerous findings provided by this case study, these findings should not be assumed true across all universities. Case studies of other universities must be conducted to fully assess the use and effectiveness of sustainability tours to determine whether the trends found here are unique or if they vary between universities. Comparing universities with different types of tours could aid in clarifying best practices.

Different types of effectiveness should be addressed in future research. This study looked only at knowledge gain. Behavior change, actions taken, and attitude changes were not assessed. These other types of effectiveness should be assessed, as action and behavior change is a goal of environmental education towards which most programs

strive. Lectures were demonstrated as more effective than tours in terms of knowledge gain in this study, but this pattern may not hold true for behavior or attitude changes. . Future research should assess whether or not tours are truly the best method for disseminating sustainability information to the campus community.

Sustainability tours should be assessed for their potential to be used on campus to emphasize campus values. This research demonstrated that some students felt pride in being a part of WKU after participating in the Green Tour. In addition, many universities see their tours as instilling values rather than knowledge. Determining the effectiveness of campus sustainability tours in communicating and instilling values would have implications for how tours are used in the future, such as in use as an introductory experience for new students.

At WKU, the Green Tour was shown to be an effective learning tool and WKU professors were interested in using the tour in their courses. How professors use the tours in classes and reactions to the tour as a classroom tool from students and instructors provide data on whether they should indeed be used in the classroom and in what capacity. Universities should look into how best to empower their instructors to use the tour, and whether or not the tour is found to be useful by instructors and in what capacities. Tours could be looked into as way to bridge gaps between disciplines and develop systems thinking skills in students.

Assessments of effectiveness in this research were limited to guided, self-guided, and lecture format, and were assessed within the framework of a class. Other methods, such as virtual tours, or other situations, such as truly informal learning, should also be

examined to determine whether the Green Tour, or another campus sustainability tour, continues to be effective in other situations.

The campus sustainability tour as an effective advertising tool is a further facet that could be assessed. This research looked at the tour from the perspective of an educational tool. Many universities target visitors, prospective students, and guests, individuals that are being wooed and to whom the campus is being advertised. Given that this research demonstrated that the WKU Green Tour promoted pride in the university in some students, assessing whether participants make decisions about the university, such as choosing to attend based on this tour as an advertising tool, is likely a worthwhile pursuit.

The flexibility of use and learner interest in campus sustainability tours give them the potential to be effective learning tools for the campus community. Research regarding these tours, however, is lacking in almost all areas. This research provides a foundation upon which future research can build to determine how these tours can best be used and improved to the benefit of campuses, communities, and learners.

REFERENCES

Ainsworth, H.L., Eaton, S.E. (2010). *Formal, Non-Formal and Informal Learning in the Sciences*. Calgary, Canada: Ornate Press.

American University (2015). Sustainability Map and Tours. Retrieved 20 June 2015 from http://www.american.edu/finance/sustainability/map.cfm.

Arizona State University (2012). Sustainability Initiatives Tour: Self-guided Tour of the Tempe Campus. Retrieved 20 June 2015 from https://sustainability.asu.edu/docs/gios/ASU-Sustainability-Tour-Map.pdf.

Barlett, P.F. (2002). The Emory University campus walking tour: awakening a sense of place. *International Journal of Sustainability in Higher Education 3*(2), 105-112.

Barry, J. (1976). The Belgrade Charter: A global framework for environmental education. *UNESCO-UNEP Environmental Education Newsletter* 1, 1-9.

Berman, J. (2009). College students are flocking to sustainability degrees, careers. *USA Today*. Retrieved 16 April 2015 from: http://usatoday30.usatoday.com/news/education/2009-08-02-sustainability-degrees_N.htm.

Black, R., Ham, S. (2005). Improving the quality of tour guiding: Towards a model for tour guide certification. *Journal of Ecotourism 4*(3), 178-195.

Brabson, B.B. (2010). Population, Energy, and Sustainability. In Reynolds, H.L. (Ed.) *Teaching environmental literacy: Across campus and across the curriculum.* Bloomington, IN: Indiana University Press, Vol. 38, 39-49

Braund, M. (1991). Children's ideas in classifying animals. *Journal of Biological Education 25*(2) 103-110.

Braund, M., Reiss, M. (2006). Towards a more authentic science curriculum: The contribution of out-of-school learning. *International Journal of Science Education 28*(12), 1373-1388.

Capshew, J.H. (2010). Population, Energy, and Sustainability. In Reynolds, H.L. (Ed.) *Teaching environmental literacy: Across campus and across the curriculum.* Bloomington, IN: Indiana University Press, Vol. 38, 130-134.

Chang-Jie, M., Jin-Yun, F. (2008). Location-based mobile tour guide services towards digital dunhuang. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences* 37(B4), 949-953.

Cho, Y., Wang, Y., Fesenmaier, D.R. (2008). The Web-based Virtual Tour in Tourism Marketing. *Journal of Travel and Tourism Marketing* 12(4), 1-17.

Chu, T.H., Lin, M.L., Chang, C.H., Chen, C.W. (2011). Developing a tour guiding information system for tourism service using mobile GIS and GPS techniques. *Advances in Information Sciences and Service Sciences* 3(6), 49-58.

Chu, T.H., Lin, M.L., Chang, C.H., Chen, C.W. (2012). Using mobile geographic information system (GIS) techniques to develop a location-based tour guiding system based on user evaluations. *International Journal of the Physical Sciences* 7(1), 121-131.

Cotton, D., Winter, J., Bailey, I. (2013). Researching the hidden curriculum: intentional and unintended messages. *Journal of Geography in Higher Education* 37(2), 192-203.

Cortese, A.D. (2003). The critical role of higher education in creating a sustainable future. *Planning for Higher Education* 31(3), 15-22.

Davis, J. (1998). Young children, environmental education, and the future. *Early Childhood Education Journal* 26(2), 117-123.

Dib, C. (1987). Formal, non-formal and informal education: Concepts/applicability. Retrieved 16 October 2014 from http://www.techne-dib.com.br/downloads/6.pdf.

Dierking, L. Falk, J. (1994). Family behavior and learning in informal science settings: A review of research. *Science Education* 78(1), 57–72.

Digby, C.L. (2013). The Influences of Socio-demographic Factors, and Non-formal and Informal Learning Participation on Adult Environmental Behaviors. *International Electronic Journal of Environmental Education*, *3*(1), 37-55.

Elder, J.L. (2003). *A field guide to environmental literacy: making strategic investments in environmental education.* Rock Spring, GA: Environmental Education Coalition.

Falk, J.H., Dierking, L.D. (2000). Learning from museums. Visitor experiences and the making of meaning. Walnut Creek, CA: Altamira.

Gay, J. (1999). A guide to tour designing for seniors. *Tourism Recreation Research 24*(1), 90-92.

Goudie, A.S. (2013). *The Human Impact on the Natural Environment: Past, Present, and Future* (7th edn.). New York: John Wiley & Sons.

Gudgion, T.J., Thomas, M.P. (1991). Changing Environmentally Relevant Behaviour. *Environmental Education and Information 10*(2), 101-12.

Ham, S.H. (1992). *Environmental interpretation: A practical guide for people with big ideas and small budgets*. Golden, CO: Fulcrum Publishing.

Heimlich, J.E. (1993). Nonformal Environmental Education: Toward a Working Definition. The Environmental Outlook, ERIC Clearinghouse for Science, Mathematics, and Environmental Education. Retrieved 3 March 2015 from http://files.eric.ed.gov/fulltext/ED360154.pdf.

Huang, J., Zhan, Y., Cui, W., Yuan, Y., Qi, P. (2010). Development of a campus information navigation system based on GIS. *Computer Design and Applications (ICCDA), 2010 International Conference,* Qinhuangdao, June 25-27, Vol. 5, 5-491.

International Union for the Conservation of Nature (1970). *International Working Meeting on Environmental Education in the School Curriculum. Final Report*. Gland, Switzerland: IUCN.

Jickling, B. (1997). If environmental education is to make sense for teachers, we'd better rethink how we define it! *Canadian Journal of Environmental Education* 2, 86-103.

Jickling, B., Spork, H. (1998). Education for the Environment: a critique. *Environmental Education Research 4*(3), 309-327.

Jucker, R. (2002). *Our Common Illiteracy: Education as if Earth and People Mattered*. Frankfurt, Germany: Peter Lang.

Jurin, R.R., Roush, D.E., Danter, J. (2010). *Environmental Communication: Skills and Principles for Natural Resource Managers, Scientists, and Engineers*. New York: Springer.

Kagawa, F. (2007). Dissonance in students' perceptions of sustainable development and sustainability. *International Journal of Higher Education 8*(3): 317-338.

Keck, A., Sharma, N.P., Feder, G. (1994). *Population growth, shifting cultivation, and unsustainable agricultural development*. New York: World Bank Discussion Paper 234.

Kingston, D.G., Eastwood, W.J., Jones, P.I., Johnson, R., Marshall, S., Hannah, D.M. (2012). Experiences of using mobile technologies and virtual field tours in Physical Geography: implications for hydrology education. *Hydrology and Earth System Sciences*, 16, 1281-1286.

Knapp, D. (2007). *Applied Interpretation: Putting Resource into Practice*. Fort Collins, CO: InterpPress.

Lee, J., Williams, M. (2006). *Environmental and Geographical Education for Sustainability*. New York, NY: Nova Science Publishers.

Livingstone, D.W. (2001). Adults' Informal Learning: Definitions, Findings, Gaps, and Future Research. Educational Resources Information Center. Retrieved 20 June 2015 from http://files.eric.ed.gov/fulltext/ED452390.pdf.

Marsick, V.J., Watkins, K.E. (1990). *Informal and incidental learning in the workplace*. New York: Routledge.

McGivney, V. (1999). *Informal learning in the community: A trigger for change and development*. Leicester, U.K.: National Institute of Adult and Continuing Education.

Merriam-Webster. (2015). Dictionary: Sustainable. Retrieved 14 March 2015 from http://www.merriam-webster.com/dictionary/sustainability.

Middleton, N. (2013). *The Global Casino: An Introduction to Environmental Issues*. New York, NY: Routledge.

National Environmental Education Advisory Council. (1996). Report Assessing Environmental Education in the United States and the Implementation of the National Environmental Education Act of 1990. Washington, D.C.: U.S. Environmental Protection Agency Environmental, Education Division. Retrieved 20 June 2015 from http://www.d.umn.edu/~tbates/educ5236-1/report.pdf.

National Research Council. (2009). *Learning Science in Informal Environments: People, Places, and Pursuits*. Committee on Learning Science in Informal Environments. Philip Bell, Bruce Lewenstein, Andrew W. Shouse, and Michael A. Feder, Editors. Board on Science Education, Center for Education. Division of Behavioral and Social Sciences and Education. Washington D.C: the National Academies Press..

Niaraki, A.S., Kim, K. (2009). Ontology based personalized route planning system using a multi-criteria decision making approach. *Expert Systems with Applications 36*(2), 2250-2259.

North, L. (2015). Personal Communication, Western Kentucky University, 16 February.

Nundy, S. (2001). *Raising achievement through the environment: a case for fieldwork and field centres*. Peterborough, U.K. National Association of Field Studies Officers.

Orams, M.B. (1996). Using interpretation to manage nature-based tourism. *Journal of Sustainable Tourism 4*(2), 81-94.

Orr, D.W. (1990). The liberal arts, the campus, and the biosphere. *Harvard Educational Review 60*(2), 205-217.

Orr, D.W. (1996). Educating for the environment: higher education's challenge of the next century. *The Journal of Environmental Education 27*(3), 7-10.

Palmer, J. (1998). *Environmental education in the 21st century: Theory, practice, progress and promise*. New York, NY: Routledge.

Parvin, J., Stephenson, M. (2004). Learning science at industrial sites. In Braund, M., Reiss, M. (eds.) *Learning Science Outside the Classroom.* New York, NY: RoutledgeFalmer, 129-149.

Pimentel, D., Westra, L., Noss, R. (2000). *Ecological integrity: Integrating Environment, Conservation, and Health*. Washington, D.C.: Island Press.

Portland State Univerity. (2015). Campus Sustainability Tour. Retrieved 20 June 2015 from https://www.pdx.edu/sustainability/campus-sustainability-tour-0.

Purdue University. (2013). Campus Sustainability Tour. Retrieved 20 June 2015 from http://www.purdue.edu/sustainability/news/greencampus/campustour/index.html.

Ribble, B. (2013). *Promoting Sustainability Literacy at Higher Education Institutions: A Comparative Case Study at Ten of the Largest US Universities*. M.A. Thesis, Duke University, Nicholas School of the Environment.

Ryan, C. (2014). Western Kentucky University Sustainability Coordinator. Personal Communication, 5 October.

Ryle, Z. (2012). *A Virtual Tour of WKU's Main Campus*. Bowling Green, KY: WKU Honors College/Capstone Experience/Thesis Projects. Paper 355.

Saveland, R.N. (1976). *Handbook of Environmental Education with International Case Studies*. Bath, UK: John Wiley & Sons.

Sauve, L. (1996). Environmental Education and Sustainable Development: A Further Appraisal. *Canadian Journal of Environmental Education* 1, 7-34.

Schugurensky, D. (2000). *The forms of informal learning: Towards a conceptualization of the field*. New Approaches to Lifelong Learning Working Paper No. 19. Toronto, ON: Ontario Institute for Studies in Education of the University of Toronto. Retrieved 14 October 2014 from https://tspace.library.utoronto.ca/bitstream/1807/2733/2/19formsofinformal.pdf.

Shams, A., Harris, R.A., Namwamba, F., Lyles, L. (2007). A 3-D Geo-database Virtual Reality Map for Southern University's Campus. In *2007 ESRI Education User Conference Proceedings* 98, San Diego, CA, June 16-19, pp. 45-51.

Sun, Y., Lee, L. (2004). Agent-based personalised tourist route advice system. Paper presented at the ISPRS 2004: 20th International Society for Photogrammetry and Remote Sensing ISPRS) Congress: "Geo-Imagery Bridging Continents." Available online at: http://195.130.87.21:8080/dspace/bitstream/123456789/593/1/Agent-based%20personalised%20tourist%20route%20advice%20system.pdf.

Thomashow, M. (2014). *The Nine Elements of a Sustainable Campus*. Cambridge, MA: Massachusetts Institute of Technology Press.

Tilbury, D. (1995). Environmental Education for Sustainability: defining the new focus of environmental education in the 1990s. *Environmental Education Research 1*(2), 195-212.

Tilden, F. (2008). *Interpreting our Heritage*. Chapel Hill, NC: University of North Carolina.

Tisdell, C., Wilson, C. (2005). Perceived impacts of ecotourism on environmental learning and conservation: Turtle watching as a case study. *Environment, Development and Sustainability* 7, 291–302.

United Nations. (1972). Declaration of the United Nations Conference on the Human Environment. Retrieved 24 January 2015 from http://www.unep.org/Documents.Multilingual/Default.asp?documentid=97&artic arti=1503.

United Nations Educational, Scientific and Cultural Organization. (1977). Intergovernmental Conference on Environmental Education. Retrieved 12 February 2015 from http://www.gdrc.org/uem/ee/EE-Tbilisi_1977.pdf.

United Nations Educational, Scientific and Cultural Organization. (1992). United Nations Conference on Environment & Development. Retrieved 15 February 2015 from https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf.

United States Environmental Protection Agency. (2015). Sustainability: Basic Information. Retrieved 20 June 2015 from http://www.epa.gov/sustainability/basicinfo.htm.

Weiler, B., Ham, S. (2001). Perspectives and thoughts on tour guiding. In Lockwood, A., Medlik, S. (eds.) *Tourism and Hospitality in the 21st Century.* Oxford, U.K.: Butterworth-Heinemann, 255-264.

Weiler, B., Ham, S. H. (2002). Tour guide training: A model for sustainable capacity building in developing countries. *Journal of Sustainable Tourism 10*(1), 52-69.

Western Kentucky University. (2014). 2014 Western Kentucky University Fact Book. Retrieved 17 April 2015 from https://wku.edu/instres/fact_book.php.

WKU News. (2015). WKU Among 2015 U.S. Department of Education Green Ribbon Schools. April 22, 2015. Retrieved 24 April 2015 from: https://wkunews.wordpress.com/2015/04/22/green-ribbon-2015/.

Winter, J., Cotton, D. (2012). Making the hidden curriculum visible: sustainability literacy in higher education. *Environmental Education Research 18*(6), 783-796.

Wolf, I.D., Stricker, H.K., Hagenloh, G. (2013). Interpretive media that attract park visitors and enhance their experiences: A comparison of modern and traditional tools using GPS tracking and GIS technology. *Tourism Management Perspectives* 7, 59-72.

World Commission on Environment and Development. (1987). *Our Common Future*. Oxford, U.K.: Oxford University Press.

Xiao-Long, M.A. (2005). A Study on Organization of Tour Routes Based on Tourists' Behaviors. *Geography and Geo-Information Science* 2, 98-101.

Young, J. (2013). Stepping into the Past with Historical Walking Tours. History Matters. Retrieved 12 March 2015 from: http://activehistory.ca/2013/10/a-step-by-step-guide-to-historical-walking-tours/.

APPENDIX A: Survey and Interview Instruments

Sustainability Professionals Interview Questions

Thank you for taking the time to respond to these questions. Please answer the following questions regarding creation of your sustainability tour. All responses are appreciated.

- What was the initial motivation in creating the tour?
- What preparations and research were done prior to installation and creation? (e.g. were best practices assessed, was the student body surveyed, etc.)
- What were the goals for the tour? How did you envision students and professors using the tour?
- How did you develop the signs/tour themselves? Why did you decide to include certain aspects (e.g. QR codes, or guided vs. self-guided tour, virtual tours)?
- How does current actual use of the signs compare to what was initially planned? Do students and staff interact with the tour as much as expected?
- Do you believe it was a worthwhile investment?
- Is there anything you wish you had done differently?
- Is there anything you would like to add or improve in the future?

Sustainability Professionals Survey Questions

1) What university, college, or institute do you represent?
2) What position do you hold at your university?
3) Do you consider environmental and sustainability education to be one of the primary goals of your institution?
    a. Yes
    b. No
4) Do you believe your campus is used as a teaching tool to promote understanding and awareness of environmental issues and sustainability?
    a. Yes
    b. No
5) If so, how?
6) Does your campus use outdoor interpretive signage to educate students, faculty, staff, and campus visitors?
    a. Yes
    b. No
7) Does your campus use indoor interpretive signage to educate students, faculty, staff, and campus visitors?
    a. Yes
    b. No
8) Does your campus use outdoor interpretive signage to educate students, faculty, staff, and campus visitors on environmental issues and sustainability on campus?
    a. Yes
    b. No
9) Does your campus use indoor interpretive signage to educate students, faculty, staff, and campus visitors on environmental issues and sustainability on campus?
    a. Yes
    b. No
10) What topics are covered by signage on your campus? Please list all topics and be specific.
11) By whom were the signs developed? Select all who apply.
    a. Students
    b. Faculty
    c. Staff
    d. Independent consultants
    e. Other
12) How many signs are currently installed on your campus?
13) Does your institution use any of the following components in conjunction with these interpretive signs? Check all that apply.

a. Tours
b. Brochures
c. QR codes
d. Website
e. Other

14) Are statistics available regarding use of the signs?
    a. Yes
    b. No
15) Are these statistics able to be shared?
    a. Yes
    b. No
16) Do you believe these signs are effective in increasing the awareness of campus environmental and sustainability issues?
    a. Yes
    b. No
    c. Unsure
    d. No basis to judge
17) Do you believe these signs are effective in increasing the understanding of campus environmental and sustainability issues?
    a. Yes
    b. No
    c. Unsure
    d. No basis to judge
18) Would you be willing to be contacted for more information regarding the interpretive signage on your campus?
    a. Yes
    b. No

Western Kentucky University Campus-wide Survey

The WKU Green Tour is a collection of signs around the WKU campus which cover the sustainable practices of the university (an example of the sign was shown). The following questions will ask you about your experiences with the Green Tour signs.

1) Do you live in Bowling Green, Kentucky for the majority of the year?
    a. Yes
    b. No
2) Are you a WKU student, faculty, or staff member?
    a. Yes – student
    b. Yes – faculty
    c. Yes – staff
    d. No
3) What is your current age?
    a. 18-25
    b. 26-35
    c. 36-45
    d. 46-55
    e. 56-65
    f. 66-75
    g. 76 and older
4) How do you identify your gender?
    a. Male
    b. Female
    c. Transgender or other
    d. Prefer not to answer
5) What is your ethnicity?
    a. White/Caucasian
    b. African American
    c. Hispanic or Latino
    d. Native American
    e. Asian/Pacific Islander
    f. Other
    g. Prefer not to answer

6) What is your primary language?
    a. English
    b. Spanish
    c. Bosnian
    d. Burmese
    e. Other
7) What is your highest level of education?
    a. Grade school
    b. Some high school
    c. High school diploma or equivalent
    d. Vocational or technical school (2 year)
    e. Some college
    f. Bachelor's degree
    g. Master's degree
    h. Doctoral degree
    i. Professional degree, please identify.
8) In what field do you work/study?
    a. Transportation/Tourism/Travel
    b. Philosophy/Religious Studies/Theology
    c. Education
    d. Engineering
    e. Earth Sciences/Geography/Environmental/Agricultural
    f. Mathematics
    g. Media Studies/Communication
    h. Chemistry
    i. Medicine/Dentistry/Nursing/Pharmacy/Veterinary Science/Physiology
    j. Civil Government
    k. Military
    l. Law Enforcement
    m. Legal
    n. Architecture
    o. Art and design/Drama and Dance
    p. Business/Management/Economics
    q. Computer Sciences/IT
    r. Other
9) Which of the following best describes the area in which you live?
    a. Urban (50,000 residents or more)
    b. Rural (less than 50,000 residents)

10) How often do you visit the WKU campus?
    a. Never
    b. A few times per year
    c. A few times per month
    d. Once per week
    e. More than once per week
    f. Every day
11) Why do you visit the WKU campus?
    a. For events such as shows, lectures, or festivals
    b. Student of WKU
    c. For meetings
    d. Employee of WKU
    e. Reside on campus
    f. Other
12) Do you consider yourself well-informed about sustainability practices on WKU campuses?
    a. Yes
    b. No
13) Are you personally interested in sustainability issues?
    a. Yes
    b. No

This is an example of one of the WKU Green Tour signs available on campus (Example shown). Please answer the following questions regarding these signs.

14) Have you ever heard of the Green Tour signs before?
    a. Yes
    b. No
15) If yes, how did you hear about them?
    a. A friend
    b. WKU outreach activities
    c. WKU events
    d. Other: _____
16) Have you ever seen the Green Tour signs?
    a. Yes
    b. No

17) If yes, how did you find out about them?
    a. Saw them while walking around campus
    b. Saw them while on a tour of campus (such as a recruitment tour)
    c. Saw them while on a scheduled field trip
    d. A friend showed them to you
    e. The Office of Sustainability website
    f. Other: _____
18) Have you ever read any of the Green Tour signs?
    a. Yes
    b. Yes, but not the entire sign.
    c. No
19) If yes, approximately how many signs have you read?
    a. 1-3
    b. 4-6
    c. 7-9
    d. Unsure
20) If yes, what did you learn by reading the signs? Check all which apply.
    a. Sustainability efforts on the main WKU campus
    b. Heat island effect
    c. Permeable concrete
    d. Rain Gardens
    e. Stormwater Runoff
    f. LED lighting
    g. Rainwater collection on campus
    h. The Big Red Bikes Program
    i. Native plants on campus
    j. Tree Campus USA
    k. LEED certification
    l. Xeriscape Gardens
    m. Gas burning heat plant on campus
    n. Karst and Injection wells
    o. Other – Please explain
21) Did you find the signs interesting?
    a. Yes
    b. No
22) If yes, why did you find the signs interesting?
    a. _____

23) Did the signs provide new information to you?
    a. Yes - I had not heard about these campus practices before
    b. No – I already knew about these practices
24) When viewing the signs, did you use your phone to access the QR codes on the signs?
    a. Yes
    b. No
25) If yes, did you read the website to which the QR code directed you?
    a. Yes
    b. No
    c. The QR code did not work
26) Have you told others about the Green Tour signs?
    a. Yes
    b. No

Student Tour Pre-test

Green Tour Pre-Test

Name _____

Date of Tour _____

Demographics

1) Are you a WKU student, faculty, or staff member?
    a. Yes – student
    b. Yes – faculty
    c. Yes – staff
    d. No
2) What is your age?
    a. Under 18
    b. 18-25
    c. 26-35
    d. 36-45
    e. 46-55
    f. 56-65
    g. 66-75
    h. 76 and older
3) How do you identify your gender?
    a. Male
    b. Female
    c. Transgender or other
    d. Prefer not to answer
4) What is your ethnicity?
    a. White/Caucasian
    b. African American
    c. Hispanic or Latino
    d. Native American
    e. Asian/Pacific Islander
    f. Other
    g. Prefer not to answer

5) What is your primary language?
    a. English
    b. Spanish
    c. Bosnian
    d. Burmese
    e. Other _____
6) What is your highest level of education?
    a. Some high school
    b. High school diploma or equivalent
    c. Vocational or technical school (2 year)
    d. Some college
    e. Bachelor's degree
    f. Master's degree
    g. Doctoral degree
    h. Professional degree, please identify.
7) In what field do you work/study?
    a. Transportation/Tourism/Travel
    b. Philosophy/Religious Studies/Theology
    c. Education
    d. Engineering
    e. Earth Sciences/Geography/Environmental/Agricultural
    f. Mathematics
    g. Media Studies/Communication
    h. Chemistry
    i. Medicine/Dentistry/Nursing/Pharmacy/Veterinary Science/Physiology
    j. Civil Government
    k. Military
    l. Law Enforcement
    m. Legal
    n. Architecture
    o. Art and design/Drama and Dance
    p. Business/Management/Economics
    q. Computer Sciences/IT
    r. English/Music/Humanities
    s. Other
8) Which of the following best describes the area in which you live?
    a. Urban (50,000 residents or more)
    b. Rural (less than 50,000 residents)

9) How often do you visit the WKU campus?
    a. Never
    b. A few times per year
    c. A few times per month
    d. Once per week
    e. More than once per week
    f. Every day
10) Why do you visit the WKU campus?
    a. For events such as shows, lectures, or festivals
    b. Student of WKU
    c. For meetings
    d. Employee of WKU
    e. Reside on campus
11) Do you consider yourself well-informed about sustainability practices on WKU campuses?
    a. Yes
    b. No
12) Are you personally interested in sustainability issues?
    a. Yes
    b. No
13) What degree of experience do you have regarding sustainability and environmental issues?
    a. Very well informed
    b. Somewhat well informed
    c. Not very well informed
    d. No knowledge

Familiarity

1) Have you ever **heard** of the WKU Green Tour before?
    a. Yes
    b. No
2) If yes, how did you hear about the signs?
    a. A friend
    b. A professor
    c. The WKU Office of Sustainability
    d. Other _____
3) Have you ever **seen** any of the Green Tour signs before?
    a. Yes
    b. No

4) If yes, how did you find out about them?
    a. Saw them while walking around campus
    b. Saw them while on a tour of campus (such as a recruitment tour)
    c. Saw them while on a field trip
    d. A friend told you about them
    e. The Office of Sustainability website
    f. Other _____
5) Have you ever **read** any of the Green Tour signs before?
    a. Yes
    b. Yes, but not the entire sign
    c. No
6) If yes, approximately how many signs have you read?
    a. 1-3
    b. 4-6
    c. 7-9
    d. Unsure

Content

1) What is the Heat Island effect?
    a. The effect of rural areas being warmer than the urban areas they surround due to larger areas covered by plant life.
    b. The effect of the northern hemisphere being warmer than the southern hemisphere due to larger cities being located in the northern hemisphere.
    c. The effect of the southern hemisphere being warmer than the northern hemisphere due to larger cities being located in the southern hemisphere
    d. The effect of urban areas being warmer than the rural areas which surround them due to larger areas covered by concrete and asphalt.
2) How does WKU reduce the Heat Island effect?
    a. Removal of parking lots on campus
    b. Use of gravel lots on campus
    c. Use of reflective asphalt coatings
    d. Reduction of building projects on campus
3) What is stormwater runoff?
    a. When water flows through streams faster after a storm
    b. When water flows from impermeable surfaces to area streams
    c. When water is directed into human-made structures such as culverts
    d. When storms force streams to overflow their banks

4) How can stormwater impact water quality in nearby lakes, rivers, and streams? Select all which apply.
    a. Stormwater can carry oil and contaminants into area streams
    b. Stormwater can wash away plant life
    c. Stormwater can contribute to erosion
    d. Stormwater can introduce new species into a stream
5) What design features can be used to reduce stormwater runoff? Select all which apply.
    a. Rain gardens
    b. Reflective asphalt
    c. Permeable concrete
    d. Landscape islands
6) Are parking lots and structures large consumers of electricity?
    a. Yes
    b. No
7) How can parking lot energy consumption be reduced? Select all which apply.
    a. Use of fluorescent and LED lighting
    b. Turning off lights when not in use
    c. Limiting the number of cars on campus
    d. Parking lots do not consume much energy
8) How is rainwater collection used by WKU? Select all which apply.
    a. The main campus uses rainwater to fill the campus pool
    b. Many gardens around the main campus are watered using collected rainwater
    c. The WKU farm uses rainwater to wash livestock
    d. The WKU campus does not collect rainwater
9) How is solar energy used on campus?
    a. We use solar panels to power the WKU South Campus
    b. We use solar panel to heat the pool on the WKU main campus
    c. We use solar panels to run the WKU Farm
    d. We do not use any solar energy on campus
10) Is WKU currently heated using coal or natural gas?
    a. Coal
    b. Natural Gas
    c. Other
11) What is a xeriscape garden?
    a. A garden which uses only colors which attract pollinators
    b. A garden which contains only edible plants
    c. A garden which contains only local plants
    d. A garden which requires minimal water using drought-resistant plants

12) Are LEDs more or less efficient than incandescent bulbs?
    a. LEDs are more efficient
    b. LEDs are less efficient
13) What benefits were gained by Studio One in switching to LEDS from incandescents?
    a. The studio became safer
    b. Energy savings
    c. More technologically advanced
    d. More comfortable studio for staff and guests
14) What level LEED certification has Gary Ransdell Hall achieved?
    a. Gold
    b. Silver
    c. Platinum
    d. Diamond
15) What does Downing Student Union currently do with its waste?
    a. Composting
    b. Landfill
    c. Incineration
16) What is Karst?
    a. A landscape in which sinkholes, springs, and caves develop in dissolving limestone
    b. A landscape consisting of rolling hills and small streams
    c. An impermeable surface found in cities
    d. A landscape which is dominated by flat grasslands and very few trees
17) How do urban areas affect karst landscapes? Select all which apply.
    a. Cities often fill in sinkholes.
    b. Cities often alter drainage pathways of stormwater.
    c. Cities often avoid karst landscapes
    d. Cities often pave surfaces, preventing water from easily seeping into the ground
18) What are injection wells?
    a. Large vertical wells into which trash is dumped
    b. Large vertical wells into which stormwater can drain
    c. Large vertical wells which allow gases built up in caves to escape
    d. Large vertical wells into which we can dump chemicals
19) What does LEED certification for a building mean?
    a. A certification that the building is architecturally sound
    b. A certification that the building is visually pleasing
    c. A certification that the building is optimal for educational use
    d. A certification that the building uses sustainable practices

20) In what ways may a LEED certified building be good for the health of the environment? Select all that apply.
    a. A LEED certified building may reduce energy use
    b. A LEED certified building may reduce water use
    c. A LEED certified building may reduce stormwater contamination
    d. A LEED certified building may reduce the heat island effect
21) What is Tree Campus USA?
    a. A program which promotes the planting of trees on university campuses
    b. A program which catalogs trees across the United States
    c. A program which determines the health of forests in the state of Kentucky
    d. A program which provides tips and guides for growing different types of trees
22) What is Ransdell's Rule?
    a. Trees cannot be cut down unless they are a danger to the campus
    b. Trees which are cut down must be composted
    c. When one tree is cut down, two must be planted
23) Why are native plants important? Select all which apply.
    a. They are more attractive than non-native plants
    b. They are better suited for the climate.
    c. They cannot be invasive.
    d. They provide a food source for local animals.

Student Tour Post-test

Green Tour Post-Test

Name _____

Tour Date _____

If part of class, teacher name: _____

Are you part of a lecture, guided tour or self-guided tour?

Guided **Self-guided** **Lecture**

Content

24) What is the Heat Island effect?
    a. The effect of rural areas being warmer than the urban areas they surround due to larger areas covered by plant life.
    b. The effect of the northern hemisphere being warmer than the southern hemisphere due to larger cities being located in the northern hemisphere.
    c. The effect of the southern hemisphere being warmer than the northern hemisphere due to larger cities being located in the southern hemisphere
    d. The effect of urban areas being warmer than the rural areas which surround them due to larger areas covered by concrete and asphalt.
25) How does WKU reduce the Heat Island effect?
    a. Removal of parking lots on campus
    b. Use of gravel lots on campus
    c. Use of reflective asphalt coatings
    d. Reduction of building projects on campus
26) What is stormwater runoff?
    a. When water flows through streams faster after a storm
    b. When water flows from impermeable surfaces to area streams
    c. When water is directed into human-made structures such as culverts
    d. When storms force streams to overflow their banks
27) How can stormwater impact water quality in nearby lakes, rivers, and streams? Select all which apply.
    a. Stormwater can carry oil and contaminants into area streams
    b. Stormwater can wash away plant life
    c. Stormwater can contribute to erosion
    d. Stormwater can introduce new species into a stream

28) What design features can be used to reduce stormwater runoff? Select all which apply.
    a. Rain gardens
    b. Reflective asphalt
    c. Permeable concrete
    d. Landscape islands
29) Are parking lots and structures large consumers of electricity?
    a. Yes
    b. No
    c. Unsure
30) How can parking lot energy consumption be reduced? Select all which apply.
    a. Use of fluorescent and LED lighting
    b. Turning off lights when not in use
    c. Limiting the number of cars on campus
    d. Parking lots do not consume much energy
31) How is rainwater collection used by WKU? Select all which apply.
    a. The main campus uses rainwater to fill the campus pool
    b. Many gardens around the main campus are watered using collected rainwater
    c. The WKU farm uses rainwater to wash livestock
    d. The WKU campus does not collect rainwater
32) How is solar energy used on campus?
    a. We use solar panels to power the WKU South Campus
    b. We use solar panel to heat the pool on the WKU main campus
    c. We use solar panels to run the WKU Farm
    d. We do not use any solar energy on campus
33) Is WKU currently heated using coal or natural gas?
    a. Coal
    b. Natural Gas
    c. Unsure
34) What is a xeriscape garden?
    a. A garden which uses only colors which attract pollinators
    b. A garden which contains only edible plants
    c. A garden which contains only local plants
    d. A garden which requires minimal water using drought-resistant plants
35) Are LEDs more or less efficient than incandescent bulbs?
    a. LEDs are more efficient
    b. LEDs are less efficient
36) What benefits were gained by Studio One in switching to LEDs from incandescents?

a. The studio became safer
b. Energy savings
c. More technologically advanced
d. More comfortable studio for staff and guests

37) What level LEED certification has Gary Ransdell Hall achieved?
a. Gold
b. Silver
c. Platinum
d. Diamond

38) What does Downing Student Union currently do with its waste?
a. Composting
b. Landfill
c. Incineration

39) What is Karst?
a. A landscape in which sinkholes, springs, and caves develop in dissolving limestone
b. A landscape consisting of rolling hills and small streams
c. An impermeable surface found in cities
d. A landscape which is dominated by flat grasslands and very few trees

40) How do urban areas affect karst landscapes? Select all which apply.
a. Cities often fill in sinkholes.
b. Cities often alter drainage pathways of stormwater.
c. Cities often avoid karst landscapes
d. Cities often pave surfaces, preventing water from easily seeping into the ground

41) What are injection wells?
a. Large vertical wells into which trash is dumped
b. Large vertical wells into which stormwater can drain
c. Large vertical wells which allow gases built up in caves to escape
d. Large vertical wells into which we can dump chemicals

42) What does LEED certification for a building mean?
a. A certification that the building is architecturally sound
b. A certification that the building is visually pleasing
c. A certification that the building is optimal for educational use
d. A certification that the building uses sustainable practices

43) In what ways may a LEED certified building be good for the health of the environment?
a. A LEED certified building may reduce energy use
b. A LEED certified building may reduce water use
c. A LEED certified building may reduce stormwater contamination

d. A LEED certified building may reduce the heat island effect

44) What is Tree Campus USA?
    a. A program which promotes the planting of trees on university campuses
    b. A program which catalogs trees across the United States
    c. A program which determines the health of forests in the state of Kentucky
    d. A program which provides tips and guides for growing different types of trees
45) What is Ransdell's Rule?
    a. Trees cannot be cut down unless they are a danger to campus
    b. Trees which are cut down must be composted
    c. When one tree is cut down, two must be planted
46) Why are native plants important? Select all which apply.
    a. They are more attractive than non-native plants
    b. They are better suited for the climate.
    c. They cannot be invasive.
    d. They provide a food source for local animals.

Reactions

1) Why did you find the Green Tour signs and/or information interesting?
2) Did you find the information easy to understand? Why or why not?
3) What valuable information did you learn from the WKU Green Tour or lecture?
4) If guide tour or lecture, what concepts presented in the Green Tour did your teacher or guide help explain?
5) How were these explanations helpful to understanding the information?
6) If self-guided, would a guide have been useful? If so, why and what information?
7) What information have you retained from the tour or class? Why? Do you think you will remember this information?
8) Did you enjoy the method through which you received the information? Would you have rather had the lecture, the guided tour, or the self-guided tour?
9) Which method do you think you would have learned more from? Why?

WKU Instructor Survey

Western Kentucky University Green Tour Survey

The WKU Green Tour is a collection of signs around the WKU campus which cover the sustainable practices of the university. There are 9 total signs, and they can be taken through self-guided tour or as a guided tour. The signs cover issues such as stormwater, karst, LED lighting, composting, and the heat island effect. In the past, some professors and instructors in the university have incorporated the tours in their classes for content or as a way to introduce new students to campus.

The following questions will ask you about your experiences with the Green Tour.

1) Do you teach classes at WKU?
    a. Yes
    b. No
2) In what college do you teach?
    a. Ogden College of Science and Engineering
    b. College of Education and Behavioral Sciences
    c. College of Health and Human Services
    d. Potter College of Arts and Letters
    e. Gordon Ford College of Business
    f. University College
3) What courses do you typically teach on a regular basis?
    a. _____
4) Have you ever heard of or seen the WKU green Tour?
    a. Yes
    b. No
5) Have you ever used the Green Tour as a part of your class?
    a. Yes
    b. Yes, but not regularly
    c. No
6) Have you known any professors who have used the Green Tour in their classes?
    a. Yes
    b. No
7) Would you be interested in using the current Green Tour in your classes?
    a. Yes
    b. Some classes
    c. No

8) If yes, why would you be interested in using the tour?
    a. _____
9) How do you think the tour could benefit your students?
    a. _____
10) If no, why not?
    a. _____
11) What challenges might prevent you from using the tour in you courses?
    a. _____
12) Additions may be made to the Green Tour in the future, including the following:
    a. An online virtual tour with videos which will allow participants to 'take' the tour on a computer.
    b. Themed tours, which only visit certain signs depending on your focus (e.g. a water tour, or a campus buildings tour)
    c. Ready-made assignments for students regarding the tour which can be accessed by professors or instructors.
    d. A guided tour schedule with times put out prior to the beginning of each semester.
    e. The availability of a brochure for self-guided tours, provided at the Office of Sustainability.
13) Of the following, which would increase your likelihood of using the tours in your classroom? Select all that apply.
    a. An online virtual tour with videos which will allow participants to 'take' the tour on a computer.
    b. Themed tours, which only hit certain signs depending on your focus (e.g. a water tour, or a campus buildings tour)
    c. Ready-made assignments for students regarding the tour which can be access by professors or instructors.
    d. A guided tour schedule with times put out prior to the beginning of each semester.
    e. The availability of a brochure for self-guided tours, provided at the Office of Sustainability.
14) If yes to a, why?
15) If yes to b, why?
16) If yes to c, why?
17) If yes to d, why?
18) If yes to e, why?

APPENDIX B: Raw Data

Sustainability Professionals Interviews

1. What was the initial motivation in creating the tour?

University 1: Ours is a 300+ year old campus that is distributed throughout a small city. We decided that a tour would be a good way to highlight the challenges and opportunities offered by this context.

University 2: Demonstrate sustainability is an integral part of the culture at HSU; highlight sustainability programs, initiatives and resources students (incoming and current) can tap into.

University 3: My motivation in creating the tour was to give the students, who are getting their first experiences in campus sustainability, a chance to apply what they'd been learning in "The 9 Elements of a Sustainable Campus" to our own campus – helping them to interpret their university in terms of sustainability challenges/opportunities, as they look forward to completing a semester-long sustainability project in the next course of their Sustainability Certificate program. For the people who attended the tour – specifically, the Admissions staff – it was to increase their awareness of sustainability priorities identified by students, to empower them to share sustainability information with prospective students and families. For community members who attended, it was to share with them what their neighbor institution is doing, and could use help with, with the goal of relationship-building and transparency.

University 4: We just do not have enough information on campus about sustainability available online. We wanted to show people the highlights of what we are doing.

University 5: In 2008, our campus hired our first Sustainability Coordinator, and one of her goals was to increase the visibility of UMD's sustainability efforts.

University 6: Suggested as content for a concurrent session of a conference we hosted at our university in 2012. Was hugely successful, so we kept offering them!

University 7: Student project

University 8: Educate the campus community about sustainability initiatives at University 8.

University 9: (Notes: Just a tour, not the initial coordinator, 8 year old office, created by a student, started out as intern, newness allows creativity) Student identified as a need. ID

ways to get out the word in a way that people can empower themselves. Improve culture of sustainability. Method that wasn't direct involvement, but wanted to guided the conversation.

University 10: Lots of Requests

University 11: It was developed as part of a course in sustainability to familiarize students enrolled in the class with the green initiatives on campus. Since so much of meeting the sustainability challenge is grounded in communication, I developed the assignments for students to do research and use multiple forms of media (video, photos, writing) to communicate why these various campus features are helpful as regards our community environmental footprint.

University 12: To showcase the items in physical tours requested by various groups.

University 13: Educating students and visitors. Showcasing projects that advance green agenda

University 5: In 2008, our campus hired our first Sustainability Coordinator, and one of her goals was to increase the visibility of UMD's sustainability efforts.

University 14: Increased awareness of the ecological features of the specific building—many of which are easily visible, but others of which are somewhat hidden (e.g., energy-saving features)

University 15: We found that many students, faculty, and staff were excited to learn about sustainability efforts on campus, but that there were often places/efforts that got overlooked. We like to use our campus as a living laboratory and wanted to create a go-to document so that as many people as possible could learn about the great efforts happening on campus. In addition, we thought it would be helpful for prospective students who might be unable to visit campus in person. We hoped that it would provide a way for them to get a feel for campus and to better understand our commitment to sustainability.

University 16: Provide information about environmentally-sustainable features on campus and encourage participation from the PSU community. The tour was designed primarily for special visiting groups and students.

2. Do you believe your initial goals have been achieved? Why? Have there been difficulties in achieving these goals (e.g. vandalism, lack of interest, etc.)?

University 5: Yes, I think the goals have been realized. The difficulties are primarily related to the fact that any signage loses its impact over time. Because of this, we've had to change locations and messaging of our signage.

University 13: No yet. Time constraints and funding are limited.

University 14: Partly—particularly by the chemistry, physics, and science education faculty and staff who work in the building. Otherwise, Lack of interest, mostly

3. What preparations and research were done prior to installation and creation? (e.g. were best practices assessed, was the student body surveyed, etc.)

University 1: We partnered with the Visitor's Center to determine how the content should be structured and what would be of most interest to the 80,000+ visitors we get each year.

University 2: This is a walking tour, which can be self-guided or student-guided. Had to map out and time routes, identify points of interest, write up descriptions for each.

University 3: The students read "The 9 Elements of a Sustainable Campus" by Mitchell Thomashow, and during the two weeks before the tour, identified a landmark they felt represented 1 or 2 of those elements. The students prepared a 3-4 minute explanation, identified the path they would follow to hit each landmark, and thought about questions the Admissions staff and community members might ask. The tour was promoted on the Sustainability Center's Facebook page and intranet calendar of events, and invitations were specifically sent to offices.

University 4: None really. We just went with what we knew.
University 5: We developed our signage internally, with student employees. We took pictures, or found images online of existing signage at other campuses and encouraged our students to use that as a starting place. (Other: Our signage is passive - it is placed in relevant areas. We conduct sustainability tours of our campus with small groups of interested incoming freshmen, for classes who request it, or for external groups. We can craft our tours to be relevant to whatever group we are hosting. We offer tours that provide a broad overview of sustainability on our campus, and we can also spend an entire tour focused on a single topic area.)

University 6: Nothing has been installed to date to assist with the tour. We are exploring the development of informational signage and trying to assess materials that have low environmental impact, durability, and low potential for vandalism. This is mostly a student-lead effort.

University 7: Installation of physical signs required approval from several governing bodies on campus including Office of the President. No surveys were implemented.

University 8: Tour stops were selected based on their ability to tell the sustainability story of campus – each stop represents a different area (transportation, waste, food, etc.) that University 8 targets. Student guides also offer input to help update the tour and keep information fresh.

University 9: Not her time, pass

University 10: Not really

University 11: It was an assignment, student reviewed one another's work, the professor modified the entries and worked with IT to create the path. Creating the signs took the longest time. Not sure what you're trying to get at with this question. There were not a lot of models to follow that worked for our campus.

University 12: The project installations were part of student internships and were researched by students for the students.

University 13: Horticulture plus facilities landscape architect and Landscape Architecture Dept. are heavily involved with decision making. All students and visitors are addressed.

University 14: Development was an iterative process between me (director, office of sustainability, and the chief architect of the building. The architect developed the initial list of features to highlight, and provided technical information about the features. I then developed the initial signage, then had the architect review it for accuracy. We chose a signage and a "virtual tour" over an in-person tour largely because of lack of staff.

University 15: A lot of thought about best practices, stakeholder input, etc. went into each aspect of the tour. The tour simply provides a way to summarize all of those efforts.

University 16: The original tour was designed by the Campus Sustainability Manager and student employees in 2008. Research was completed on different green features of the campus in conjunction with Facilities and Planning (now Facilities and Property Management). To our knowledge, no best practices were assessed and no one was surveyed. However, research about other campus tours was completed prior to starting the project.

4. What were the goals for the tour? How did you envision students and professors using the tour?

University 1: Our main audiences for the tour are guests, prospective students, and visitors. We anticipate that the tour will provide the sense that our institution has a strong culture of sustainability – that environmental and social factors are a part of decision-making and daily habits at the individual and institutional scale.

University 2: See 'initial motivation' above. Self-guided tour; brochure can be downloaded. Tour was also integrated into standard campus tour, and tour guides were trained on the sustainability aspects of the campus.

University 3: See #1 above

University 4: Our main goal was to educate our campus about sustiainability initiatives that they didn't know about.

University 6: The tour evolved as a result of sustainability features we had on campus; it wasn't planned and so we didn't set forth any goals.

University 7: Goal was to highlight the features of campus, promote to visitors and students, and recruiting.

University 8: The online tour is accessible for all audiences. Anyone can visit the mobile app to use the self-guided online tour. The in-person guided tour has been offered to staff, incoming students, and alumni. The tour is available on request.

University 9: See #1 – knowledge gain in own hands. Pull back the curtain. For visitors and students. No info about how they 'courted' professors for use.

University 10: Provide a self-guided tour that might engage passers by with the new signage. Each sign has a QR tag (yes we thought at the time this might take off) so that viewers could scan the tag and go to a page with a video. Each stop has a professionally edited video highlighting some of the stop features.

University 11: We were finding that we had a nice loop of the campus and were conducting the tours frequently; this was partly designed to be a labor-saving device for those of us who are called on to communicate about the university's green commitments.

University 12: Anyone can take the tour-they have a broad focus.

University 14: It is used by SOME campus tours for interested students; and most frequently by our STEM-H office that brings school groups to campus for tours and activities.

University 15: For prospective students, we hoped that the tour would provide a way for them to get a feel for campus and to better understand our commitment to sustainability. For current students, faculty, and staff, we hoped that the tour would provide a way for them to gain a better understanding of the opportunities that surround them.

5. How did you develop the signs or tour themselves? Why did you decide to include certain aspects (e.g. QR codes, or guided vs. self-guided tour, virtual tours)?

University 1: We have several options for tours. One is through the Visitor's Center website. It uses our institutional aesthetic, but focuses on green highlights such as LEED buildings and energy management. Another is an in-person tour with a member of our team. This one is tailored to the visitor. A third is sustainability highlights that are worked into the daily tours provided by student docents.

University 2: Increase access.

University 3: See #1 above

University 4: We do it with personal guides. We would like to develop signs and a virtual tour. University 4 is a small campus with a personal touch. Our class sizes are small and most of us know each other. It made sense to us to make the tours personal with a guide.

University 6: In development.

University 7: Developed based on the skillset and resources available at the time.

University 8: See above

University 9: Content – return on investment items. Water, energy, land, waste conservation. Extras – Guided (on request), self-guided brochure, QR code (silicon valley, more of trend), staff guided tours, trainings, alumni weekend guided tour (general but adds in sust tour)

University 10: See above

University 11: We use QR codes; we did a trial run during alumni weekend and it got a LOT of hits; this convinced our communications committee that it would be a worthwhile investment to make it official and permanent. I think that the best-practice of keeping oceans of text out of the commons to explain green elements did inform this choice. Community members who use our campus are curious about various features and it

works nicely to guide people around our green initiatives (and make them aware that there ARE some!

University 12: Those were developed using self- guided intuitive design and messaging.

University 14: The “surprise under their feet” aspect is usually the most effective. When we talk about the large amount of concrete in the building being a heat sink; or the use of the fritted windows to control incoming solar radiation. It’s sort of the “make the invisible visible” phenomenon.

University 15: We decided to do a virtual tour so that 1) we would not waste paper and 2) it could be accessed by people all around the world.

University 16: No signage was developed for the tour, but this has been discussed as a potential initiative. The tour information was compiled into a PDF document that could be viewed online or printed. To our knowledge, the first publicized tours of campus were offered starting in 2008 at Viking Days (new student week). Prior to that time, tours may have occasionally been offered to campus visitors.

6. How does current actual use of the signs or tour compare to what was initially planned? Do students and staff interact with the tour as much as expected?

University 1: We don’t use signs for our tour.

University 2: We don’t survey for this.

University 3: N/A we did not develop signs

University 4: We do not have signs.

University 6: In development

University 7: Not measured, not measured

University 8: The amount of in-person tours has increased since implementation. We are planning for more ways to allow for guided sustainability tours of campus.

University 9: No way of tracking how many people use the tour. No information

University 10: We had hoped for higher involvement

University 11: Families on campus tours use the codes, we use it for outreach and tours for freshman orientation, high school groups, needs some revising.

University 12: The tour is self-directed or can be done with a lead person.

University 15: It's hard to say how much the tour is accessed and used online, but we have shared it with many current student groups and their response has been that it's quite useful and educational. We are always curious to learn which parts of the tour are new (or a surprise) to students. Often times some of the sustainable features of a building are unnoticeable, so they seem to be excited to learn about solar panels etc. that they hadn't noticed before.

University 16: We do not currently have designated tour signage, although there are various signs around campus for green features and LEED buildings.

6. Do you believe the tours were a worthwhile investment?

University 1: Yes. While the tours have likely netted only a nominal raise in awareness on campus, they have been valuable as a means of engaging visitors and the act of partnering with our Visitor's Center was valuable to our team as it helped us to develop a firmer institutional context for our work.

University 2: Yes.

University 3: There was no investment of money, but I do believe it was a worthwhile investment of time. I am awaiting feedback from the Admissions staff on whether they would agree.

University 4: Yes, we believe the tours matter and help to educate stakeholders.

University 6: We certainly hope it's going to be! Also, we have some extra funding this year that we need to spend down before the end of June. This is potentially a very expensive project and I'm not sure that it would be the absolute best bang for our buck if we didn't already have funds on hand to spend.

University 7: At the time it was

University 8: Yes

University 9: People ask for tours –priceless to be able to tell them they can check the website.

University 10: Yes

University 11: Given that it was mostly free, apart from the signs themselves, and it was a learning experience for the students who created it, absolutely!

University 12: The actual investment that is worthwhile are the roof top gardens, rain gardens, recycling installations, LEED Buildings and Solar installations. Not the signage themselves.

University 15: Yes.

University 16: Yes; the tour has become more popular with each year. We now have a student ambassador who leads about five tours per week for potential students, delegations, classes, and other groups. The map has been revised and updated. Printed maps are available in many resource areas around campus. As well, students in the Sustainability Volunteer Program's Cultural Sustainability Task Force have also designed a complementary Cultural Sustainability Self-guided Tour that includes information about resource centers and other opportunities that are relevant to new students coming to PSU from diverse backgrounds and experiences.

7. Is there anything you wish you had done differently?

University 1: Nothing.

University 2: No.

University 3: I would have given the students a chance to do a "dry run" of the tour, and I would have polled the Admissions office to see what kinds of sustainability questions are asked most frequently by prospective families.

University 4: I wish we had more signage and I wish we had an online video tour.

University 6: Not yet!

University 7: N/A

University 8: N/A

University 9: No

University 10: QR codes, but it's hard to gauge that initially

University 11: I wish the process was shorter than 3 years, it took a lot of reminders and prodding to get the signs eventually put up. Student work took a lot of editing/pruning to make consistent between signs; maybe style guides would have lessened the work needed on the back end.

University 12: No

University 15: It would be helpful if we could track who was using it.

8. Is there anything you'd like to add or improve in the future?

University 1: We would like to see more sustainability-specific tours offered through the Visitor's Center, but we do not anticipate having the bandwidth to take that on.

University 2: Eventually create a virtual tour

University 3: Not at this time.

University 5: Although we recognize that changing our signage regularly would help, we just don't have the infrastructure to support doing that. One thing that we did for the first time this year was to hire a student graphic designer to work 10-20 hours per week for our office. This has been a HUGE boon to our messaging.

University 6: I'd be interested to learn more about how other schools track the usership of signage. Short of training a camera on sites with signs.

University 7: More updates and promotion, also more connection to recruiting students, admission, residence life, etc.

University 8: N/A

University 9: No – fine as is. Time priorities

University 10: Nothing comes to mind… I'm sure we could improve but I'm not going to rip out the signs. I will reevaluate when it is time to replace the signs.

University 11: Future iterations of the course will do the labor of updating the content on the links.

University 12: No

University 13: More of it with more faculty involved.

University 14: I have not been successful in installing signage of our wetlands and engineered stream stormwater management system on the exterior of the building because of (a) lack of funding; and (b) stalling by our campus "aesthetics" folks who are trying to reduce the number of external signs (Other: One of the signs describing the double door lock also encourages people NOT to use the handicapped automatic door openers unless they truly need them because they override the double door energy savings features. We have observed (anecdotally) that this particular building has the lowest unnecessary use of the handicapped door openers than any building on campus (in other buildings—e.g., the main library—one student observed that more than 70% of people used the handicapped door opener!))

9. Do professors at your school use the tours in their classrooms? Have you specifically targeted professors in terms of advertising the tour for class use?

University 1: No, we have not targeted professors directly to use the tour as a resource for their classes, and I am unaware of any that use it, although it is free and available for that purpose if desired.

University 1: Yes, some faculty members do request tours. I give a guest lecture and tour to one class every year and other classes request tours – either of campus or of specific parts of campus (the power plants) – as suits the courses. By the way, we also have sustainability tours of some of the buildings on campus. I'm not sure if this is applicable, but I thought I should mention it. No, we have not targeted professors directly to use the tour as a resource for their classes, and I am unaware of any that use it, although it is free and available for that purpose if desired. (AUTHOR NOTE: 2 different respondents from University 1)

University 2: Hello, I am not aware of faculty utilizing the tour, we do not make a targeted marketing effort to faculty.

University 3: I invited all the instructors of courses included under the Sustainability Certificate program to have their students participate in the tour. As far as I know, none of them have used the tour in their classrooms.

University 4: We largely do the tours in sustainability classes. We haven't started advertising the tours.

University 6: Yes, they do --- some of them have requested tours, and some of them have sent their students to tours we make available to the wider community. I wouldn't use the word "targeted" since they're open to anybody, but we have worked with professors to

help ensure that our own students are understanding the sustainability features of their own campus.

University 8: We haven't specifically targeted professors to advertise the tour for class use, and I don't have any knowledge of professors using the tours in their classrooms.

University 10: Not really and no we haven't targeted them as a group – good idea!

University 11: It's not really in use other than by Sustainability Studies faculty.

University 12: Some professors have and do, and I have sent faculty information regarding the green tour of campus plus it is listed on our website via a green features tour of campus

University 15: One, possibly two, professors have used the tour in their class (to our knowledge). We did not create it with that use specifically in mind, and therefore have not advertised it specifically for that use, but I think it certainly could be tailored for that. It might be nice for something like a freshman seminar or a sustainability course. We had imagined it being used mainly by prospective students, and by current students at their leisure.

Sustainability Professionals Survey Questions

1. What university, college, or institution do you represent?

ANSWERS WITHHELD FOR ANONYMITY

30 universities represented, 38 total responses

2. What position do you hold at your university?

Text Response
Sustainability Outreach & Engagement Program Manager
Sustainability Lead
Professor
Assistant Director - Sustainability
Director, Capital Budget and Integrated Planning
Director, Office of Sustainability
Director of Sustainability
Director, Center for Environmental Education
Director, Campus Sustainability & Executive Officer, Department of Geography
Sustainability Coordinator
Interpretation Coordinator
Sustainability Coordinator
Sustainability Coordinator
Sustainability Director
Sustainability Coordinator
Chief Sustainability Officer
Campus Sustainability Coordinator
Interim Director, Institute for Community Sustainability
Assistant Director of Campus Sustainability
Sustainability Coordinator
Associate Professor
Undergraduate student
Assistant to the Provost for Sustainability Initiatives (Sustainability Coordinator)
Campus Planner
Faculty - Principal Investigator for the Insitute for Community Sustainability
Sustainability Program Manager
Grounds Manager, Landscape Architect
Interim sustainability coordinator - addition to EHS and hazardous waste management
Sustainability Coordinator
Program Ambassador
Director of Sustainability Studies
Sustainability Program Coordinator
Asst Dir Sustainability
Director Utilities Operations
Planning Associate
Sustainability Coordinator
Sustainability Center Intern
Several - veterans center school certifying official, educator for the Environmental Learning Center and project support for Customized Traning

3. Do you consider environmental and sustainability education to be one of the primary goals of your institution?

#	Answer		Response	%
1	Yes		23	61%
2	No		15	39%
	Total		38	100%

4. Do you believe the physical environment of your campus is used as a teaching tool to promote understanding and awareness of environmental issues and sustainability?

#	Answer		Response	%
1	Yes		34	89%
2	No		4	11%
	Total		38	100%

5. If so, how? Do you believe the use of the campus environment it is an effective tool?

Text Response
We see our campus as a living laboratory for students, faculty and staff to develop and implement sustainability initiatives- both in and outside of the classroom. We have internships, student positions, sustainability grant funding and volunteer positions all available to our community to catalyze sustainability.
We use campus sustainability tours and co-curricular engagement as well as integrated curricular assistance mostly for labs that relate to campus operations and management. Relating what the students are learning about to the places they interact with on a day to day basis is very helpful in their identifying with sustainability issues as they relate to the students lives.
Students building sustainability trail, Landscape remediation techniques researched Sustainable Sites Award winner Plant Selection for site conditions taught
Living Learning Communities, Programming, Sustainability focused academics, career development opportunities
At the moment, we have several elements within the physical plant and operations that serve as teaching tools. The campus has several LEED Gold buildings and a LEED Platinum building, we have a well used and successful transit system, as well as car and bike share, most of our students walk or ues alternative transportation, we have several thousand acres of natural areas on the campus that are used actively for teaching and research, a student organic garden, and numerous student led campus landscape projects. The campus environment is all around and a part of daily life and can internalize a way of living and thinking without an overtly didactic approach.
I believe that SOME of our campus is used as a teaching tool-- specifically our Taylor Fork Natural Area, which is used as a learning laboratory for stream and field restoration. In addition, our New Science Building is well marked with signage that explains the many green features of the building. Beyond that, we have done a very poor job of using our campus as a learning laboratory/ teaching tool for sustianabiltiy
Yes, at least in our newer buildings. we frequently host tours for the sustainable features of the New Science Building. I think that there is a need for improvement but with a part time sustainability coordinator we are retrained by time available to promote this type of learning. I do believe that using the campus environment can be a very effective tool.
We use the campus (landscape, built environment, food service, recycling, energy management, etc, and populations of faculty, staff, and students) for many, many projects we are working on. I am adding this for the next question: Dr. Reg Golledge developed interpretive signage when he was with us. Here is a link to their locations: http://map.geog.ucsb.edu/ if you look at some of the other layers in the Interactive Campus Map, you will see some of the other things we work on.
Our campus is uniquely situated within a mile of Lake Superior in Minnesota's North Woods. We have a 55-acre forest on campus, which also has a LEED-Platinum outdoor classroom within the forest. We also have a Dept. of Natural Resources-designated trout stream running through campus. We also have several large rain gardens and stormwater management-related plantings and landscapes. Yes,

I am employee of Cornell Plantations, which is Cornell's Botanical Garden, ARboretum and Natural AReas. As interpretation coordinator, I create signage, exhibits and brochures and work with our staff to offer quality classes, events and workshops to promote sustainable gardening practices and beyond.
Our campus uses indoor (digital and stationary) and outdoor (stationary) signage to highlight sustainability features around our campus and campus grounds.
We seek to model best practices in the built environment and in our operations. We make effort to educate students on these practices. I believe it can be a VERY effective tool, if the capacity to use it as a living laboratory exists.
We are just starting to do this more but have much more that we could be doing. I think our faculty need to learn how they can do this more, for a variety of classes.
Yes, we use the campus as a living laboratory for research through a variety of projects, as well as through tours etc
Our campus is a living learning laboratory. Our buildings, landscaping, farm, etc are all used as hands-on learning opportunities, which I believe is very effective.
Without a doubt, it could be used more effectively than it is, but my office alone hosts a wide variety of campus and community groups here to use our campus as a learning tool. In the next month or so we will finalize a master plan for the eastern end of our campus, which consists mostly of residential and former commercial parcels that the university purchased over the past 2 decades, to create a Sustainability Campus that can be used as a living laboratory.
Research, Living Learning Residences, Programming, Workshops, Service Learning, etc.
Yes, some sustainability features are more visible than others. We have a dining rooftop garden, student storm water facilities, LEED buildings, combined heat and power plant, etc. A campus map with these sustainability features are available, and tours are sometimes provided.
It's a curriculum whether intentional or not. The way we use our campus environment teaches students LOADs about the values we use, whether overtly or unintentionally. I ensure that students in my classes explore the natural and manmade parts of the campus and consider what is happening in both kinds of environments.
We have classes that use campus as a living lab, and lots of our sustainability showcases on campus are marked with signage.
We under-utilize the campus itself as an educational tool, but when we do, it is quite powerful and effective.
Class projects/research using sustainable features - buildings, landscapes, trees; Student Design/build projects - eg bioswales; Sustainability tours (lead, self guided brochure and iphone app); substantial focus on providing for alternative modes of transportation - eg bike parking of all kinds, bike repair stations, bike counter, etc...; recycling and compost stations with instructions - interior and exterior; interior signage highlighting sustainable features; on-line "dashboards" for new buildings that track energy use, etc.

We are a tree campus USA campus and have been since 2008 when the program started in Indiana. Our grounds are very nice and are a major reason that students give to come to ISU. Our grounds manager also works to maintain native plants on campus and to reduce chemical use in the maintenance of campus. As a faculty member, I bring all of this into my classrooms to educate students about their local environment and community (focusing on ISU as their local community). To you previous question, I would say that environmental and sustainability education is a primary goal of many of us and our Institute for Community Sustainability, but it has not been declared as a primary goal of our administration.
We have possibilities for learning about sustainability, because we employ many sustainable practices, but we need to do more to educate the students and inform them.
There have been efforts towards this (the question above), but generally it does not receive much support form administration
At Princeton we use the campus as a living laboratory filled with opportunities for students to study sustainability issues right here on campus through any discipline.
We have many obvious sustainability initiatives in place. Our campus is also an arboretum.
- Campus as a living laboratory - student interest spurs innovation and movement in operations - the operations of a large research facility are complicated, which is a great learning experience for students who wonder why change is challenging - work on campus is mutually beneficial to students and progress toward goals
Signage in areas with native and drought tolerant landscaping; integration of green building features into living learning laboratory opportunities in the classroom
Yes, we use Spring Lake, San Marcos River, rainwater harvesting, storm water detention, habitat conservation, ranch management and University camp settings for classes, seminars, research and outreach.
Gaining familiarity with native plants, understanding stormwater issues and natural treatment, seeing or experiencing sustainable building features, getting in the lifestyle habit of recycling and composting, having access to good walking and bicycling facilities, studying the habitat of the waterways on campus (streams, river) / Yes, I believe it is an effective tool
All of our new buildings are built to LEED Gold status or better. Very progressive energy efficiency programs. Recent university divestment from coal companies
Yes, we use the pond, wetlands, and forested areas to the best of our ability to raise awareness for environmental issues. In my four years here as a student I do believe that the campus environment is a great tool for learning about the environment.
Minimally. I don't feel it is used to it's full potential. There are native plant classes, early childhood education for teaching in the outdoors, renewable energy technology program. There is no cohesive driving force to pull as many departments into this as possible

6. Does your campus use any outdoor interpretive signage to educate students, faculty, staff, and campus visitors?

#	Answer		Response	%
1	Yes		33	87%
2	No		5	13%
	Total		38	100%

7. Does your campus use any indoor interpretive signage to educate students, faculty, staff, and campus visitors?

#	Answer		Response	%
1	Yes		33	87%
2	No		5	13%
	Total		38	100%

8. Does your campus use outdoor interpretive signage to educate students, faculty, staff, and campus visitors about environmental issues and sustainability on campus?

#	Answer		Response	%
1	Yes		29	78%
2	No		8	22%
	Total		37	100%

9. Does your campus use indoor interpretive signage to educate students, faculty, staff, and campus visitors about environmental issues and sustainability on campus?

#	Answer		Response	%
1	Yes		34	89%
2	No		4	11%
	Total		38	100%

10. What environmental or sustainability topics are covered by signage on your campus? Please list all topics and be specific. (Examples include such topics as LEED certification of campus buildings, native flora and fauna, and energy conservation on campus)

Text Response
LEED certification, stormwater management signage, closed-loop composting signage in gardens, flip the switch stickers, try just one paper towel stickers, bus signage and recycling signage.
LEED Buildings, Outdoors space creation/management/use, LID projects, sustainable site development practices.
Green roofs, stormwater capture and bioswales, site appropriate plants. low maintenance landscapes, soil remediation,
Storm water management, LEED buildings, rain garden and other water features, forestry, green roofs, urban farming, green transportation, native plants and botanical gardens
Outdoor signage is primarily around the natural areas, arboretum and the organic garden. Indoor signage is largely focused on building energy use. This is not used in all buildings - but there is a lot of potential here.
New Science Green Building tour-- building materials sourcing, energy savings, stormwater management http://green.eku.edu/science-building-virtual-green-tour
Energy use, energy efficiency, water conservation, LEED certification, irrigation, lawn conversion
"Green" construction features of the newest buildings both inside and out. Signage about the constructed wetlands with additional information about the importance of natural wetland environments as well.
LEED Buildings, Campus Flora/Wetlands/Bioswales, Recycling, Water, Energy, TGIF projects, parking, are some of the areas we cover
We have interpretive signage describing the sustainability features of our LEED Platinum classroom, our primary rain garden, our edible gardens, our 'Big Belly' solar compactors and where we use native plantings instead of sod.
Sustainable landscaping features such as rain gardens and bioswales, LEED certification of buildings, signage in a "sustainable demonstration garden" that focus on attracting pollinators, using small spaces to plant a home garden, and signage interpreting a "climate change demonstration" garden, the importance of native plants.
LEED buildings, rain gardens, alternative plantings, campus community gardens, energy saving features within buildings.
We have 9 signs that currently comprise the WKU Green Tour, interpreting green features on our campus, such as rain water collection, LEED buildings, solar thermal pool heating, parking lot lighting upgrades, LED TV studio, Big Red Bikes, Karst landscape, ecologically designed parking lots, natural gas steam plant upgrade, and Tree Campus USA. However more signs are needed and indoor signage is inconsistent.

Green roofs Constructed wetlands Dark Sky lighting Carshare Cars Permeable walkway Native plantings community garden chiller co-generation station solar array compost building materials LEED building see http://www.champlain.edu/student-life/campus-and-community-programs/sustain-champlain/resources-sustain-champlain/green-walk-interpretive-signage for examples
LEED for buildings, solar energy dashboard
outdoor signage is minimal, though all our trashcans have our zero waste to landfill by 2020 goal. Most outdoor signage is related to LEED and green buildings. Indoor signage covers a variety of topics, energy, water and food. We not only lead tours, we also train general tour leaders to integrate some sustainability.
I should clarify that we use TEMPORARY signage for most of our educational campaigns on sustainability (quick facts about sustainability on campus, how much water or energy is consumed, etc). Permanent signage is used to identify LEED buildings, help with waste sorting, and is also present in the arboretum (the signs identify the tree species).
LEED certification, community garden
Stormwater Management, Water Features, Green Buildings, Trees/natural elements, Green Transportation
Stream restoration, cistern, LEED buildings, energy dashboards, composting and recycling education
LEED certification, energy generation, waste management, beehive hosting, food and gardening, signage of CUPCC, conservation of paper, green roof
LEED certification, all flora and fauna, rain garden, green roof
LEED certification of campus buildings; Trees (species and native status); Building dashboards to promote energy conservation on campus; Tap water promotion vs. bottled water; Sustainability events, transportation alternatives, and green tips on digital signage.
A variety of LEED related issues, focusing on why/how to effectively "operate" a sustainably designed building.
LEED certification is the most obvious efforts in this direction. We have good signage on campus about artwork in multiple areas (both indoor and outdoor) that include are from recycled materials and art that incorporates environmental themes. Our Sycamore Environmental Action Club is working right now to improve our outdoor signage on many sustainability aspects around campus.
Sustainable landscaping (stormwater management and no-mow zones)
Native plant installations labeled. Wind turbine signage.
We have very limited signage outside - one sign for a graduate student green roof project (maybe you should have a category other than yes or no: "some"). We also have a newer building that incorporates day lighting, building-integrated photovoltaic glass, room occupancy lighting sensors and other energy efficiency technology.

Hydration Stations/ plastic bottled water phase out; Graduation Pledge student commitment to working towards ecological and social justice upon graduation; real-time display for a PV solar electric system on campus; Energy Efficiency stadium lighting retrofit interpretive sign; hydrogen fueling station interpretive signage; Campus Center for Appropriate Technology gray water treatment system, gardens, alternative building construction signage; recycling and waste reduction signage at core campus areas, signage identifying tree taxonomy, etc.
We have signs for a variety of things, either information about energy conservation (we are retrofitting to LED campus-wide), toilets that save water, we also have signage about recycling. We have a indoor interactive display with rotating exhibits that feature a range of sustainability topics such as water, energy, waste reduction and also exhibit student initiated projects. For more information on this kiosk known as the GreenSpace, please visit: http://sustain.princeton.edu/greenspace
They change. It is a bulletin board, not really signage. But the range of topics is covered.
LEED buildings, bioswales and water conservation, educational gardens, No Idle Policy, clean construction & sustainability features of a project in progress during construction, energy conservation and energy dashboards, lamppost banners on general sustainability and individual actions.
LEED certification, recycling, lights out stickers/ memes, native landscaping, turf removal, energy usage and dashboards, composting, local food, water conservation, Green Office program recognition and award levels
Specifically related to the natural Spring Lake and the San Marcos River flora, fauna and endangered species.
Usually related to LEED certification. There are some instances where a pilot project goes in (i.e., student initiated PV installation) and there is signage or info on a monitor inside the building related to that.
LEED Certification, native plants, water conservation, energy dashboards displaying energy conservation
invasive species, native plants to the area, the history of the land, projects that professors have worked on in the past, and pollinator habitat.
Sustainablity trail signage which highlights solar and wind power on campus, a compost demonstration site, drainage swales, native plants, water efficient gardens, eco-roof demo site and an organic garden.

11. By whom were your environmental interpretive signs developed? Select all who apply.

#	Answer		Response	%
1	Students		27	71%
2	Faculty		21	55%
3	Staff		34	89%
4	Independent consultants		11	29%
5	Other		0	0%

12. Were you involved in the development of environmental interpretive signs on your campus?

#	Answer		Response	%
1	Yes		29	76%
2	No		9	24%
	Total		38	100%

13. How many environmental or sustainability educational interpretive signs (both inside and outside) are currently installed on your campus?

Text Response
over 1,200 flip the switch stickers, 2,000 try just one stickers, 10 bus signs, 3 composting signs, 29 LEED certifications
14
3
20-30 don't have exact number but signage approval is very restrictive on campus
Around 20 - 30.
New Science Building has about 15
Number unknown
I am not sure at least 12 or so in my building alone.
I don't have an actual count on all of them. We have 8 "green boards" where we post sustainability 411 topics. These are double sided and the topics change each quarter. In addition, we have permanent signage for bioswales, plants, and interactive panels for energy use, waste, water recycling,etc.
20-30 (changes seasonally)
Our campus is very large, so I don't know. I just noticed a new sign on campus interpreting a rain garden next to a building. At Cornell Plantations, we have at least a dozen.
Not sure. We have lots, and it varies seasonally (during winter, we take down the 'native grasses' signage, for example). I'll just give you an average of... 35.
9
12 outside; 6 inside
??
unknown
Our LEED buildings, waste sorting, and arboretum signs are permanently installed, but we currently do not have any educational/interpretive signage out due to the snow (except for posters promoting RecycleMania or efforts by student groups)
2
20-50
11
12 -- it's a QR code guided campus tour
No idea. Maybe 10?
Roughly 40 tree plaques for our Campus Tree Tour; 29 outdoor campus map kiosks that incorporate transportation alternatives; 2 dedicated building dashboard lobby monitors; Roughly 12 digital signs that rotate content, including sustainability.
Note sure. No outside signage. A number of our new building projects have indoor signage.
That is hard to guess. I could probably find 10 of them, we hope to have about 30 by the end of the year.
We have 8 no-mow urban meadows in which we have installed several signs to explain why they are not being mowed.
Approximately six? Our Student Environmental Action Committee is working on a widespread application to occur this year.

I don't have that number
Couldn't say, likely 50 - 100
I don't know the number off-hand
1
80-90
too many to begin to count - thousands
About a dozen
Don't know
not sure
30
Not positive but at least 14 on the sustainability tour

14. Does your institution use any of the following components in conjunction with these interpretive signs? Check all that apply.

#	Answer		Response	%
1	Guided Tours		27	73%
2	Brochures		24	65%
3	QR codes		16	43%
4	Website		34	92%
5	Other		5	14%

15. Do you believe these signs are effective in increasing awareness of campus environmental and sustainability issues?

#	Answer		Response	%
1	Yes		20	54%
2	No		0	0%
3	Unsure		9	24%
4	No basis to judge		8	22%
	Total		37	100%

16. Do you believe these signs are effective in increasing understanding of campus environmental and sustainability issues?

#	Answer		Response	%
1	Yes		13	34%
2	No		3	8%
3	Unsure		16	42%
4	No basis to judge		6	16%
	Total		38	100%

17. Do you believe these signs are effective in increasing knowledge of campus environmental and sustainability issues?

#	Answer		Response	%
1	Yes		19	51%
2	No		1	3%
3	Unsure		11	30%
4	No basis to judge		6	16%
	Total		37	100%

18. Why do you believe that your campus interpretive signage is or is not effective in educating faculty, staff, and students regarding environmental and sustainability issues?

Text Response
We've received a lot of positive feedback from all parts of the U.Va. community. Most of it is qualitative but in a pilot study of our paper towel signage, we did notice a reduction in the number of paper towels consumed.
The signs are effective when they are interacted with but other than walking people to the sign and reading to them we have no other way of assessing their effectiveness. Through assessing current students knowledge of existing signs it seems very few students are interacting with the signage on their own unless the signage is specifically pointed out to them.
Interpretive signage is a tool to support of augment messaging about sustainable features on campus. We don't have a basis to judge its effectiveness. It is a good marketing tool to bring awareness to location of specific features in conjunction with web or other communication modes.
The signage is localized around an issue, and does not communicate its connection to the larger whole or to other issues. This is a shortcoming. The signage should have a consistent theme and layout that indicates what aspect of overall campus sustainability it is communicating. Signage has largely been an ad hoc set of actions - well-intentioned but uncoordinated.
Our main evidence that our science building signage has some effect is from questions that we get from faculty and students who have spent time in the building. We currently do not track traffic on our virtual tour, but that is a goal for us in the near future.
Too many messages out there, hard to ensure that people even read signage
I believe that interpretive signage is effective as a teaching tool but it must also be enhanced by QR codes and other information. Tours that point out the signs and additional web based augmentation is essential.
The feedback I have received makes me believe they are effective. Last spring, we developed signage about campus irrigation practices (we are in a sage 2 drought here). We deployed signage that stated the following 1) 90% of our campus is irrigated with recycled water (larger lettering used by roads) 2) 90% of our campus is watered with recycled water (then in smaller letters) this saves 19,500,000 gallons annually every gallon of recycled water used for irrigation saves a gallon of drinking water 2) This location on the campus has REDUCED IRRIGATION of potable water by 50% in response to drought - UCSB is reducing its water demand by limiting irrigation and promoting water conservation Results from this campaign (along with other outreach/education efforts) helped us reduce potable water use by 21% from our prior year.
Without having undergone a study to make this determination, it's difficult to make broad assertions on one-off phenomena. One note, and I don't see a space for it, we also have digital signage (TV screens with rotating images/video) throughout campus, that we supplement with sustainability messaging.

In my position, I try to evaluate the effectiveness of interpretation we offer and I have administered a few small informal surveys in which I interviewed visitors to gauge whether they understood the content. A formal survey was conducted focusing on the effectiveness of a panel that was designed to communicate the purpose/function of our bioswale next to a parking lot in the botanical garden. The results showed that over 90% of the people interviewed understood the messages we set forth to interpret.
I hear people tell me that they read the signs and thought that the issue being highlighted was cool or interesting. On the flip side, some of the signage that is not seasonally relevant can begin to be ignored, knocked down, etc.
I believe its effective but can't know for sure. I personally see people read the signs, but am not sure how many do or how often, or if they gain knowledge from the content.
Hard to know if they are being seen (no way to track). In the sea of over-information, not sure if these stand out or not.
I think our signage is effective, but we are working on improving it. Our campus does not have a lot of outdoor signage, so we are not able to do as much interpretive signage outdoors as I would like. Anecdotaly signs help, but I don't have any studies on it.
I believe that it is helping based on both anecdotal data and based on observed behavior changes.
We have many sustainability features on our campus, but not all of them are messaged very well. Sometimes our signs are the trigger that gets folks to contact our office to learn more about the other pieces of sustainability at our university. I know this because newcomers tell us this, but I also believe that this happens more frequently than we always know (i.e., people seeing signs and becoming more aware, taking initiative to learn on their own without contacting us).
I think that some signage is placed in good areas for reading with more in depth material. Other area are high circulation and serve only for awareness.
Lots of folks are accessing them, and we use them on guided tours. Not sure whether the campus admissions tour guides really know enough about the importance of the various initiatives to make them as effective as they can be. The stop text and pictures were all designed by students as part of a class project; they may need additional updating.
People don't take the time to read it
Besides one-time events and digital media (websites, videos, social media, email), interpretive signage is the only opportunity we have to spark interest in sustainability. I often hear from students, faculty, and staff that they noticed something about our campus sustainability initiatives because of these signs.

Please refer to the UO Campus Plan, Policy 10: Sustainable Development. The new Oregon Model for Sustainable Development includes a PEOPLE component that addresses the importance of education - http://uplan.uoregon.edu/subjects/Sustainability/OMSD/OMSDHomepage.htm. Our policy implementation is too new for us to determine the effectiveness of signage and other educational techniques but prior studies have demonstrated the value of educating building occupants. While we do not have exterior signage, per say, we do have signage about bike routes and we are installing a bike counter designed to gather data and bring attention to bike ridership.
I believe that many of our currently signed objects fade into the every day experience. That is one reason that our student group is interested in putting in good interpretive signage about all things sustainable on campus. Those signs should bring student, staff, and faculty interest into many of the things around campus that have been there for a while, but they did not know about. I have led many sustainability tours of campus and even long-term students are surprised by all that is going on. I do think that new signs will raise awareness about sustainability issues on campus. I plan to work the signs into my curriculum (like a scavenger hunt on campus to learn about sustainability programs around campus).
There isn't enough signage, and it doesn't have enough information. The Wind Turbine sign is probably the most informative one, and had student involvement in the design.
Several of the signs are in well travelled areas, but I have no information on how often people stop to actually read them.
I believe that the signage is effective as we try to engage our university community (students, faculty and staff). Even if the signage does not change behavior, it gets people thinking about sustainability and encourages discussion of sustainability on campus.
Students and faculty speak to me about them.
Content is intentional and designed for both awareness-raising and increasing knowledge. Some signage is rotating, roaming or temporary so it doesn't become unnoticeable over time (like wallpaper), colors are bright and designs appeal to a wide variety of audiences.
environmental psychology research supports this
Signage is a major part of the tours and activities specifically related to the natural Spring Lake and the San Marcos River flora, fauna and endangered species. http://www.meadowscenter.txstate.edu/

I'm not sure if it's effective. Up until recently, I didn't really have a role in developing signage, so don't know. On a recent project, I did have a role and that signage (for LEED certification of the new Student Recreation Center) will be going up at some point within the next several months, but the signage itself has not been developed yet. There will be a sustainability tour for that building as well. That is the first instance I can recall of an effort to put up actual interpretive signage rather than an LCD monitor with sustainability info (aka "sustainability kiosk"). Also, on campus we have a strict outdoor sign policy that only allows certain types of signs- building identification, traffic/parking, and map stations. Any other sign needs special approval by the Campus Planning Committee. This reduces sign clutter because everyone program wants their own sign outside.
While these signs bring attention to sustainability features on campus, I don't think we do a good job at explaining why these things are important, and how individuals can make a difference through their behaviors.
Although we have signage, there is no information out there about how many people are using the signage for educating purposes or even seeing them at all. I think it could be a great resource to get more involved with, but there is no research done to see if our campus is using it.
We don't have information on who actually does the self guided sustainability tour or feedback from the campus community on how effective the signage is. When free sustainability tours were offered to students and staff, there was very low turn out. The grant $ for this project were used up 3 yrs. ago and minimal $ and hrs have been put into the project since.

19. Are data available regarding the use of the signs on your campus?

#	Answer		Response	%
1	Yes		6	16%
2	No		31	84%
	Total		37	100%

20. Are these data available to be shared?

#	Answer		Response	%
1	Yes		6	20%
2	No		24	80%
	Total		30	100%

Western Kentucky University Campus-wide Survey

1. Have you participated in a Green Tour survey before?

#	Answer	Bar	Response	%
1	Yes		30	17.02%
2	No		146.29	82.98%
	Total		176.29	100.00%

2. Do you live in Bowling Green, Kentucky for the majority of the year?

#	Answer	Bar	Response	%
1	Yes		641.95	79.21%
2	No		168.48	20.79%
	Total		810.43	100.00%

3. Are you a WKU student, faculty, or staff member?

#	Answer	Bar	Response	%
1	Yes - student		626.22	77.04%
2	Yes - faculty		74.34	9.15%
3	Yes - staff		108.87	13.39%
4	No		3.43	0.42%
	Total		812.86	100.00%

4. What is your current age?

#	Answer	Bar	Response	%
1	18-25		520.58	64.10%
2	26-35		121.1	14.91%
3	36-45		73.43	9.04%
4	46-55		57.16	7.04%
5	56-65		34.2	4.21%
6	66-75		4.87	0.60%
7	76 and older		0.76	0.09%
	Total		812.1	100.00%

5. How do you identify your gender? (AUTHOR'S NOTE: Weighted)

#	Answer	Bar	Response	%
1	Male		356.28	43.94%
2	Female		447.57	55.20%
3	Transgender or other		3	0.37%
4	Prefer not to answer		4	0.49%
	Total		810.86	100.00%

6. What is your ethnicity?

#	Answer	Bar	Response	%
1	White/Caucasian		670.24	82.45%
2	African American		45.24	5.57%
3	Hispanic or Latino		26.45	3.25%
4	Native American		4.11	0.51%
5	Asian/Pacific Islander		38.77	4.77%
6	Other		15.44	1.90%
7	Prefer not to Answer		12.62	1.55%
	Total		812.86	100.00%

7. What is your primary language?

#	Answer	Bar	Response	%
1	English		757.73	93.78%
2	Spanish		2.28	0.28%
3	Bosian		2.43	0.30%
4	Burmese		1.67	0.21%
5	Other		43.87	5.43%
	Total		807.99	100.00%

8. What is your highest level of education?

#	Answer	Bar	Response	%
1	Grade school		9.73	1.20%
2	Some high school		2.28	0.28%
3	High school diploma or equivalent		120.48	14.84%
4	Vocational or technical school (2 year)		9.42	1.16%
5	Some college		382.75	47.15%
6	Bachelor's degree		134.25	16.54%
7	Master's degree		90.6	11.16%
8	Doctoral degree		55.49	6.84%
9	Professional Degree, please identify		6.84	0.84%
	Total		811.86	100.00%

9. In what field do you work/study?

#	Answer	Bar	Response	%
1	Transportation/Tourism/Travel		5.63	0.72%
2	Philosophy/Religious Studies/Theology		12.31	1.57%
3	Education		154.74	19.69%
4	Engineering		38.25	4.87%
5	Earth Sciences/Geography/Environmental/Agricultural		89.63	11.41%
6	Mathematics		13.77	1.75%
7	Media Studies/Communication		47.12	6.00%
8	Chemistry		19.7	2.51%
9	Medicine/Dentistry/Nursing/Pharmacy/Veterinary Science/Physiology		158.32	20.15%
10	Civil Government		7.9	1.01%
11	Military		4.11	0.52%
12	Law Enforcement		9.73	1.24%
13	Legal		3.8	0.48%
14	Architecture		12.92	1.64%
15	Art and Design/Drama and Dance		24.47	3.11%
16	Business/Management/Economics		103	13.11%
17	Computer Sciences/IT		29.34	3.73%
18	Humanities/English/Music		51.1	6.50%
	Total		785.86	100.00%

10. Which of the following describes the area in which you live?

#	Answer	Bar	Response	%
1	Urban (50,000 residents or more)		493.04	60.90%
2	Rural (less than 50,000 residents)		316.54	39.10%
	Total		809.58	100.00%

11. How often do you visit the WKU campus?

#	Answer	Bar	Response	%
1	Never		14.29	1.77%
2	A few times per year		32.23	3.99%
3	A few times per month		10.42	1.29%
4	Once per week		12.46	1.54%
5	More than once per week		154.23	19.09%
6	Every day		584.12	72.31%
	Total		807.75	100.00%

12. Why do you visit the WKU campus?

#	Answer	Bar	Response	%
1	For events such as shows, lectures, or festivals		183.47	22.77%
2	Student of WKU		606.39	75.27%
3	For meetings		147.14	18.26%
4	Employee of WKU		272.99	33.89%
5	Other		29.49	3.66%
	Total		1239.49	100.00%

13. Do you consider yourself well-informed about sustainability on the WKU campuses?

#	Answer	Bar	Response	%
1	Yes		412.81	51.06%
2	No		395.71	48.94%
	Total		808.51	100.00%

14. Are you personally interested in sustainability issues?

#	Answer	Bar	Response	%
1	Yes		582.45	71.88%
2	No		227.89	28.12%
	Total		810.34	100.00%

15. Have you ever heard of the Green Tour signs before?

#	Answer	Bar	Response	%
1	Yes		267.3	32.95%
2	No		544.04	67.05%
	Total		811.34	100.00%

16. If yes, how did you hear about them?

#	Answer	Bar	Response	%
1	A friend		48.59	18.30%
2	WKU outreach activities		73.97	27.86%
3	WKU events		67.5	25.42%
4	Other		75.49	28.43%
	Total		265.54	100.00%

Other
around campus
walking around campus
Environmental Class
Saw them on campus and email
I have seen them around campus
saw signs
email
Intro to environmental science class
Professors
signs

17. Have you ever seen the Green Tour signs before?

#	Answer	Bar	Response	%
1	Yes		251.8	31.27%
2	No		553.46	68.73%
	Total		805.26	100.00%

18. If yes, how did you find out about them?

#	Answer	Bar	Response	%
1	Saw them while walking around campus		213.55	84.56%
2	Saw them while on a tour of campus (such as a recruitment tour)		5.63	2.23%
3	Saw them while on a scheduled field trip		11.86	4.69%
4	A friend showed them to you		7.38	2.92%
5	The Office of Sustainability website		6.99	2.77%
6	Other		7.14	2.83%
	Total		252.56	100.00%

Other
Helped in the creation of them while on committee
Saw them while biking to downtown Bowling Green, KY.

19. Have you ever read any of the Green Tour signs?

#	Answer	Bar	Response	%
1	Yes		87.44	10.78%
2	Yes, but not the entire sign		132.89	16.38%
3	No		590.85	72.84%
	Total		811.19	100.00%

20. If yes, approximately how many signs have you read?

#	Answer	Bar	Response	%
1	1-3		157.74	72.39%
2	4-6		30.13	13.83%
3	7-10		1.67	0.77%
4	Unsure		28.37	13.02%
	Total		217.9	100.00%

21. If yes, what did you learn by reading the signs? Check all that apply.

#	Answer	Bar	Response	%
1	Sustainability efforts on the WKU campus		130.98	60.79%
2	Heat island effect		19.55	9.07%
3	Permeable concrete		28.06	13.02%
4	Rain gardens		11.56	5.36%
5	Stormwater runoff		28.37	13.16%
6	LED lighting		58.32	27.06%
7	Rainwater collection on campus		24.63	11.43%
8	Native plants on campus		12.77	5.93%
9	Tree Campus USA		26.45	12.28%
10	LEED Certification		26.85	12.46%
11	Xeriscape Gardens		6.78	3.15%
12	Gas burning heat plant on campus		14.6	6.77%
13	Karst and injection wells		5.47	2.54%
14	Other		14.77	6.85%
	Total		409.14	100.00%

22. Did you find the signs interesting?

#	Answer	Bar	Response	%
1	Yes		178.07	81.10%
2	No		41.5	18.90%
	Total		219.57	100.00%

23. Why did you find the signs interesting?

Text Response
Subject matter, saving recources
I did not know some of the information prior to reading it
I like to learn
IT was intereseting to see that WKU is putting effort into being green
I am interested in innovative ways to reduce ecological impact.
interested in green
I like that our campus actually promotes sustaining the environment instead of destroying the one habitat we as humans have.
Tv studio is my passion
It's interesting to see the different ways that campuses can implement sustainability efforts.
Cool initiative
Good information
Stood out among the others
I care about sustainability and making campus more GREEN.
It's interesting to see innovative ways that the University is conserving energy. It's especially interesting because you can't tell by looking at a structure that it uses permeable concrete- it makes conservation efforts seem non-intrusive (because they are)
Learned something new
New ways to avoid common problems.
pictures
I care to know whats being done in the community with energy savings
it's nice that would is making the effort.
They inform and promote the effects and benefits of sustainability to others.
Sustainable practices are highly important in todays architecture
Information is being provided to educate those on how to save energy and reduce cost buy using LED lights or other means
I like learning about how WKU is improving our enviroment
I enjoy reading
I am interested in what our campus does to go green.
Good knowledge for college students
The signs presented sustainability info in a clear way.
DIFFERENT BUT INFORMATIVE
placed in convenient locations to read while waiting - reading signs more interesting than doing nothing while waiting for bus; science behind signs also interesting
I didnt know that stuff like this was part of the construction efforts
It was related to my studies
I'm interested in the subject
I just became aware that they existed with this survey and read the example sign provided.
They informed about my school.

It's interesting to see what wku is doing for the environment
I think it's great that WKU is actively making an effort to become more sustainable and go green
They seemed informative about our campus.
Good to learn about the sustainability options around campus
I didn't know WKU was making any sustainability efforts.
informative about how WKU is making an effort to become greener
tells me stuff i didn't know before
I'm an environmental health science major
I like to know about things going on around campus
Sustainability is what I hope to do in my future
Because I didn't know such an effort had been made on WKU's campus.
I like to know what efforts WKU is doing to be more sustainable and if those are anything I can do as well.
I am interested in sustainability
I don't
Because its important to take care of the planet
nice to know wkus efforts toward sustainability
They were very informative and helped me understand more about what WKU is doing and also our environment.
There is a lot going on on campus that you would never know about since a lot of it is incorporated into how buildings and the campus are designed and don't necessarily shout "sustainability". I also appreciate when I DO see something that stands out that I don't understand, and being able to read a little bit on it.
It showed consideration of the environment in the construction of buildings.
everything I always learn some thing new
It contained information about how eco-friendly GRH is
It gives the community to feel like it is part of something larger, the fight toward better sustainability practices.
I did not know about this.
informative
Factual
Because It was informational
They are extremely educational and informative.
They are informative and shows we are moving forward in terms of earth stewardship and awareness, but they could be less wordy.
I found it interesting that the campus was taking time to "go green."
More specified
It broke up the monotony of my walk to classes
It's great that the university informs everyone what is going on to conserve the earth
informative
Because of its concern about the environment.
They tell about something relatable

It was interesting to know what WKU is doing in the sustainability market.
Inform about efforts
New methods of being "green"
Because it let me know what the campus is doing to be energy efficient.
I am interested in Energy and environmental conservation
Neat information
i did not know the campus was going green.
Because they show the WKU efforts envolving sustainability
I thought it was interesting a school cares about the environment.
Showed how WKU was trying to help
It is interesting and inspiring to see my university as a symbol of sustainability efforts
Pictures caught my eye
I had not heard about WKU sustainability until reading them. It provided me with information that was new to me.
I was interested to know more about the high efficiency lighting and LEED certifications.
They give quality information but could be more visually captivating
They were very visually appealing and informative
The information supplied was very interesting and enjoyed reading about something in progress to help the earth.
informative and let me know parts of WKU cared about the environment
I think that it is a great way to communicate with elements of the campus community in a non targeted way
informative
learn
It is interesting to read what WKU is doing and the quantifiable results.
I am interested in the topic
Nice to see what new ideas are being incorporated. In relation to next question - some I knew about, others I do not
They are a teaching tool and show how WKU is helping our environment
It provided information I was not currenlty aware of about our campus.
provided facts
Offers information to anyone visiting to know more about what WKU is doing.
I think it's wonderful that we can see "beneath the surface" of the measures taken to make campus more earth friendly!
Large amount of energy savings with small steps.
I was bored...
Information is easy to understand, visuals are good

24. Did the signs provide new information to you?

#	Answer	Bar	Response	%
1	Yes - I had not heard about these campus practices before		186.19	84.80%
2	No - I already knew about these practices		33.38	15.20%
	Total		219.57	100.00%

25. When viewing the signs, did you use your phone to access the QR codes on the signs? (AUTHOR NOTE: This sample is weighted by gender. Prior to weighting, only one respondent accessed the QR code.)

#	Answer	Bar	Response	%
1	Yes		5.63	2.58%
2	No		212.43	97.42%
	Total		218.05	100.00%

26. If yes, did you explore the website to which the QR code directed you?

#	Answer	Bar	Response	%
1	Yes		5.11	3.58%
2	No		134.18	94.18%
3	The QR code did not work		3.19	2.24%
	Total		142.47	100.00%

27. Have you told others about the Green Tour signs?

#	Answer	Bar	Response	%
1	Yes		49.49	6.17%
2	No		752.87	93.83%
	Total		802.37	100.00%

Western Kentucky University Student Tours: Pre-test

1. Name

OMITTED TO PROTECT ANONYMITY

2. Are you part of a lecture, guided tour, or self-guided tour?

#	Answer		Response	%
1	Lecture		56	37%
2	Guided tour		45	30%
3	Self-guided tour		50	33%
	Total		151	100%

3. Are you a WKU student, faculty, or staff?

#	Answer		Response	%
1	Yes - student		153	100%
2	Yes - faculty		0	0%
3	Yes - staff		0	0%
4	No		0	0%
	Total		153	100%

4. What is your age?

#	Answer		Response	%
1	Under 18		0	0%
2	18-25		145	94%
3	26-35		6	4%
4	36-45		2	1%
5	46-55		1	1%
6	56-65		0	0%
7	66-75		0	0%
8	76 and older		0	0%
	Total		154	100%

5. How do you identify your gender?

#	Answer		Response	%
1	Male		84	55%
2	Female		70	45%
3	Transgender or other		0	0%
4	Prefer not to answer		0	0%
	Total		154	100%

6. What is your ethnicity?

#	Answer		Response	%
1	Male		84	55%
2	Female		70	45%
3	Transgender or other		0	0%
4	Prefer not to answer		0	0%
	Total		154	100%

7. What is your primary language?

#	Answer		Response	%
1	English		117	76%
2	Spanish		5	3%
3	Bosnian		0	0%
4	Burmese		0	0%
5	Other		31	20%
	Total		153	100%

8. What is your highest level of education?

#	Answer		Response	%
1	Some high school		12	8%
2	High school diploma or equivalent		42	27%
3	Vocational or technical school (2 year)		4	3%
4	Some college		89	58%
5	Bachelor's degree		6	4%
6	Master's degree		0	0%
7	Doctoral degree		0	0%
8	Professional degree		0	0%
	Total		153	100%

9. In what field do you work/study?

#	Answer		Response	%
1	Transportation/tourism/travel		0	0%
2	Philosophy/religious studies/theology		1	1%
3	Education		17	11%
4	Engineering		16	11%
5	Earth Sciences/Geography/Environmental/ Agricultural		33	22%
6	Mathematics		1	1%
7	Media Studies/Communication		10	7%
8	Chemistry		3	2%
9	Medicine/Dentistry/Nursing/Pharmacy/Veterinary Science		11	7%
10	Civil Government		1	1%
11	Military		0	0%
12	Law Enforcement		0	0%
13	Legal		0	0%
14	Architecture		1	1%
15	Art and Design/Drama and Dance		1	1%
16	Business/Management/Economics		33	22%
17	Computer Sciences/IT		4	3%
18	English/Music/Humanities		3	2%
19	Other		16	11%
	Total		151	100%

10. Which of the following best describes the area in which you live?

#	Answer		Response	%
1	Urban (50,000 residents or more)		108	71%
2	Rural (less than 50,000 residents)		45	29%
	Total		153	100%

11. How often do you visit the WKU campus?

#	Answer		Response	%
1	Never		0	0%
2	A few times per year		0	0%
3	A few times per month		1	1%
4	Once per week		2	1%
5	More than once per week		23	15%
6	Everyday		128	83%
	Total		154	100%

12. Why do you visit the WKU campus?

#	Answer		Response	%
1	For events such as shows, lectures, or festivals		5	3%
2	Student of WKU		134	88%
3	For meetings		0	0%
4	Employee of WKU		0	0%
5	Reside on campus		14	9%
	Total		153	100%

13. Do you consider yourself well-informed about sustainability practices on WKU campuses?

#	Answer		Response	%
1	Yes		59	38%
2	No		95	62%
	Total		154	100%

14. Are you personally interested in sustainability issues?

#	Answer		Response	%
1	Yes		94	61%
2	No		59	39%
	Total		153	100%

15. What degree of experience do you have regarding sustainability and environmental issues?

#	Answer		Response	%
1	Very well informed		6	4%
2	Somewhat well informed		59	39%
3	Not very well informed		68	45%
4	No knowledge		19	13%
	Total		152	100%

16. Have you ever heard of the WKU Green Tour before?

#	Answer		Response	%
1	Yes		56	37%
2	No		97	63%
	Total		153	100%

17. If yes, how did you hear about the signs or Green Tour?

#	Answer		Response	%
1	Friend		10	18%
2	Professor		29	53%
3	WKU Office of Sustainability		5	9%
4	Other		11	20%
	Total		55	100%

18. Have you ever seen any of the Green Tour signs before?

#	Answer		Response	%
1	Friend		10	18%
2	Professor		29	53%
3	WKU Office of Sustainability		5	9%
4	Other		11	20%
	Total		55	100%

19. If yes, how did you find out about them?

#	Answer		Response	%
1	Saw them while walking around campus		34	79%
2	Saw them while on a tour of campus (such as a recruitment tour)		3	7%
3	Saw them while on a field trip		1	2%
4	A friend told you about them		4	9%
5	The Office of Sustainability website		0	0%
6	Other		1	2%
	Total		43	100%

20. Have you ever read any of the Green Tour signs?

#	Answer		Response	%
1	Yes		15	10%
2	Ye, but not the entire sign		22	15%
3	No		114	75%
	Total		151	100%

21. If yes, approximately how many signs have you read?

#	Answer		Response	%
1	1-3		25	64%
2	4-6		2	5%
3	7-9		1	3%
4	Unsure		11	28%
	Total		39	100%

22. Have you ever taken a Green Tour before? (AUTHOR'S NOTE: Data regarding score changes were analyzed without previous Green Tour participants.)

#	Answer		Response	%
1	Yes		4	4%
2	No		96	96%
	Total		100	100%

23. Pre-test scores.

Statistic	Value
Mean Score	17.42
Score Standard Deviation	6.56
Weighted Mean of Items	1.00
Weighted Standard Deviation of Items	0.00
Items	2,682.00

Western Kentucky University Student Tours: Post-test

1. Name

OMITTED TO PROTECT ANONYMITY

2. Why did you find the Green Tour signs and/or information interesting? (AUTHOR'S NOTE: All answers were recorded as written, including spelling errors)

Text Response
I didn't know alot of the things before like that they got ride of a huge parking lot to plant trees
It told me how green WKU is
I learned more about my college's efforts to go more green
Because it showed us how the environment and the surroundings work on campus
I found them interesting because they were in places I didn't even know we had!
It was good to me
Because it tells you about area
Energy saving by different method
Introduce of teacher
Teacher introduce
teacher introduce
Because it gives us much knowledge about different stuff around campus
Cause they provide information about every place that has to do with edibility
Good to save money
I found the interesting about the way save energy and still provide to make plant alive
Because they were very informative and easy to understand
The teacher introduce us
It was interesting to know what efforts we are putting to make the place more sustainable
Yes I learned more information about sustainability
It was interesting because it informed me about how the school is try to keep the environment safe.
There were a lot of things on the slideshow I didn't know about
Knowing all the new things going on and how I can help save energy and waste
The information helps students be more aware of their carbon footprint
Because I had no idea this stuff was here
Because it was talking about the environment I live in
Should me a lot of how wku is runned. How they save energy
Because I was not aware of so much effort
Informs guest and students of green efforts
I honestly don't
Because plants are important to know about
because I have geography class
because it is more natural
Because most of the information was new to me
I have seen them before but I did find them to be interesting. I enjoy the idea of energy efficient.
Because it showned me places that I've not seen before
Because I am interested in sustainability
They provided information about WKU that I didn't even know about
Cus it has some new info

The Rellycall program is very interesting, also its very education
Because it shows me a lot of thing that I didnt know about them
In south campus
Because I'm interesting to learn about it
Because i live on campus and I didn't know that all these buildings and problems were happening around me
It is very useful to know more about ways to improve our environment and conserving energy
It is interesting what steps are being made to make our campus greener
A greenr takes the time to explain the reduction levels in urban/rural areasier, natural earth is always interesting
For learning
I don't know
I found the Mass Media Center
Sustainament tour for GEO 110
I didn't know a lot of the stuff on them
I found out things I didn't know
Because the amount of things to help the environment
because its more hopeful for students
It gets me with anew infromation
Because I learned new stuff about Wku
I am not really interested of any of these
I never heard anything about this before
I found this interesting because I had no idea about the ecofriendly actions our campus was taking
I learned alot about things/places on campus that have become more sustainable
Because I have never heard about it before and also didn't know our campus was doing so much to preserve energy
I did not know alot about any of it, and it feels good to know our school is trying to be environmentally smart
Good for safety
It's interesting to learn how places go green. Also, the pictures helped.
My teacher talked about it alot
It's interesting to learn how places go green. Also, the pictures help.
My teacher talked about it alot
Because you normally don't see educational (Earthy) information posted on campus daily or even monthly
To inform me about how campus is (unknown) by different things
Just to learn how WKU campus helps the environment
It is nice to know and learn about the campus on what they are doing to help.
I did not find it interesting
I found them interesting because they were in places I didn't even know we had
Because it showed us how the environment and surroundings work on campus

It told me how Green WKU is

I didnt know a lot of things before like that they get rid of a huge parking lot to plant trees
I wanted to know how WKU reduced energy
Because we need to know these practices
I think sustainability is important and interesting
Learned how our campus is trying to do better
I'm a biology major with an interest in environmental geology. Everything is relevant.
It is something different that WKU is doing to help the environment stay healthy
There was more to know about campus, along with venturing to parts of campus not usually gone to.
Because I learned several new things
informed me on ways wku is being energy efficient
It is maronment betterking our envi
Because it helps the earth continue to let us survive
Because it lets me know that this campus is practicing environmentally friendly concepts and investing a lot of money in them.
Lets viewers know that sustainable practices are in place, even though most are not seen as easily recognizeable
Easy to digest factoids
Learning is fun! The tour helped me to see the campus differently
I never really knew the things WKU does to keep campus green so it was interesting to learn
The advancement of sustainability at WKU is interesting
It was part of a class lecture
Interested in sustainability
I really enjoyed the tour because I find the sustainability, reusing, and nature to be one of my favorite topics
They point out things on campus you would never notice or think about
I didn't know about them
Because I didn't know about most of these programs and they help the environment alot
Its great that our university helps out so much. We're playing a role in saving our environment.
enough to where I've read then before
It was interesting because I did not know wku was this 'green friendly'
Yes, very interesting because it was new information about stuff I walk by everyday.
I didnt know all the actions wku was taking to be more 'green'
Alot of the information was all new and very informative to me
They have a lot of information about interesting stuff
They taught alot about sustainability
Because it talks about bettering the environment and campus
I found it fascinating and I was unaware of some green movements

I now know that wku was a cutting edge school in relation to the environment. It makes me more excited and pround to be a hilltopper.
I actually found the information extrememly interesting. It helps knowing that wku is taking the initiative to bettering the earth
I didn't know western was doing so much to help the environment so that was really cool
Most of the things presented ion the slide I didnt know or have never heard of and it was cool learning about it
Because it was new and neat
They let oyu know what wku is doing for the environment
It was neat all the stuff they do
I got to walk around
Because of the neat eco-friendly things on campus
I got to be around exciting plant life.
It was interesting to see how much our campus safes on enery and money as well.
Some of the techniques use, I had never heard of them.
It was interesting to see how western is striving to help the environment
They gave me more information about sustainability on campus that I otherwise didi not know
Because the Green Tour is involve in sustainability / The green tour let us know it is necessary
It lets you know about the sustainable practice we use on campus
I found it interesting because I didn't realize how much energy wku is saving
I didn't realize they were even there before
It made the methods of sustainability sustainability seem more practical and affordable
They were visually appealing
Because it provides information about how the campus practices sustainability.
I'm an education major. It was interesting to learn about GRH.
It is good for the environment
I had never noticed them
Learned about campus more.
Didn't know about Green Tour
Yes - we need to love our planet more
Because I learned new things about WKu
It was interesting
learn different thing
I didn't realize how much energy wku saved
Because I had never learned any of it
It is good to know that my university campus is playing a role in energy conservation
Show you important stuff about energy
Had facts I didn't know
It was interesting to learn abuot some ways wku tries to help the environment

Got to learn more about how campus helps the environment
Because they were so informative

3. Did you find the information provided easy to understand? Why or why not?

Text Response
Yes, they used pictures and facts that were easy to understand
Yes I did because it was simple language for anyone to understand
Yes, because I took environmental science last year and went on the green tour
Yes I did but thought that some of it could have been shortened to main points
Yes for the most part some was confusing because I didn't know the background
Yes, the director explained to us in detail and we had a chance to see what she was talking about
Yes, because there are many things to it in there signs
Yes. The green tour (unclear) provide explanation
Yes
Yes because it close to our (unclear)
Yes, these index board set in the campus side
Yes the information was easy to understand because all the info was stated on the boards
Yes, it's simple english
Not all of them because the English level is not that good
Not really to understand but I kind of get the idea
Yes. The fact that it was a guided tour and the fact that our tour guide explained the concepts in a simplistic fun way
Yes, because it close to our life
Yes, it was easy. Because the guide used easy language that was easy to understand
Yes, the guide was very helpful
Yes because she was giving good examples
Yes because everything was explained
Yes it was
Yes I did, with the pictures and videos
Yes, it was all straightforward and provided in easy to understand categories
Yes simple explanations
Kinda because it was so much info at once
Yes. Tour explained everything well.
Yes, Christian was informative
yes
Yes, because it tells you in a way you can understand it
the guidance makes it easy
No that it something new we do not do this stuff back home
Yeah it's so easy to understand and its clear
Yes because all the information is provided on the sign and is well written and informative
Yes it was simple and to the point
Yes because she was really detailing about everything
Yes, because our tour guide was hepful and passionate
Yes, our guide explained everything in great detail

yes because its clear
Yes, it was well explained
Yes, because the teacher was clear when she was explaining and the powerpoint helps too
Yes, the informations are presetated in different ways
Yes, may by because I saw the powerpoint
Yes, it was easy to understand and learn what WKU is doing to solve these issues
Yes
Yes the information was easy to understand
Yes, because the instructor takes the time to explain the reduction levels in urban/rural areas
most of them
No, because I don't which information
Yes, because, it was very simple to understand
Yes
Yes, it was simple
Yes
A little hard, good information but more details
Yes it did. Because of the lecture and the picture
Yes
kind of
Yes, because I see why they are doing this stuff
Yes. It wa put into words I could understand with great pictures and videos
Yes, it was easy to understand and interesting
Yes, it was explained well
Most of it
Yes but not all of them
Kind of
Yes. It was short, simple, and to the point
Yes, I was worded clearly
Yes, it was short, simple, and to the point
Yes, it was worded clearly
Yes, because its simple reading and once you understand the amount of energy consumed you'll want to use less
Yes, listed lots of details
Yes. It was fairly easy because its well explained
For the most part, yes. Alot was good information that was easy to remember
The information was easy to understand
Yes for the most part some was confusing because I didn't know the background
Yes i did but thought that some of it could have been shortened to main points
Yes I did because it was simple language for anyone to understand
Yes, they used pictures and facts that were easy to understand
Yes, everything was explained well on the signs

Yes, very easy to read and descriptive
Yes. Info was well worded
Yes, well explained signs
Yes. Put in people friendly terms (i.e. not as technical as it could be)
Yes. The information was displayed in an easy to understand way
Yes, The signs were well explained. How the green efficiency was operated.
Yes, it was simple and to the point
Yes, it showed pictures and explained well
Yes, it was helpful
Yes, it was easy to read but go tthe point across
Yes because it was not super 'wordy' with big scientific words and it was to the point
Yes. Straight forward simple explanations accompanied by diagrams/pictures
Yes, it was written clearly and well formatted
Some was more difficult than others, but the pictures helped
Most of it was
Yes, Christian did a wonderful job explaining and answering questions
Yes, tour guide was very informative
Yes
Yes, it was simple but meaningful
Yes
Somewhat
Yes

Yes, all info made since. So it was easy to follow.
yes
Yes
Yes entirely
Yes
Yes
Yes the information is described well
I didi find it easy to understand
Yes-ish/haven't read much of the signs
Yes, it was simple and concise
Yes
Yes
Yes, it was straightforward and informative
Yes
Most of it. Some was a little complicated with details but over all I understood it
Yes
Yes
Yes
Yes
Yes
Yes because it all pertains to the environment
Yes
Yes
Yes
Not easy to understand for me
Yes
Yes
Yes, very well explained
Yes
Yes
Yes, because the picture helped provide a visual of the work done.
Yes. It was simply put.
Yes, straightforward
Yes. Good explainer
Yes, once I read them
Yes, simple
Yes, related to campus and me as a student
Yes
Yes
Yes. Because I learned something I didn't know
Yes
Yes
Yes, it was explained well

Yes. Signs were easy to read and clear enough to understand the information presented
Yes, it was simple
Yes, it was pretty clearly drawn out
Yes, it was very informative
Yes, it was clearly written

4. What valuable information did you learn from the WKU Green Tour or lecture?

Text Response
That our campus is environmentally friendly
How our campus is green and what all our campus has done to become green
Gary Ransdell's rule!
How much LED lights can really help saving energy. I think it said about 52% savings/benefits
Where our rainwater goes and how it's used and that we use solar panels
About LEDs and how it works
How they taken care of the rain and also solar pannel to get energy to the area
The technology help us to saving energy. Such solar panel and LED light.
Different way of saving energy
Energy saving
we need use advance technology to make energy saving
Every one tree cut down, two more will be planted.
About the food waste being used as landfills
How to use every single thing properly
Save plant and save energy
Learned how to be more energy efficient
Energy saving
How to recycle waste How wastage of food is used as fertilizers
Use of natural gas instead of coal
the use of water
About how the school is saving energy and using recycling
I thought it was really interesting that when one tree is cut down you have to plant two more
About the things I saw on campus and never knew what it was for
LED lighting versus incadescent lighting benefits
That wku is an amazing user of recycled material
That fresh compost leftover food
That we are a tree campus. I love trees
The way the campus uses energy, particularly sun energy
That the pool is heated with solar power
That all the stuff they do really helps
heating system was the most valuable to me
That recycling is good thing to do
How WKU Green Tour heat all the campus
A lot. solar energy, natural gas, LEDs
The campus uses natural gas to produce heat for the campus. Gary Ransdell is the head of the Tree Campus USA and has a tree rule. The pool on campus is hated by solar energy.
It was nice to know that the campus is doing its best to become cleaner for the environment
I learn about recycling trash, heat producer

How WKU is developing its sustainable practices
How our campus is becoming more environmentally sustainable
many info that I didn't know: heat, (unknown), and food recycle
Saving the environment by doing many good things
Yes
LEDs lights
That GRH is one of the neweest building on the campus, and it has a lot of the stuff that are more (savey?) than the other buildings, also it has alot of stuff that is recycled
WKU is a campus that worries about the environment!
Ways that WKU is expanding their effort in maintaining/improving sustainablity - also ways that are available to students on campus
How bad stormwater is and where its pollutants are going
There are some rain garden around the campus
Nothing, I just walk around
Didn't realize there were signs posted. Never read them before. Students are in too much of a hurry to do this.
How our lights save energy
How to save energy
We are pretty green
That WKU actually put time into make it green
Learned how the things work in the campus
Waterstorm, natural gas, recycling, heated water
They saved a lot of money just because they used leds lights
Gary Ransdell is a very efficient building
It's easier than you think to decrease your carbon footprint and not waste water/energy
I learned that WKU has put alot of effort/money/time into becoming more sustainable and it's important for students to know this. I learned about karst environment, the difference btw incandescent vs. flourescent light bulbs, etc
How much students and others are doing for the well being of our campus
Our pool's heated solarly We use asphalt on our gravel paths to trap the water
They take care about the trees around campus
energy saving
WKU is a leading university in its green efforts
Parking lot waste alot of electricity
WKU is a leading university in its green efforts
Parking waste alot of electricity
Office of Sustainability has no BILLS due to natural resources
How scientific campus is and how much we're involved with the environment
How solar thermal array helps the pool heating
The campus actually does a lot, not just at the main campus, especially with the rainwater

Way WKU is reducing waste and energy use
Where our rainwater goes and how it's used and that we use solar panels
How much LED lights can really help saving energy. I think it said about 52% savings/percents
How our campus is green and what all our campus has done to become green
That our campus is environmentally friendly
That we shouldn't fill in sinkholes
I learned about the solar panels heating the pool. Its pretty neat
How earth-friendly WKU is becoming
How important our environment is
Rainwater collection on campus is a thing
I learned that there is a small sinkhole on campus
Small changes can largely impact efficiency
Ransdells rule and that the pool is solar heated
There are many ways to save energy
All the ways that our campus is environmentally friendly
Solar panels on campus
The widespread use of collected rainwater
Tree replenishment rule Use of solar panels for heat Efficiency of LED lighting
WKU spends a lot of money to get rid of parking lots
There was too much text, but the pictures were helpful
That Gary Ransdell Hall is super green
Perinnial herbs and flowers that do well here
I learned that WKu is much more involved in being green than I first thought
WKU uses rainwater for irrigation. LED lighting.
I didn;t even know the green tour existed, so most of the info about what WKU is and has done is new to me!
The amount of money WKU is saving
WKU is making a lot of changes to increase our sustainability
Just how hard WKU is trying to be environmental friendly in general

The compost we use from dsu thats used as fertilizer, Also heating the Preston pool was new info to me.
The amount of food that we compost
I learned that wku has cut energy use by 54%
Almost everything provided on the powerpoint was valuable
How Gary Ransdell Hall does so much to conserve. I'm an education major so a majority of my classes are in there
Alot of it was new knowledge to me. The most interesting thing to me was the LED lights put in the studio
I think that the energy efficient buildings are very interesting
Wku is making a great effort to become more 'green' and sustainable
Lots of things going on around campus. I knew most of the info but still learned more
Learned about permeable concrete and the problems of stormwater
I learned about the various ways I can recycle on campus. / I learned about the many Green buildings on campus
We diverted 10 tons of waste in 6 mos. / We collect stormwater / Permeable concrete / GRH LEED certified
I learned about all the different ways/methods you can use to help the environment that I could implement in my own life someday
Gary Ransdell Hall is LEED certified, we have a food composite, we have rain gardens, and permeable concrete
WKU is a very sustainable campus
That wku is one of the only colleges that does so much to sustaina and help the environment
That wku is a leader in sustainability
WKU is proud of its sustainability practices
locations of environmental buildings
The exotic station near the DS Union building
That by saving energy and being more environmentally friendly, this not only helps sustain our environment and local economy but helps keep tuition low. Also that anybody from the community can use the recycling bins.
Ways I can help eliminate waste safely
I learned all the difficult practices that not only the campus was doing to be sustainable but also that I could do
The ransden hall is use Led / This building could use nature resource to service students
All of it was very interesting and proud st wku because we use these sustainable practices
That wku has saved 22% of its energy by having sustainable projects be done
That almost everything can be recycled in the bin / Gary Ransdell hall is a green building
What and where I can recycle, the benefits of LED lighting
The heating plant isnt ran by coal anymore

WKU is striving to be a green campus.
GRH and how it is being used in sustainability.
How Ransdell Hall was LEED
How wku is using waste
All the ways wku saves energy and environmentally friendly
How we save money
All sustainable activities on wku campus
Campus initiatives of sustainability
I learned where the signs are located
How much energy wku saves
About energy use
How to conserve energy
That wku conserved alot of rainwater
More about permeable concrete
That wku is so aware of being eco friendly

5. If guided tour or lecture, what concepts presented in the Green Tour or lecture did your teacher or guide explain?

Text Response
How LEDs assist and how it works How to recycle food wate
Yes
Saving our environment. Saving our energy.
saving energy
saving energy
the barrel is use to collect rainwater to irrigation those plants
The white squirel habitat
food waste
How to use the waste food into planting
about the environment
practical ways of renewing energy and recycling
Saving energy, protect our environment
The green tour signs The habitat of squirrels Dr. Ransdell rule
about the environment
about the rainwater collection
Rain gardens and food waste
She explained where things were on the campus and what they were for
all of it
the steam plant and xeriscaping
That the DSU used compositer
Talked about the rainwater and how it can (unlcear) over the service
A lot about how we recycle
That heat pads and water uses. How composting waste.
Tour. Our guide was very thorough during the entire tour
About how the heat system works
we walked around the campus and the guidance explained everything
Yes, they did better job by explaining
She helped explain the history and improvements the campus has made by giving facts and percentages
She explained how the different places on campus were being more cost effective and efficient. Overall it was explained well.
She took me around campus
How WKU is heated, current sustainabie practices, future ideas, recycling and composting
How WKU is working to become more environmentally sustainable
The pictures and the videos
stormwater
Heat island effect, stormwater runoff, LED ligting, karst, xeriscape
Kart - I had no idea what this was before today
The heat island effect, how stormwater affects our water, rain gardens, the trees on campus, compost for DSU

Lecture helped with understanding the need for more reflective asphalt in concrete structures such as parking lots
Yes, my teacher helps us
She gave us a map. She gave us a time limit. It was COLD!
No guide
New information
Karst
The different types of garden
Rain garden, ransdell's rule, xeriscape
It helped show what WKU is doing to become more sustainable and why
She explained each powerpoint very well
Tree campus USA Leed certification Stormwater
N/A, besides the knowledge about the garden of edible herbs and fruits/vegetable. I love that,
Yes she helped explained what the greent our was and all about
Self guided
I took a self guided tour
The use of led lighting
The Gary Ransdell tree rule
What WKU is doing to save energy
The LEED standards, compost system, boilers, really everything we visited and talked was explained well
The use of LEDs, water collections
Karst, permeable concrete, trees at wku, and others
Was in class
The way stormwater works with the permeable concrete
Composting Karst mngmt Natural Gas
All concepts were further explained by the teacher (solar energy, drainwater, natural gas, karst)
Karst, heat island effects, stormwwater run off, green gardens, composting, LEED certification, and other sustainability practices on campus. Solar panels LEDs on roof
Permeable concrete and how it works
She explained everything western is doing to help the environment and be a more sustainable campus
She explained the sustainability all over campus
The solar panel to heat the pool
The processes of those sustainable projects and the benefits and reasons for it all
She helped explain the composting on campus and other stormwater issues
What a LEED certified building is Why it is important to recycle Karst systems
Permeable concrete karst landscapes stormwater runoff LEED certification
How the permeable asphalt helps to keep our water from being polluted
Helped explain permeable concrete which was cool and Ive never heard of
the use of solar energy and LEED buildings

LEED certification Pool heating Natural gas heat Self drip gardens Collecting rainwater
LED light use
How it effects me
The concept of natural plants
The concepts on how to save on electricity and heat with solar panels Natural gas is better to use than coal LEED buildings LED light saves money
White squirrel refuges Rainwater conservation and usage
The heating and cooling of the buildings, the gardens, the pool, and the LEED building
My teacher told me the wku is good example for sustainability plant alot tree and take actions to deal with waste
The guide explained what sustainable practices we use
LED lights and recycling
How they financially saved by upgrading their energy systems whether it was recycling or switching from coal to glass
What can and cannot be recycled
Heat island, stormwater runoff, karst
Everything wku is doing to improve sustainability.
LEED
All of the slides
Money and energy saving
Areas which are using sustainable practice and what they are
All
Go to whats close
More about the solar energy they use to heat the pool
I didi the tour by myself

6. How were these explanations helpful to understanding the information?

Text Response
We had a chance to see how it was done
It's give a good experience and a good information
Very helpful
helpful
very helpful
By know the effects of those device
Now I know where I can see the most of white squirrels to get luck P
pretty good
Very good explanations
clear, animal, demonstration
They were helpful in that they were simplistic and easy to grasp
Easy to understand, energy using
The guide gave clear explanations
clear, demonstration, visual
Because there was videos and picture about them
Because it gave you info on how to make the community more green
I understood what everything was used for
to get a better understanding of it
They explained how natural gas was better in the long run than coal use and explained what xeriscaping was because i was not aware of it
Made it more clear
Because now I know about my school environment
The sights around the campus and getting a visual seeing
yes
I finally found out how the campus works
green tour signs helped us to understand
The rainwater using
Yeah the information so clear because I saw it
These explanations helped me understand how important these changes are and how much they have saved the university money and the environment
It made it understandable in that we can see how these efficient steps were used why they were used and how they reduce campus costs
It's goes really detailing
It was helpful because now we know how to better use offered services on campus
It made the information more clear and understandable
Yes it was helpful
The information was delivered in best way
They were really good I really did understand alot of things about the toar green
the powerpoint and youtube videos
Its beneficial b/c where we live - around many cave systems
They are helpful because you can understand more ways the campus is green
read about it and look it up

It helps us to know more about the campus
I knew where to go.
Easy
She explained it very well, so I got the idea of it
It made it more clear
I had no idea what they previously were
Ransdell hall is Leed cert. Many buildings are very sistainable I will remember this info
Her explaining it helped me learn everything about sustainability
I did not understand the concept until after I knew the meaning
By being very specific about eaches active duties
They were helpful because they were easy to understand
The signs were easy to read and understand
Explained in simple terms of percentages
She explained why that rule was here
Explained sustainability with examples
It gave the full background on why we use it and how it was before
They gave more detail than the signs
They gave us and inside look at how everything runs
It helped me to understand why we do the things we do here at wku, Not just seeing/hearing. But I know the reason behind it. Savings and conserving.
How we use them in sustainability
I knew most of the basics of each concept, but the explanations helped me to further understand more complex info within
It allowed me to understand ow they helped and the differences they make
Understanding how it benefits the environment
She showed us everything that is being done on campus in terms of sustainability
They put in better terms that were easy to understand
They help grasp the concept behind it
By realizing why we as a school were doing these things/sustainable practices
Absolutely!
It makes being green seem more relevant and showed me practical ways to make a difference. I also learned that being green is cost effective
Made the information easier to process and understand
It helped me understand the impact stormwater can have in many aspects, both positive and negative
It was helpful by learning the problem and what we're doing to try to fix it
So you can know how these concepts help the environment
They helped me to visualize and really see how its used
Showed me the process of how it works
So I can better understand how to keep the environment safe
Being able to be there and see the examples helped me better understand what info she was telling us.
Very easy to understand

They helped me to understand what these practices were doing and how they were sustainable instead of just knowing about them
These explanation help me to undestand which material the Rasden hall use which part of Rasden Hall is sustainable
It was helpful that the guided explained because it helps me to understand what we are doing on campus to be sustainable
It helped me to understand how wku was saving money
We understood what all the money they save goes toward
60% of waste on cmpus is recycleable but only about 14% is actually recycled due to ignorance
Made it easyier to understand what they were
They provided a background of what each term was
Powerpoint was great
Gave examples
I didn't know what environmental problems we faced
Broken down
Explained what the processes do an affect
Extemely - you can't understand fully without knowing what something is
Because the signs had more explanation
Easy to find
Took the tour by myself
I took the tour by myself

7. If self-guided, would a guide have been useful? If so why and for what information?

Text Response
I think it would have been the same because the signs held alot of info
It would have been helpful because the places weren't clearly marked on the map
Yes, in finding those spots I couldn't find
Yes, I think it would have made it more interesting. I would have like to know more about the plants and trees on campus.
Maybe to provide some background on the subjects
No, because I could have not known mostly how they work (some machines)
No because I won't get as much information
Yes, she explains in more details, better than just reading the signs
I don't thinl so cuz we need explanation for the things we see and how it works
yep, it useful OK
Yes, because I like to know what I'm looking at instead of being clueless
Not self-guided, but I would not have known a lot of the information had it not been for a guide
Yes because same learning about the environment
guided
Yes because I just would off be walking around
There are some pd and they use heat. No all.
Yes because of the signs but no because the guide gave iformation that wasn't provided which helped me have a better understanding
The stations explained it well no guide was needed
Yes about heating and recycling
it is not useful
Because if someone has knowledge about the subject they'll explain better
Karst
No, because it hard to notice
Yes because that she is going to learn new things
Perhaps, but it wasn't hard - it was just cold!
Nope, it wouldn't have sped anything up
Yes, to help us answer any questions, if any
Yes, they know more
Yes, I would rather have the lecture because the videos and pictures kept my attention
Yes, I feel that I got more out of the lecture powerpoint then if I would have gone on a tour alone
Maybe, you do get extra information in a guided tour, walk a more efficient path, and get to walk with a group instead of being along.
Knowing campus better in order to find the signs
Maybe, you do get extra information in a guided tour, walk a more efficient path, and get to walk with a group instead of being alone.
Knowing campus better in order to find the signs
Either or because the map was very helpful

Maybe useful, because I could of ask any questions I have during the tour
A guide would have been able to provide more information - so yes would have been useful
Maybe. The signs are small and a little difficult to find
Maybe to provide some background on the subjects
Yes I think it would have made it more interesting. I would have liked to known more about the plants and trees on campus.
It would have been helpful because the places weren't clearly marked on the map
I think it would have been the same because the signs held a lot of info
Yes, an expert would know more and I wouldn't have to wonder about answers
Yes, because our info was limited to signs, guides tend to know more
Yes, I am sure there would be more info for each stop that way
Yes, to better understand each other before you got there
Not especially for me. I know campus well, so it wasn't difficult. Maybe for newer people to campus, provide pictures of locations.
I think a guide would be helpful, but you could still be able to understand and learn about sustainability without one.
A guide may have helped explain things the signs didn't say
Yes, I feel like a guide could provide more info than signs they sould also answer questions
Yes, they would have known the best route and would have known more than the signs
Yes, they are more knowledgeable
Just to ask questions
Yes, mostly for extraa fun facts about earth sign and a few additional details overall
Possibly, they may have insight of further development or changes since sign creation, more detail/interesting facts.
Not really
The technology and practices due to the money saving and the statistics. Yes
se I could see all the info and the videos were interesting to watch
I think I will remember most part of information to make waste recycled and take full advantage of them
That there is almost always a way to save or reduce energy. Yes
It would have been more interesting but lecture was great
Yes, they are educated on the subject
Not self-guided
Yes. Because you don't have to depend on anyone
Only if I had more time. Hearing a little more detail and explanation would have been nice
Yes, show you were to go
Yes, find them easier
Yes, maybe could describe it more in detail
Yes. Where the places are located

8. What information have you retained from the tour or lecture? Do you think you will remember it?

Text Response
A lot about how WKU helps the environment, yes I will
I have retained that alot of our buildings are being efficient in their energy usage
What we do with rain water, ransdell's rule. I will remember it, yes
I have retained so much energy saving uses that we use on campus, such as a coal and LED light
Some new places I didn't know about and about our energy and how we can conserve them. Yes I think I'll remember it.
Energy saving - we can not need somebody to switch off the lights rather they since themselves
About the planet and the solar pannel
Compost of the waste of food. Yes.
solar pannel. yes
solar pann, yes
solar pann. Energy efficiency. Yes.
The food waste, because I always waste food and now I know where it goes
Food waste, I waste a lot of food and it was good to know that it is not just thrown away
I will remember the food waste cuz I am hungry all the time
I have learned how to be kinder to the earth by being more energy efficient and recycling
solar pann
A lot of information was given about the things going on campus which were interesting so easy to remember
The use of natural gas, yes
I now know what the green tour is about
I thought it was cool how many trees there are on campus
the waste compactor
Steam plant, tree campus usa and storm water run off - I believe I will rememeber all of this because I found it interesting
Our school is 'green' and yes
That solar energy is used for our pool temperature. Because I swim.
How much light we save. How much money we are saving.
I thnik I remember the switch to natural gas the most
pool heat
That we only recycle 14% and we want to at least hit 30%. And yes I will
I think I will because of the green signs
Yes.
Kars, yes I will remember it
What buildings are green and how they have help improved the environment. Yes.
Buildings on campus are becoming more efficient with time. Yes I will remember it
Recycling and heating because it's used in daily life. and ill remember it
I am now aware and can use the sustainability services offered on campus

Locations of sustainable practices and informations on some aspects that can be improved
that bowling Green has some cafe
I did enjoy it. I would rather have the lecture
LED, stormwater, because it general knowledge
alot of things. Yes, of course I will remember
I have reatined all the lecture information. this interests me and I hope to be able to inform others about it.
Yes - I learned alot about stormwater/Heat Island Effect - these were everyday things that we all should know about our world
I retained everything and I will remember
The karst effect understanding what it is and where/how it happens
I now understand what the university is doing to protect the environment and be more cost efficient on campus.
The pool heating. DSU building styles.
That led lights helps alot saves up to 97% than regular
The stormwater/karst
Yes, I will remember them
All the things WKU is doing to help the environment. Yes, I will remember the info
How to be eco friendly. Yes!
Lecture, because I am a auditory learner primarily and videos help me
I will remember this information because it is very important to our world
Rain gardens and asphalt can reduce our use of water, Yes
Sure I will
Solar panels on Preston - 8 year payback Rain systems in PS 1 Really neat ways to efficiently go green. Yes I will retain this information.
Parking lots use a lot of electricity and solar power is used to heat our pool
Solar panels on Preston - 8 year feedback Rain cisterns in PS 1 Really neat ways to go green, yes I will retain this information.
Parking lots use alot of electricity and solar power is used to heat our pool
Solar energy is widely used throughout all of WKU campuses
Information abotu different parts about that I never knew or paid attention to
All good things, because its information I wanted to know about my campus. Yes!
I feel like I have gained a few things that I did not know before the tour, I think I will remember just because it is interesting facts about the campus.
GRH has a gold LEEC rating and for every tree that is cut down, two must be planted
Some new places I didn't know about and about our energy and how we can conserve them, Yes I think I'll remember it.
I have retained so much energy saving uses that we use on campus, such as coal and LED light. I will remember this.
I have retained that alot of our buildings are being efficient in their energy usage
A lot about how WKU helps the environment, ye I will
We got rid of a parking lot for trees To save energy Yes

Gary Ransdell rule WKU pool heat Injection Wells
LEED and Gary Ransdell Hall Xerioscape Gardens Rainwater collection These things interest me.
Environmental importance, we live in it and its the effects of us that hurt it. Yes.
Not much that I didn't already know :) just the rainwater storage/collection around the music hall.
I will definitely remember the information on sinkholes. It was extremely interesting to me!
The injection well because I'm fascinated by sinkholes, and the solar powered pool, because I see the panels every mornign.
Ransdell's rule, b/c my mom loves trees
Injection wells are wells where rainwater runs off. Yes.
Information that is making the environment cleaner and safer
The ways campus saves energy because I can save the same energy
I've retained most of it, I'll probably remember it because it is interesting and applicable
Most of the practice types, I think I will remember this info b/c I find it interesting or believe we need more of it.
Mostly that the school is working hard to help the environment
All of it. It was interesting
I honestly knew nothing about how WKU saves energy and water before the tour. I will remember some of this information. More pictures would be helpful
97% savings by using LED. Because thats huge!
That WKU has saved millions of dollars in energy savings. Yes.
The different things wku does to be sustainable
WKU is doing so much more than I knew about! It makes me want to get more involved
Yes, Guided tour is my preference
I know about new ways to be more sustainable. Yes I do
Most of the info because it was interesting and really good to know we're doing it
The amount of energy and money wku has saved over the last couple of years
Because its my major and it interest me
I will remember that energy is still being used even if a product is turned off and still plugged in. This knowledge will help reduce energy at home
Almost if not all the information I have retained. Why? because every time I notice something related to that topic or building I will remember what was talked about in class
The different aspects of conservation in GRH because I'm in there so often
Our campus is working hard and improving the sustainability of our campus
I learned that wku is doing a lot to be more sustainable
I will remember everything we learned about because everything was interesting

Vampire energy was interesting to me, the LEDs in Gary and Studio, the assfault parking lots, and karts. I'm really into sustainability, so I will probably remember most of this info

I retained almost all of it, but I am majoring in E Science and Sustainability
How to recycle on campus / Studio 1 - LED lights / Its very interesting and unique to WKUs campus
1) rainwater, collection, 2) preston pool, 3) compost pile, 4) heating / I had no idea wku was this sustainable. Yes I'll remember
Westerns sustainability practices because I appreciate the efforts WKU is making to be sustainable. Yes I will remember it.
I retained a lot of info about the permeable concrete and I will remember and try to look for it now
Most of it. I dunno. Maybe
That there are a ton of simple ways to conserve energy and I do think I will remember this because I would like to be a part of sustaining the environmentI enjoyed the tour
That wku does a lot for sustainability. I had no idea that they did that. / Yes
Gary Ransdell Hall is LEED certified, everything is for sustainability purposes
Financial aspects. The affect me
How can the environment around kentukcy be kept clean and more than likely yes
I will remember how to save on heating water and energy. LED lights save money on energy - reduces energy use by 97%! That there are community gardens for all students to grow food and bikes that we are able to rent.
Recycling bins and their use
I have returned the information of all the sustainability practices on campus because I walk around and physically see them. I think I will remember it because I see these structures everyday so it will be almost a reminder
Yes I would rather had a guided tour I know more about my campus
Yes I found the info interesting
That wku switched from using coal to coal using natural gas. I'll remember this because I won't see any black smoke come out of the heating building
Yes, out of class day and shows us where the signs and buildings are (and their functions). Guided tour
Recycling, composting, alternative heating methods, and water collection
Heating and cooling. It is how our campus is heated and cooled
That wku is a greencampus and that each student plays an important role
GRH info
Trees on campus
All the buildings on campus and what they do to save energy
Money saving and how things work. I've always wondered.
Sustainable areas around wku. Will remember those I visit
Most - yes
That wku is more environment friendly than I thought
This is because I didn't knw that we have have series of signs which discuss the environmental issues
The energy we use on campus
More about how wku benefits the environment. Yes, I will remember it.

That geography can be an exercise! Yes I will remember

9. Did you enjoy the method through which you received the information? Would you have rather had the lecture, guided tour, or self-guided tour?

Text Response
Self-guided
I like the self-guided tour so I can go at my own pace.
Yes. Guided tour.
I thought the signs should have been bigger and more vibrant. Like actually green. If they were presented better more people would see them and read them. Also I would like a [guide?]
Probably guided tour or lecture
Yes. (and I would like tour)
Yes, because I learned a lot of thing that was interested for me
Yes. Guided tour perfect.
yes
yes
Enjoy, I like self-guided tour.
Yes I was fun, the guided tour
Yes, guided tour
Yes it was fun and usefull but next time lets do it in the food cort!
Yes I would have
I did. I'd much rather be on a guided tour
yes
It was enjoyable because the guide was a student also.
I would rather have a guided tour
Yes, guided tour because I like visually things
The lecture was god I feel more informed about green life on campus
Guided tour
I enjoyed it. I would have been on a tour too after the lecture
Yes, but I think I would have rather gone on the guided tour because I learn better through physical experience
Yes. I liked being able to watch videos
Rather have a lecture
Guided tour
I did
yes
Yes and the guided tour
I enjoyed it so much . I wish to study more about sustainability because of this tour. It is helpful
about that thing that for rainwater looks great thing
Yes
Yes, I would rather do the guided tour that I had today
Yes guided tour was nicer as questions can be answered if a person has them
Yes, and tour guide is the best
Yes
Yes. Loved the tour

Yea kind of
Yes I enjoy it and I would rather the guide tour
Yes
Yes, I did. Yes of course, yes I would try.
I did enjoy the presentation, the teacher taught it well
The lecture was good - but I also kind of would have enjoyed the guided tour - just to have the chance to actually see all of this on campus instead of in a presentation
The lecture was OK. I would of rather done the guided tour to see the things in person.
I enjoy any method to teaching a greenier earth
Yes I did
Yes - self-huided
It was cold, but it was fine otherwaise
I would have learned more through lecture
I would have liked the lecture
Yes it was great
I would have enjoyed the lecture and the guided tour
Yes i enjoyed the lecture
Yes. Either, depending on weather
I liked the lecture
Yes. Lecture
Yes. The lecture
I did enjoy, the guided toue
I liked the self guided but might have enjoyed the guided tour a little more
Yes, it was very relaxing and informative
I liked the self-guided but might have enjoyed a guided tour a little more
Yes it was very relaxing and informative
I prefer self-guided but I did enjoy the walk and information I did read about. (Other: the signs should be more out and open for people to see instead of incidently walking past them
I'll like a guided tour to meet others
A guided tour
The self-guided was fun because I got to go at my own pace, however I think I would have liked the guided tour as well just because I would have found out more information than from just reading the blocks around campus
Guided tour could've been better
Probably guided tour or lecture
I thought the signs should have been bigger and more vibrant! Like actually green. If they were presented better more people would see them and read the. Also I would like a guide.
I like the self guided tour so i can go at my own pace
Self-guided
Yes, guided

Guided tour
I liked the self guided tour, but more info would have been available through the guided/lecture.
Yes, guided
Yes, self-guided. I like taking my time and walking where I want.
I really enjoyed the self guided tour. I was able to go at my own pace and thoroughly read the information.
I did. I prefer self guided.
It was okay, guided tour
Yes, but guided tour would have been better
Self-guided
I would have prefered guided tour
I liked the self guided for efficiency, but a guided tour would be nice for more information
A guided tour may have been a bit more enjoyable, for extra detail
Yes, I enjoyed it
Any of the three would be fine
The tour was fun because it was similar to a scavenger hunt. Much more fun than a lecture.
Yes, guided tour
I enjoyed the guided tour.
Yes, guided
Yes - The guided tour was great
Guided due to the knowledge of the guides
I would have rather had the door (tour?) ... maybe
I loved the lecture
I liked hearing about all the ways wku contributes, but seeing in person is better. Cooler!
No, the tour
I enjoyed the lecture but would rather had the guided tour
Yes I did. Lecture or guided tour would both work. Lecture I could understand the ideas fully
I would have rather had the tour

Yes, lecture
Yes I enjoyed it very much
I liked the lecture alot, but a guided tour would have been fun as well to actually see more of it in person
It was acceptable. I couldn't take the tour but I enjoyed the lecture.
I enjoyed the powerpoint
The lecture was very beneficial. Easy way to obtain info without going outside in the heat :) Ellen was very open about questions and I liked that
I would have rather gone on the actual tour
I liked the lecture because I could see all the info and the videos were interesting to watch
Yes. Lecture
I enjoyed the tour
Yes / Guided Tour
Kind of... lecture, it was hot
Yes, I liked the tour
Yes. I'd have the guided tour.
I really enjoyed the guided tour. The info was really interesting and valuable! I feel like I am better by interaction and seeing than just sitting in a classroom and lecturing
Rather had the lecture
Yes, I liked the tour and am glad I had it,
Waste sorting and recycling, this would make waste be used again
I enjoyed the guided tour because we got to see the items up close
Yes, the guided tour was fun
Guided tour, because you are able to learn and ask questions or someone who has been involved for years.
I think it helps to actually be able to see the places where sustainable practices are being utilized but I feel like I would have been presented with more info in a lecture setting
Yes
Guided tour
Yes, guided tour
The guided tour would be more interesting
The guided tour would have been more fun than the lecture
Guided tour
Would have preferred a guided tour
Yes
Yes
I rather have a guided tour because it helps one know where they are located
Yes, guided tour could've learned more
Yes
Yes. It was a very interesting way of learning about how green our campus is
Yes, guided tour

Yes
Yes, it was nice to get to pick which ones to go to
Yes

10. Which method do you think you would have learned more from? Why?

Text Response
The self-guided because you could go at your own leisure
Self-guided because I can take time to read and understand the material I read.
Guided tour. Someone with more knowledge could have enlightened me with more information!
A guide because I like when the info is presented from me.
Lecture, walking kind of made it hard to remember the info
Just the method we use of walking was useful enough for me. And it helps because you view as you go.
Soler pannel, because it really interested to learn about it, my country one of the hotest place so we can earn alot of electricity from the sun
Use LED light instead of regular light. LED light has 90% more efficient than the bulb.
use led light
LED light
Visit, because I believe the thing to learn should be by yourself and look for it.
The tour guide becayse everything is visual
Guided tour. More info are provided to us.
Seeing physical things is much better than reading about it (Further noted: I liked the idea of the planting tower I think this would be a good subject tot alk about.)
I think its enough
The guided tour
LED light. its about energy saving
I preferred this (guided)
I think the guided tour is the best. Because we am learn by looking
I learned more from the lecture
Probably guided tour so I could see everything
The tour because I would like to see the improvements in person
I learn through memorization via writing notes and through physical experience, but I learn more easily through physical experience so I think I would have learned more from the tour
Lecture. I wouldn't have listened on a tour
Lecture
Guided. Hands on type of person.
Guided tour. Good interaction
Tour. I am more of an interactive learner
The guided tour on the walk around
Tour. I learn more in tours
The lecture would have provided more information about things such as stormwater and the heat island effect
Tour because I can see it with my own eyes
Tour guide because I have got to see what the process
I liked the guided tour
The tour, More hands on.

showing video
The guide tour
Maybe the rain garden because I like the prosse of it that
I learned it best this way!
Guided toru - just because I am a more hands on learner. The lecture was good.
The guided tour because you can see the ways and also talk about them
In my opinion, I think for people majoring in geography and/or geology should have a credited lab on sustainability
If I was with the teacher
The self-guided tour was fine but the classroom would have taught more w/ more time
Lecture
Lecture
Stormwater
All of them
Lecture, I would get distracted on the tour
Lecture. I learn better that way.
Lecture, because it's cold outside and I don't think I could concentrate
The guided tour
Energy saving, I like that I think it is saved
Lecture, I retain more information if I listen to someone else saying it
Lecture, I retain more information if I listen to someone lese saying it
Guided tour, because I would've been guided by an expert and other peers along the way
A tour is a great method
The guided just because I listen better when someone was talking to me rather than talking to myself, reading the information
Guided tour. I find more interesting.
Lecture, walking kind of made it hard to remember the info. (Notes: Would you be willing to be interviewed? 'No I feel I didn't retain enough info.')
A guide because I like when info is presented from me
Self guided because I can take time to read and understand the material I read
The self guided because you could go at your own leisure
With a guide I believe I would have learned more
I would have learned more from a guided tour or a lecture
The lecture seems like it would provide the most information
Guided, given more info
Self-guided. I'm pretty self sufficient
Self guided because I can learn at my own pace and choose which signs to go to
Guided, as the guide knows more information, and can answer questions
Guided, the guide could answer questions
Guided, because a tour guide would help a lot
Guided

Guided as I retain more info from hearing then reading
Guided because they could answer some questions that the signs cannot
Guided tour, more insight/details/statistics
A guided tour might have taught us more because the guide could answer our questions
Guided tour
Guided tour because the guide is the most knowledgeable of the info
Guided, helps with understanding info
Guided, best explained by someone who really knows what they're talking about
I'm really not sure, maybe the lecture because I could focus
Lecture
Seeing the ways we conserve energy is better than hearing it.
Tour, would have been boring!
Guided tour because I would see it all first hand
Lecture. A guided tour would just show me more of where certain things are
The tour to see it in person.
Lecture, because all the information was presented to me at one time
lecture because it's not hot as hell
Lecture, hard of hearing, but the actual tour would be fun. I'm a visual learner.
Either the lecture or tour. The lecture allowed me to take notes.
Not the self-guided tour. I wouldn't pay close attention, but the lecture was sufficient.
I would have liked to have seen the green tour because its more handson
I learn best by lecture, and I got alot of information from it
Tour because its more interactive than a lecture
Maybe the guided tour so I could actually see everything in person
Lecture. I prefer lecture to most other teaching types/
The tour because I actually got to see the things wku is doing for the environment, not just hear about them
Guided tour Yes can see everything

Powerpoint, they wouldn't have forgotten any info
Class. The other students said so.
Not much else because most of the universitys methods were easily summed up
I see and learn better in a class room
I think I learned more from this tour because I physically went around and saw them instead of just sitting and learning about them
I enjoyed the guided tour
The guided tour because I like walking around and seeing what were talking about
Lecture more info would be presented since you are not having to walk from place to place
I thin kI learned the best through this tour.
Guided tour because i can see what is being done
Guided tour - seeing in person always helps
The guided tour
The guided tour because it's more hands on
Guided tour
Guided tour because I could connect places with practices.
Tour - more interactive
Lecture
Guided tour
Guided because people talking coulve explained it well and answer any questions
Self-guided, get done quiker
Self-guided
Guided tour so I could find the locations

Western Kentucky University Instructor Survey

AUTHOR NOTE: Questions asked after a detailed description of the tour and a photo of a Green Tour sign.

1. Do you teach classes at WKU?

#	Answer		Response	%
1	Yes		22	100%
2	No		0	0%
	Total		22	100%

2. In what college do you teach?

#	Answer		Response	%
1	Ogden College of Science and Engineering		5	23%
2	College of Education and Behavioral Sciences		4	18%
3	College of Health and Human Services		6	27%
4	Potter College of Arts and Letters		4	18%
5	Gordon Ford College of Business		3	14%
6	University College		0	0%
	Total		22	100%

3. What courses do you typically teach on a regular basis?

Text Response
ENG 100 ENG 300
Human A&P; Ornithology; Endocrinology
FACS 281, 310, 311, 380, 381, 481, 493
PSY 310, PSY 436
too many to list
research methods
Worksite Health Promotion,. Community Organization
several
geology
Interior Deisgn classes and kitchen and bath design
Freshman experience, business
psychology
Technical
GIS
Introduction to World Religions (RELS 102); Christianity (RELS 305); Religion and Ecology (RELS 408 with Green Tour))
BA 580, 751,752,753
Graduate
speech anatomy and physiology, normal speech and language development, phonetics, articulation disorders
introductory and upper-leve courses in my discipline
SMED 470, TCHL 560

4. Have you ever heard of or seen the WKU Green Tour?

#	Answer		Response	%
1	Yes		8	36%
2	No		14	64%
	Total		22	100%

5. Have you ever used the Green Tour as part of your class?

#	Answer		Response	%
1	Yes		1	5%
2	Yes, but not regularly		1	5%
3	No		20	91%
	Total		22	100%

6. Have you known any professors who have used the Green Tour in their classes?

#	Answer		Response	%
1	Yes		2	9%
2	No		20	91%
	Total		22	100%

7. Would you be interested in using the current Green Tour in your classes or are you currently using them?

#	Answer		Response	%
1	Yes		8	36%
2	No		14	64%
	Total		22	100%

8. If yes, why would you be interested in using the tour or why do you use the tour?

Text Response
For my ornithology class, I would use for bird watching around campus
Sustainability and corporate responsibility is taught in all my classes
Need more information
As a way to expose students to local environmental features and to increase knowledge of sustainability options.
We use the tour for our USGBC club
I am a recycler (for about 35 years) and would like students to understand being green(er)
Topics of green and sustainability are covered extensively in my classes and this would be beneficial for the students
A good activity that takes students out of the classroom.
Although I have a good reason for going on the Green Tour with respect to RELS 408. It would be a good idea to take my 100 level students on tours.
not applicable

9. How do you think the tour could benefit your students or how do they currently benefit your students?

Text Response
Sustainability issues could be discussed
Publicized more
Community Organziation students may benefit, depending how it is used
What is the green tour?
Provide a learning opportunity outside of the classroom. Provide an opportunity to see links between human activity and the natural environment.
See above
Will need to see what the tour has to offer befor I can comment on this question
I am always looking for outside activities that expand my student's experiences.
The tours might be useful as a way pf encourage the link between places and religious ideas about life on Earth, and maybe consider taking RELS 408 (Religion and Ecology) later!
not applicable

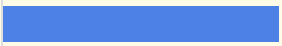
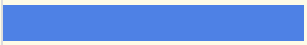
10. If no, why not? What could be done to make the tour useful to you?

Text Response
I teach online.... not sure how I'd use for 2 reasons-- not sure exactly what it is or how it could be adapted for an online course.
My classes are mostly for upper-classmen; they don't need to be familiarized with campus
It's off the topics I teach.
I have no idea what it is.
We use the tour for our USGBC club
How is it relevant to psychology?
Do not have time.
NA
Knowing what it is would be helpful.

11. What challenges might prevent you from using the tour in your courses?

Text Response
The class being online.
None
It's not relevant to cognition
Not relevant.
None, would be used as a homework assignment
Time?
I haven't yet bothered to figure out how long it takes to complete the green tour, so I don't know if I can do this in one class period.
we have so much content to cover already that the tour is reserved for club participation.
I didn't know it existed.
I teach online-- no one is on campus.
Do not know
can't think of any.
It is easy to confuse students at 100 level.
Classes online…tour not online
All of my courses are online at this time.
linking it meaningfully to my course content

12. Of the following choices which were described above, which options would increase your likelihood of using the tours in your classroom? Please select all that apply.

#	Answer		Response	%
1	Online virtual tour		11	58%
2	Themed tours		9	47%
3	Ready-made assignments		10	53%
4	A guided tour schedule		6	32%
5	Brochure for self-guided tours		12	63%
6	Phone accessible guide		3	16%

13. Why would the virtual tour make you more likely to use the Green Tour in your classes?

Text Response
My classes are online-- those who are not in the area could then participate.
May be easier?
you can use it in conjunction with our professional organizations.
We could use it in class and not worry about weather.
because I teach online.
Yes….
Because my classes are all online.
It allows flexible class implementation.

14. Why would the themed tours make you more likely to use the Green Tour in your classes?

Text Response
A bird theme....
If the theme were relevant to my course, I'd consider using it
Fit into subjects
Keeps the information fresh and different
Without knowing themes I'm unsure. In the business college I'm not sure where a theme would fit. Many possibilities.
Can focus on specific topics depending on the class.
native plants, landscape changes on the Hill, cultural/human themes like pre-campus occupants
It allows flexible class implementation.

15. Why would the ready-made assignments make you more likely to use the Green Tour in your classes?

Text Response
Would give me a springboard from which to adapt assignments I have now.
If there was a bird theme...
Ease
I think this could be useful as an extra-credit opportunity. Prepared assignments might give me some good ideas for integrating more of the green tour into other class content.
can be used for extra credit assignments
Ready-made assignments. Covers the information, saves me time.
Can make it a part of a graded assignment for the course. Makes students pay more attention
An addition to assignments that I already have - save me some time.

16. Why would a guided tour schedule make you more likely to use the Green Tour in your classes?

Text Response
Could be used as an out-of-class activity/homework for them to do and then do something with IN the class/online.
Others more familiar might do a more complete tour
adds more information and little know facts about campus if you have a speaker along with the tour
It may be more chaoticwithout a guide
The history of the office of sustainability is interesting.

17. Why would a self-guided tour brochure make you more likely to use the Green Tour in your classes?

Text Response
Could be used as an out-of-class activity/homework for them to do and then do something with IN the class/online.
Assist me with knowing where the tour goes
Information that could be easily desiminated. Could be done with a web brochure vs. paper.
Students could go on the green tour on their own schedule.
extra credit.
Students could go in groups and outcomes assignments could involve each stop.
Know exactly what to look for
I might have students do a self-guided tour as extra credit.
It is easier to manage for a course on religion!
to have content to discuss with students

18. Why would a phone-accessible guide make you more likely to use the Green Tour in your classes?

Text Response
Could be used as an out-of-class activity/homework for them to do and then do something with IN the class/online.
Many students use their phones :}
Students love phone anything.

19. Are there other changes to the tour that might make you more likely to use the tour in your classes? If so, what do you suggest?

Text Response
Making sure online students could do it from wherever they are would be good.
None.
Maybe have QR codes on the signs that link to a website where there are more questions or assignments for the students to work on. A way to make the green tour more participatory.
na
No idea what it is, never heard of it. No idea how to "find" it or experience it.
do not know
no
I am yet to do this on a more regular basis. I have no suggestions to make as yet..
NA
I don't know enough about the tour to provide specific suggestions.