WPI

University of Worcester

Skills for Tomorrow: Hereford Student Conference

An Interactive Qualifying Project Report submitted to the Faculty of

WORCESTER POLYTECHNIC INSTITUTE

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Abstract

The Skills for Tomorrow conference is an initiative set forth by the University of Worcester to educated school-aged students on sustainability. Previous iterations of the conference have been facilitated at the University with students from Worcester schools. This project sought to modify a version of the conference for Hereford students. The primary responsibility of the team was to organize and evaluate this event. This entailed finding experts to facilitate informative workshops, analyze evaluations, and establish a schedule for the day. The goal of the conference was to prepare the pupils for their geography General Certificate of Secondary Education exams, as well as educate them regarding sustainability efforts around the world and environmental stewardship.

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Woo Bikes
Unlocking the Severn

Executive Summary

Introduction and Background

An increasing global concern is the preservation of natural resources and the maintenance of the planet as population increases and resources dwindle. Efforts to conserve what resources are left and make the Earth more self-sustaining are under way, although in order to succeed, these efforts must be met by all nations and peoples. The University of Worcester aims to contribute to these efforts by promoting sustainability education and providing resources for instructors. Specifically, through the previously developed series of Skills for Tomorrow conferences hosted at the University itself. Previous iterations of the conference have focused on the incorporation of sustainability into various careers, particularly those in STEM. Geared towards pupils who are preparing to complete their requirements to enter college, the conference had brought together local businesses and educators to provide interactive and impactful workshops and activities.

The UK school curriculum does not directly require a sustainability component, alone nor under any subject. As a result, sustainability lessons, if any, are often administered to pupils under the geography curriculum. These lessons are often brief and relatively general as their incorporation requires the instructor to add an additional topic to the already numerous requirements under the geography guidelines. Thus, this iteration of the conference seeks to emphasize the link between sustainability and geography, and to expand on the existing curriculum. Secondary school pupils are encouraged to complete a series of exams known as GCSE which are subject-tests selected by each pupil individually. The subjects are often chosen at the start of secondary school, followed by two years of in-depth study, and finally the exams themselves are taken before secondary school completion.

Project Mission, Objectives, and Methodology

The objective of this project was to take the foundation of the Skills for Tomorrow conference and introduce the event to the city of Hereford, providing local pupils with preparatory information for their GCSE exams in geography while also exploring sustainability. Members of the Hereford Geography Teachers Association expressed to the University an interest in an event that provides an in-depth review of various sustainable concepts. The team ultimately chose to look at the specific topics of Food Security, Sustainable Cities, and Geographical Information Systems. The project team spent seven weeks researching information regarding the city of Hereford, local curriculum, and perception of sustainability in the United Kingdom as a whole. Upon arrival to Worcester, the team worked to bring together all aspects of the conference, primarily promoting the event to Hereford schools and contacting local organizations in search of workshop facilitators. As the conference date approached, the team's focus shifted to testing out workshop content in focus groups and preparing supplementary documents for attending pupils to enhance their experience and edification.

Collaborating with representatives from the University of Worcester and attending schools, the team's primary goal for the conference was to not only provide pupils with valuable information that could be applied on their GCSE exams, but also to impart a motivation and knowledge to encourage pupils to apply sustainable concepts to their local community. The team developed four objectives in order to achieve these goals.

- Objective 1: Efficiently connect logistics to the primary educational goal of the conference to ensure a cohesive event;
- Objective 2: Develop an approach for contacting appropriate organizations to facilitate beneficial workshops;

- Objective 3: Produce a conference that engages the students and increases their awareness of sustainable practices;
- Objective 4: Evaluate the conference's impact on attending pupils.

Regarding logistics, the team worked to ensure all aspects of the conference related to the overall theme of sustainability. This involved taking waste production and energy consumption into account in all aspects of the day, from printing to catering. The goal of aligning all technical aspects of the conference to sustainability was done to directly show pupils how sustainable concepts can be applied in all aspects of life. Additional logistics, such as workshop cohort size, an agenda for the day, and pupil information packs, needed to be developed and organized. These logistical factors were formulated and decided upon by the team using various brainstorming techniques as well as communication with the involved parties. The method selected for approaching organizations as potential facilitators was the implementation of checklists. Factors such as the organization's mission, locational proximity to Hereford, and previous involvement in similar conferences or events were all taken into account during this evaluation. After prior research, if an organization appeared to fit the requirements on the checklist, they were contacted by the team in outreach for workshop facilitation or supplemental materials.

Generating an engaging conference involved two general tasks: producing interesting and impactful opening and closing activities and providing informative content in the workshops. For producing engaging sessions and activities, the team first focused on establishing the goal of the conference day and exciting pupils through an introductory address. Using an evaluative checklist and unstandardized interviews, an introductory speaker was chosen to provide pupils with a review of what the day would entail, an introduction to the sustainable development goals, and generate excitement. Workshop content was formulated and evaluated under the mindset of informative, interactive activities and engaging

presentations as priorities. The team chose to evaluate the impact of the conference through the distribution of four separate surveys, one after each of the three workshop that assessed the workshops individually and another at the end of the conference which evaluated the event as a whole. The team also implemented an idea tree activity that allowed pupils to freely express what they had learned through the workshops and corresponding activities.

Results, Findings, and Recommendations

9:00-9:15	Arrival & Registration G37		
9:15-9:30	Opening remarks G37		
9:30-10:45	Food Security F13	Sustainable Cities F16	Geographical Information Systems F12
10:45-11:00	Break G37		
11:00-12:15	Geographical Information Systems F12	Food Security F13	Sustainable Cities F16
12:15-12:45	Lunch G44		
12:45-14:00	Sustainable Cities F16	Geographical Information Systems F12	Food Security F13
14:00-14:30	Closing Activity G44		

Figure 1. Conference Schedule.

The team created the finalized conference agenda which followed three different workshop rotations, color-coded, to accommodate three separate groups, averaging about 24 pupils each (Figure 1). The workshop topics were determined in response to the major topics outlined on the geography GCSE guidelines. Food Security was settled on as a workshop topic in order to address the GCSE topic challenges in the human environment, specifically resource management. The activities involved were directly related to the work of the facilitating organization and addressed the SDGs as well. The workshop on GIS addressed the topic of cartographic skills and showed the pupils how GIS is used to make decisions in the real world. Finally, the sustainable cities topic was settled on to address the urban issues and challenges topic. It was generated and facilitated by a group of student teachers from the University of

Worcester and explained the real-world problems that arise when trying to create and maintain a sustainable community.

Data collected and compiled from the evaluations given at the end of every workshop displayed that pupils highly favored the Sustainable Cities workshop while they least favored the Geographical Information Systems workshop (Figure 2). The team was also able to deduce that the presented information resonated with pupils more when illustrated through a hands-on activity as opposed to a lecture-style presentation. This was directly displayed through the general survey and idea tree responses, through which pupils stated the contextual activities in the Food Security and Sustainable Cities workshops as their favorite aspect of the conference

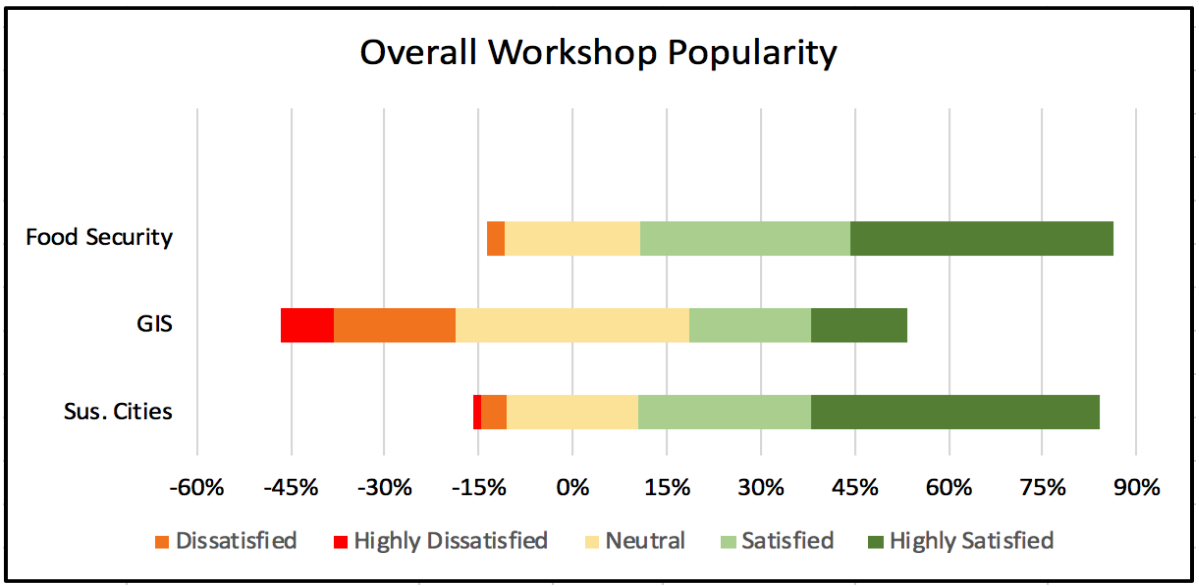

Figure 2. Diverging Stacked Bar Chart of Overall Workshop Popularity.

The ideologies taught during these sections were also often what the pupils stated as their biggest take away from the event as a whole. There were activities available for the pupils to partake in during their break and lunch times. These activities were facilitated by student representatives from WPI, working under the University of Worcester and Severn River Trust. The activities were testing out an electronic bike and participating in a volunteering and social media preference activity. These activities related to the theme of sustainability by exposing

pupils to the ideas of sustainable transport and protecting life under water. Both supplemental activities proved to be highly successful among pupils.

Should the project be conducted again, the team would recommend the following:

- Ensure that the directions on the evaluations are clear and the questions are effectively formatted. If possible, test the surveys before administering them.
- Center the workshops on an educational but hands-on activity to ensure the pupils are engaged.
- Confirm the logistical information, such as room reservations and student roster, as soon as possible.
- Reserve classrooms that are multipurpose spaces or suited to the purpose of the workshop taking place to avoid unneeded distractions.

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List of Acronyms

DfE - Department for Education

EMC - Earl Mortimer College

GCSE - General Certificate of Secondary Education

GIS - Geographic Information System

HGN - Hereford Green Network

IQP - Interactive Qualifying Project

LED - Light Emitting Diode

OS - Ordnance Survey

RGS - The Royal Geographical Society

SDGs - Sustainable Development Goals

SfT - Skills for Tomorrow

STEM - Science, Technology, Engineering, Math

THA - The Hereford Academy

UK - United Kingdom

UN - United Nations

UNICEF - United Nations International Children's Emergency Fund

UP - United Purpose

UtS - Unlocking the Severn

WPI - Worcester Polytechnic Institute

Chapter 1: Introduction

As the planet becomes more and more populated, a growing concern is how human society will maintain itself. The planet's resources are finite. The priority, then, becomes conserving these resources so that they last as long as possible. Much research has been dedicated to creating technologies that will assist in this effort. Inventions like the LED light bulb save electricity while electric cars reduce the need for gasoline. These practices, however, will be as important, if not more important, for the generations that follow. Thus, these generations need to be made aware of the current developments and understand why they are important. They need to be able to know where current measures fall short so that they can improve upon them. While green technology is an ever-expanding field, the people who will implement these changes need to adapt and grow just as fast as the environmental changes. The expansions in this area have generated the need to expand the Skills for Tomorrow conference.

The Skills for Tomorrow conference is an event created by the University of Worcester that provides secondary school pupils with educational workshops revolving around sustainability. In the city of Worcester, there are currently sustainability efforts taking place such as the University of Worcester's bike share program. This is a significant local effort that is being implemented in the everyday lives of those in the community. What will be focused on during this iteration of the Skills for Tomorrow conference is a larger scope of sustainability efforts and issues and how they relate to current events. There are new regulations and policies being put in place every year to try to improve sustainability efforts, and the team's goal is to educate the pupils attending the conference on why these new guidelines are being officialized and how it impacts their futures. With an increased understanding of sustainability and its implementation, the pupils will be better equipped to make sustainable decisions in their personal lives and careers.

Several successful Skills for Tomorrow conferences have been held on the University of Worcester campus in the past, as well as similar events such as Go Green Week. The goal of such events is to close the knowledge gap regarding what is being done in the real world and what is being taught in the classroom in order to mitigate humanity's impact on the environment. As such, the success of the conferences depends heavily on the knowledge that is taken away by student attendees, and furthermore, the implementation that students are motivated to adopt in their everyday lives. For this reason, the expansion of existing instances of the conference, as well as the refinement of workshops and presentations, is essential to prepare the next generation to participate in promoting sustainable industries and lifestyles. These sentiments are at the core of the project, expanding upon a previously successful idea to increase the reach of its effects and contribute to the promotion of a well-educated audience capable of making informed decisions regarding their future actions.

The University of Worcester serves as the project sponsor for the Skills for Tomorrow conference. The University is known for its award winning sustainability efforts both in its curriculum its operations. The University has been recognized as one of the greenest campuses in the United Kingdom. In previous years, the University has hosted the conference on its own campus. In their current efforts to expand the event, the upcoming conference will take place in Herefordshire, as opposed to Worcestershire, at The Hereford Academy. Following a change in venue, the role of the University changes as well; they can be expected to shift towards overseeing the planning process and providing the team with prior conference information that can be implemented into the new location and event itself. The goals for this project then become understanding the local sustainability education, facilitating a conference that prepares the secondary school pupils for their General Certificate of Secondary Education examinations and raises student awareness of sustainability in geography, and evaluating the results to provide recommendations for the future. By teaming up with local experts, pupils, and faculty,

the Skills for Tomorrow conference will provide secondary school pupils with knowledge about sustainable practices, specifically through the geography curriculum.

Chapter 2: Background

This chapter begins by defining sustainability, exploring the public's perception on the concept, and examining sustainability education in the United Kingdom. The goal of preparing this background material was for the research team to gather significantly sophisticated preliminary information that then could be applied to the preparation, design, and implementation of the final conference. Along with the aforementioned topics, the team also investigated the previous Skills for Tomorrow iterations to develop a framework on which to structure the latest iteration of the Hereford conference.

2.1 Defining Sustainability

The concept of sustainability is well-known among populations, implemented on local, national, and global scales. Often, sustainability is best understood in terms of lasting impact on the environment. While environment is one of the three main pillars, sustainability expands a wider scope, embodying economy and society as well. These three pillars can also be referred to as profits, planet, and people (Beattie, 2018). Environment accounts for the continuum of nature as an economic provider and consumer (Basiago, 1999, p.155). The economic aspect of sustainability explores current consumption levels and the indefinite maintenance of steady production levels while social sustainability, in the most general definition, seeks social organization that demolishes poverty (Basiago, 1999, p.150-152). The term used to define actions taken to promote sustainable lifestyles is sustainable development. The UK Parliament states that "…the principal recognises [sic] the importance of ensuring that all people should be able to satisfy their basic needs and enjoy a better quality of life, both now and in the future" (House of Commons, 2011). Without a foundational understanding of sustainability, severe consequences can occur. For example, the social impact of sustainability, or lack of, can be

seen in instances such as a lack of resources as a result of high fertility and increased population growth rates that can lead to social unrest and wars (Erdas, 2011). One way to combat these negative actions and consequences is through the use of education. Informing various populations on sustainable concepts and practices will lead to innovative thought processes that have the potential to significantly impact local and global communities for the better.

2.1.1 Sustainability in Geography

The latest iteration of the Skills for Tomorrow conference was supported by the Hereford Geography Teachers Association, with an intended focus on sustainable components within the local geography curriculum. A general definition of geography is, "…a scientific field that is devoted to the study of the Earth's landforms, oceans, environment and ecosystems, as well as the interactions between the human society and their environment" (Nag, 2017). For the context of the newest conference, it is likely that the geographical area of focus will be on human geography. This subsection explores how humans interact with and impact their environment, as well as political, social, and economic statuses across geographical areas (National Geographic Society, 2012).

In an interview conducted with geographer Scott Juisto, a Worcester Polytechnic Institute (WPI) professor, current popular topics in geography such as the motivations of immigration were explored. When prompted about knowledge that could be applicable to the structure of a secondary school geography curriculum, the topic of citizen science as a form of project-based learning was brought to the project team's attention. Citizen science can be used to ask what sustainability issues are present in local communities, and it also encourages participant observation (S. Juisto, personal communication, October 8, 2018). In a different interview conducted with geographer Stephen McCauley, also a WPI faculty member, the team gained knowledge in regards to the impact of location on sustainable ideas. Community

decision making greatly affects the actions and ideals of small groups. For example, the decision to establish a power plant in a town is contingent on the ideals of the local community (S. McCauley, personal communication, October 8, 2018). Connections can also be found between local and global communities. Through comparison similarities can be exposed, with the potential ability to apply similar innovations and solutions. Human geography topics and issues range locally and globally and having an understanding of both scales will be beneficial to the team when it comes to working with Worcester teachers and preparing workshop material.

2.1.2 Sustainable Development Goals

One manner by which the Hereford Geography Teachers Association works to expose pupils to sustainability is through the Sustainable Development Goals. These goals set forth by the United Nations serve as a foundational guideline towards achieving a more sustainable future. The UN states, "They address the global challenges we face, including those related to poverty, inequality, climate, environmental degradation, prosperity, and peace and justice" (United Nations, 2018). These seventeen goals, as shown in Figure 3, are intended to be achieved by 2030. As an initiative implemented by the UN and accompanying global organizations, a multitude of nations are involved in acknowledging and spreading these goals to their citizens, promoting participation on not just a national scale but rather an individual one. Each goal contains a general objective and then further expands into specified problems under the objective, as well as possible ways to implement a solution. For example, goal 11 is geared towards sustainable cities and communities. Under this goal are 10 targets to get to the point of achievement. These targets include ensuring access to safe and affordable housing for all as well as reinforcing efforts to protect all heritages. The UN and other organizations committed to these goals, such as UNICEF, provide resources to the public from lesson plans

to interactive activity blueprints, not only working to spread sustainable concepts but also ensure that resources are easily accessible.

Figure 3. United Nations Sustainable Development Goals. (United Nations, 2015).

2.2 The Perception of Sustainability

The majority of sustainability efforts are done to improve the public's quality of life; however, the general population is not in agreement about the need for sustainability efforts or what sustainability is. Critics of sustainability often describe the idea of sustainable development as an "oxymoron or as a compound policy slogan" (Scott, 2015). The general public opinion and definition, however, varies from person to person. In a research survey done on 6,000 United Kingdom supermarket customers, a 96% majority said they care about climate issues, regardless of socio-economic factors. The survey also asked people about their knowledge regarding various green issues. The conclusion was that United Kingdom citizens wanted to be green, but that they had little to no idea as to what that meant (National Health Service of England, 2015). With that being said, it is still clear that the citizens of Worcester and the citizens of the United Kingdom in general want to put an emphasis on sustainability.

In a survey conducted by the United Health Service of England it was revealed that 25% of people think that sustainability should be a top priority of the healthcare system. In that same respect, "… people do not think that they can solve climate change and other environmental problems alone. They expect government and businesses to take the lead and to reciprocate" (Green Alliance, 2012). Thus, the Hereford conference will need to place an emphasis on acknowledging what the students can contribute to overall sustainability efforts while still broadening their knowledge about the specific concepts, problems, and issues involved with sustainability.

2.3 Sustainability Education in the United Kingdom

The school system in the United Kingdom is split into key stages (Figure 4). The team's area of focus is on students in stages three and four. Students in years 7 through 9 are classified under key stage three while students in years 10 through 11 are classified into key stage four. Geography is not mandatory in key stage four, but students are allowed to select classes that interest them to help them explore career opportunities.

Furthermore, the elective classes students choose are applied practically through the GCSE, a standardized subject exam used for college placement. The current curriculum is flexible; it outlines what legally has to be covered. However, the teachers have the ability to add their own flare to lessons and incorporate additional topics that they deem necessary. Under current terminology from the Department for Education, (DfE), "pupils should be taught to… understand how human and physical processes interact to influence, [sic] and change landscapes, environments and the climate" (Department for Education, 2014). A more in-depth look at the curriculum reveals some key points on sustainability which the team would like to further expand. The highest priority topic taught is climate change. It is apparent that the changing climate is an issue that needs to be solved, and educating the younger generations in

schools is a good start. A second important topic in the geography curriculum relating to sustainability is natural resource use. Conservation of natural resources is necessary for a healthy and sustainable future. It is a fact that there is a dwindling supply of oil, as well as other natural resources, left on earth and constructively using these as well as finding alternative means of energy will be the key to humankind's future. The incorporation of these topics in the national geography curriculum demonstrates the United Kingdom's dedication to achieving a sustainable future. These measures are a good starting place for sustainability efforts, however auxiliary information can be useful to educate these pupils. The Hereford conference will supplement classroom activity with thorough workshops to enhance the students' understanding of sustainability.

	Key stage 1	Key stage 2	Key stage 3	Key stage 4
Age	5 – 7	7 – 11	11 – 14	14 – 16
Year groups	1 – 2	3 – 6	7 – 9	10 – 11
Core subjects				
English	✓	✓	✓	✓
Mathematics	✓	✓	✓	✓
Science	✓	✓	✓	✓
Foundation subjects				
Art and design	✓	✓	✓	
Citizenship			✓	✓
Computing	✓	✓	✓	✓
Design and technology	✓	✓	✓	
Languages[3]		✓	✓	
Geography	✓	✓	✓	
History	✓	✓	✓	
Music	✓	✓	✓	
Physical education	✓	✓	✓	✓

Figure 4. Breakdown of Key Stages and Subjects. (Department for Education, 2014).

2.3.1 General Certificate of Secondary Education

The GCSE is a set of standardized, subject-based exams that are given in the United Kingdom. They are administered in years 10 or 11 to help gauge a pupil's academic aptitude in a given subject area (Gardner, 2018). The exams offer a variety of topics including chemistry, physics, math, geography, and a number of foreign languages, although most schools require that pupils study science, English literature, English linguistics, and mathematics. It is typical for a pupil to take anywhere between five and twelve subject tests. These exams are extremely important for pupils, as higher marks provide greater opportunities when they apply for college and university. Ultimately, the results of one's GCSE can decide their future career. The exams are graded on a scale of one to nine, where anything above a four is passing. Higher grades appeal to more advanced colleges and universities and will grant access to different study programs (Gardner, 2018). Furthermore, pupils are allowed to reference external material on their GCSE exams, such as case studies which were provided in the student packets on the day of the conference. The geography GCSE consists of four main topics, living with the physical environment, challenges in the human environment, geographical applications, and geographical skills (AQA, 2018). Each of these topics embody detailed subtopics. For example, challenges in the human environment is further broken down into urban issues and challenges, the changing economic world, and resource management. In regards to the project, it is important for the team to be aware of these categorizations so that workshop content correlates with what the pupils are studying and can best prepare them for their exams.

2.3.2 World's Largest Lesson

The World's Largest Lesson is a movement in partnership with the UNICEF, aiming to provide children in over 130 countries, including the United Kingdom, with an understanding

of The Global Goals of Sustainable Development set in place by the United Nations (World's Largest Lesson, 2018). The goals of UNICEF range from promoting good health and well-being to advocating responsible consumption and production. The organization provides useful resources such as lesson plans and classroom decorations at no cost for teachers and instructors. The overall goal of the organization is to promote sustainable actions, but also to implement sustainability as a larger aspect of the current curriculum. This tool is especially useful for incorporating into a conference as it is recognized globally, easily accessible, and at minimal cost. The team intends on drawing from their published lessons to gather ideas and improve workshops. One such lesson of value is on redesigning plastic packaging and it is an activity which makes the students think about how to reduce plastic use to help the environment (World's Largest Lesson, 2018). An activity like this has the ability to make students think critically about their impact on the environment.

2.4 Sustainability at the University of Worcester

2.4.1 Previous Skills for Tomorrow Conferences

A previous iteration of the Skills for Tomorrow conference took place in 2016 at the University of Worcester and saw about 200 attendees. The conference consisted of a keynote address, interactive demonstrations, and workshops that included a variety of activities. The three main workshops focused on the topics of tourism, food production, and transportation. The common goal of these workshops was to expose pupils to careers in sustainability. Pupils also learned about sustainable changes they could implement in their own homes and lives. Local businesses were very involved in this conference, showcasing the sustainable practices present in their every day function and even facilitating some of the workshops (Evans & Jones,

2016). This allowed for community engagement and for the pupils to see the direct application of the concepts they were being taught.

This version of the conference differed from the previous iteration in both target audience and practical application. The audience in the past has been secondary school pupils from Worcestershire, but the attendees were from Herefordshire. In terms of the practical application of the presented knowledge, this information also had to be changed as compared to past iterations. Previous conferences were structured not only around workshops, but also interactive booth stations pupils could visit, that offered information on different organizations and sustainable opportunities. For this rendition of the conference, focus was primarily centered around the workshops, with the intention of providing pupils with information to prepare them for their GCSE examinations and future academic careers. While this version of the conference differed starkly from previous instances, an understanding of the logistical workings still provided essential insight into the general structure and flow of an educational event.

2.4.2 University Accolades

The University of Worcester is involved in the program Eco-Schools, which was created by the non-profit organization Keep Britain Tidy nearly 25 years ago in response to the needs identified by the United Nations in their 1992 Conference on Environment and Development (Keep Britain Tidy, n.d). The main goals of Eco-Schools are to provide the constituent institutions with the means to develop sustainably themselves as well as to give students the tools to implement clean practices in their own lives. The highest honor this organization can bestow is the Green Flag Award, which is given to public organizations in recognition of year-long student-led projects that lead to a marked quantifiable increase in the sustainability of the school or municipality in question as measured by the standards set forth

by Eco-Schools (Green Flag Award, 2007). The University holds several awards including the EcoCampus Platinum Status, Responsible Futures accreditation, the International Green Apple Award, and was ranked the fourth greenest campus by the People & Planet University League in 2017, receiving perfect scores in a fourth of the areas examined (University of Worcester, 2017).

2.4.3 SusThingsOut

SusThingsOut is an online sustainability magazine created and published by the University of Worcester. It covers a wide variety of topics, from economics to education, all with the overarching theme of sustainability. The site also hosts a student blog, and tweets about various sustainability efforts in and around Worcestershire. Publications such as this are essential in the endeavour to create a more sustainable world as they garner support for existing ventures as well as inspiring the creation of new innovative ones.

2.4.4 Woo Bikes

Woo Bikes is the bike share program run by the University of Worcester. It has 100 bikes total, 50 conventional pedal bikes, and 50 e-bikes (University of Worcester, 2018). The e-bikes have batteries to supplement the pedal power and propel the bikes faster. These batteries hold enough charge for approximately 30 miles of travel and are rechargeable (Grey Technology Limited, 2018). The bikes are loaned out on a rental system for an annual fee . This program has provided effective, clean transport for hundreds of students, particularly those from overseas who cannot bring a bike or car with them from their home.

Chapter 3: Methodology

The primary objective of this project was to expand and facilitate the Skills for Tomorrow conference from Worcester into the neighboring township of Hereford and alter it such that it was appealing to a younger audience. To complete this overall objective there were several aspects that first needed to be achieved:

- Efficiently connect logistics to the educational goal of the conference to ensure a cohesive event.
- Develop an approach for contacting appropriate organizations to facilitate beneficial workshops.
- Produce a conference that engages the students and increases their awareness of sustainable practices.
- Evaluate the conference's impact on the attending pupils.

The first objective was accomplished through focused brainstorming. Each group member introduced different ideas that were then discussed and circulated other IQP teams and the team's sponsor to deduce the best ways to present information in a way that would most effectively prepare the pupils for their tests, while also promoting sustainability knowledge.

In addressing the second goal, the team reached out to other organizations that have expertise in the areas of geography and sustainability, as well as insight into the learning styles of secondary school pupils, in order to properly facilitate the workshops. The project sponsor used her connections and expertise to point the group towards promising organizations in order to supplement the group's own research regarding the issue.

The third goal put all the prior planning and preparation into action, bringing the numerous components of the conference together to create a smoothly running and engaging

event. The success of these efforts were measured through participant observation, workshop surveys.

The final objective was to measure the success of the conference in terms of its impact on the students. The primary method for this was the use of an exit survey which provided an understanding of the impact of the conference by testing how the pupils' views changed directly. Additionally, the team facilitated a free-listing activity where the students wrote a synopsis of their understanding of sustainability on a paper leaf, which was then affixed to the branches of a painted tree trunk. There were two trees created, one at the onset of the conference and one at its end. All the sample points provided from these trees were examined for key words and phrases. A higher prevalence of certain words or a deeper understanding of the workshop topics or sustainability as a whole would indicate the pupils did in fact absorb the information from the conference which would in turn be indicative a successful event.

3.1 Connecting Logistics to Conference Objectives

While the conference was centered primarily on geography and the associated GCSE examination, a subsequent focus was given to sustainability in a variety of aspects from academics to livelihood. As a result, it was critical that the team ensured all aspects of the conference aligned with sustainable ideologies. This translated into ensuring that the materials provided to pupils and teachers added value and as well as, for example, aligning the catered lunch with food security and waste reduction. The method put into use to create synergy between the objectives and conference logistics was brainstorming. Critical thinking was vital to determining which actions needed to be set in place, and accordingly, how to go about instilling said actions. Brainstorming embodies various techniques including mind mapping, word banks, pros and cons listing, and idea switching. In a publication by Charles Wilson, the benefits of brainstorming are listed as:

- provides ideas that may not surface any other way
- provides many ideas quickly
- is a good way to get over design blocks…
- and is a democratic way of generating ideas (Wilson, 2013, p. 5-6).

This method proved to be an invaluable tool for the team as the time to prepare workshop materials and prior resources to build on were limited. Through brainstorming and a thorough understanding of the sustainable development goals, the team generated various ideas to be implemented at the conference. Packaging for catered products such tea and coffee were sourced in reusable containers as opposed to individual plastic packaging. Similarly, resources provided to students and teachers such as folders and papers were recyclable and reduced where possible such as double-sided printing. While these factors were not directly correlated to the pupils, it was correlated to the conference objective. By incorporating brainstorming into conference planning, coordination of all aspects of the conference was ensured thereby providing pupils with a well-rounded understanding of how sustainability can be implemented in a multitude of sectors.

Regarding the formation of conference documents, the team made use of previously obtained resources and venue information to best determine factors such as the conference agenda. The agenda (Figure 5) provided three different workshop rotations, intended for three different groups approximating 24 pupils each. As the attendees were from two different schools, the groups were determined by school and year. The Earl Mortimer pupils made up one group while the other two groups consisted of The Hereford Academy year 9 and year 10 pupils. The reasoning behind this division was to reduce potential distractions, allow facilitators to concentrate on one age group per session, and allow the teachers to be with the pupils from their respective schools. Furthermore, the schedule was color-coded along with the corresponding classrooms to ensure smooth transitions during switch times, as colored banners

were placed outside the three classrooms. Additional materials created were a labeled map (Appendix A) of The Hereford Academy and a promotional flyer (Appendix B). Case studies (Appendix C - E) that corresponded to the workshop topics, along with fact sheets for the Woo Bikes (Appendix F) and Unlocking the Severn (Appendix G) IQP teams, were collected from the respective facilitators and groups. These preparations were completed with the objective of providing pupils with the necessary materials they would need to obtain the knowledge and concepts presented to them by the workshops as well as conference activities.

9:00-9:15	Arrival & Registration G37		
9:15-9:30	Opening remarks G37		
9:30-10:45	Food Security F13	Sustainable Cities F16	Geographical Information Systems F12
10:45-11:00	Break G37		
11:00-12:15	Geographical Information Systems F12	Food Security F13	Sustainable Cities F16
12:15-12:45	Lunch G44		
12:45-14:00	Sustainable Cities F16	Geographical Information Systems F12	Food Security F13
14:00-14:30	Closing Activity G44		

Figure 5. Conference Schedule..

3.2 Evaluating Facilitators

The selection of experts to facilitate the conference workshops was among the most important tasks set before the team. If the facilitators were subpar, the conference as a whole would quickly unravel as pupils lost interest and became frustrated. To ease the selection process the team created a simple checklist used to select an appropriate facilitator for each specific workshop. First, the persons or organization facilitating the workshops needed to be located relatively close to Hereford as the team did not have adequate funding nor resources to provide transportation. Additionally, longer travel distances would have presented a greater

potential for delays by traffic or mechanical difficulties. These would in turn delay the start of the conference and wasted precious time as well as invalidating the carefully timed events on the itinerary. The second checkpoint was the organizations' history of involvement in similar projects and ability to stimulate the pupils' interest in sustainability. Organizations that had previous experience with younger pupils already had undergone background checks to allow them to work with minors as well as having knowledge about materials tailored specifically for younger minds and interests, both factors the team took into consideration. Another key evaluation element was whether or not a given organization had previously affiliated with the Skills for Tomorrow conferences. By working closely with the organizer of the previous conferences, Katy Boom, and finding prior conference materials online, the team contacted past collaborators to see if there was an interest in continued involvement. Once an initial email was sent to the prospective facilitator, the team would send a second email after three business days, if there had been no response. If a phone number for the organization could be found, this was used if email communication proved ineffectual. Through the resources that were provided by the University, as well as independent research, the team was able to critically evaluate potential event facilitators.

3.3 Produce a Conference that Engages the Students

3.3.1 Evaluating an Introductory Speaker

The intended purpose of the conference was to provide valuable information for the pupils to apply towards their GCSE examination as well as to demonstrate sustainable concepts that could be applied in their future endeavors. In order for the conference content to make an impact on the pupils, it was important that they were excited and willing to engage in the various activities offered. As a result, a time was scheduled for an introductory speaker to

provide opening remarks, a briefing of what the day entails, and to capture and boost the attention of the pupils. In order to ensure that the introductory speaker was a beneficial facet of the Skills for Tomorrow conference a checklist was created to evaluate candidates (Appendix H).

The criteria on the checklist includes availability, knowledge, credibility, flexibility, and engagement. The various checkpoints were assessed by online research and unstandardized interviews with the candidates. Unstandardized interviews enabled the team to gain an understanding of the speaker's background and familiarity with key concepts presented at the conference. This form of interviewing does not call for scripted questions, but rather allows for the interviewer to encourage the interviewee to lead the discussion (Lune & Berg, 2012, p.110). By permitting the candidate to speak in a loose structure, their primary focuses and personality can be assessed to determine if they align appropriately with the goals of the conference. Candidates were informed of conference logistics and finalized details in order to make an informed decision regarding their ability to travel to the venue.

Matching the introductory speaker to both the audience's sentiments and goals of the conference was an obstacle the team focused on overcoming. An expert in sustainability who provides a talk and relates the key points to implementations in business can be very informative but prove uninteresting to younger pupils. As a result focus was given to the incorporation of different factors such as audience interaction or anecdotes to increase audience interest. Similarly, the speaker's delivery and mannerisms played a key factor in potential student takeaways and understanding. The team evaluated the prospective speakers following these criteria through the unstandardized interviews to ensure that the students would benefit from the presentation.

3.3.2 Evaluating Content

Given that the conference was only a one day event, there was a finite amount of time to impress upon the students the lessons the team, the sponsor, and the associated network of organizations determined to be most important and applicable. To this end, a thorough evaluation of the content of the conference, workshops and corresponding activities was conducted to ensure that conference time was well spent. There were potential areas for error as it was possible for the team to over invest in one aspect or overcomplicate another. This could have led to frustration amongst the pupils and deafen them to the goals of the conference.

The primary method for data collection during the conference itself, as opposed to after the conference, which will be discussed in the next section, was participant observation. Being that the workshops themselves would largely be facilitated by third party organizations rather than the members of the project team directly, direct observation provided the team members with a flexibility to move about the conference and observe its workings and its effects without having the duties of facilitating the workshops themselves. More specifically, the strategy was for one group member to be stationed at each of the three workshops, with one floating member who provided additional assistance as needed. Here each member took thorough and detailed notes about the actions and attitudes of each group of pupils participating in the workshops. The most important details are seen in the body language and participation of the students. The pupils were not interacted with directly by any of the team members and furthermore each member made an effort such that their presence did not distract the pupils from the workshop itself. Observations were also made regarding the aspect and behaviors of the facilitators of the workshops, since an uninteresting presenter can foul an otherwise well-designed activity. All observations made by the team were compiled and compared to measure the interest of the pupils in each activity, and how different variables affected this. For instance many people, infamously students, are markedly less energetic after lunchtime, when the energy of the last

night's rest has diminished greatly (Bes, Jobert, & Schulz, 2009, p.392-398). This difference would easily be picked up through participant observation, as students from the same group may become increasingly lethargic as the day progresses, negatively impacting their investment in the event. In the workshops themselves, the observers would be focused on noting signs of pupil engagement. Actions such as answering questions, volunteering to go to the board to point things out, and hosting group discussions that are both on topic and productive would illustrate the kind of engagement the team would consider successful.

Additionally, each workshop itself had a set goal it sought to accomplish. For the Food Security workshop, the pupils should have taken away a greater understanding of the importance of responsible agricultural practices, especially in developing countries. In the GIS workshop, the pupils should have obtained a sense of how mapping systems and geographic information is used in their everyday lives to improve sustainability and quality of life. In the Sustainable Cities workshop, the pupils should have taken an understanding of the challenges that face communities as they try to be sustainable, including monetary restrictions and unexpected variables that require a diversion of resources. These were somewhat difficult to see entirely from a pupil's body language, so the preferred method for evaluating these content objectives falls in the next section.

3.4 Evaluating the Impact

Since the Skills for Tomorrow conference is an ongoing effort, one of the most helpful pieces of data that can be gathered is the impact that the conference had on its attendees. This allows the group to see how well the conference was planned and designed as well as provide information and recommendations to future organizers. The evaluation method desired by the team's sponsor was an exit survey. The survey "is often the best way to get information and feedback to use in planning and program improvement" (Office of Quality Improvement,

2010). It is also fairly easy to organize and administer on a limited time frame when compared to something like a focus group or interview. This combined with the ease of gathering huge amounts of raw data through surveys made them an excellent method to measure the conference's success.

In order to ensure the data collected had an appropriate depth, four total surveys were administered throughout the course of the conference. Three of these were created to gather feedback on each of the workshops individually and were administered at the end of a given workshop (Appendix I). The fourth survey was an exit evaluation used to establish how the pupils felt about the conference as a whole (Appendix J). The workshop surveys consisted of a set of Likert scale questions to gauge the pupil's feelings regarding how informative and engaging the workshop content and facilitators were. This was presented as a numeric scale of one to five, where one represented a high level of satisfaction and five indicating a high level of dissatisfaction. This metric was explained in bold text above the questions and when possible, reinforced verbally. Following the rating questions were a series of open response questions. These asked things such as what the pupil's favorite part of the workshop was, and what they would change in future iterations.

The final survey was similar in structure, except the Likert scale questions were in reference to the areas not covered on the workshop evaluations, such as the opening remarks and the Woo Bikes activity. Next to this was an additional open response question which asked pupils what their biggest takeaway from the conference was. The other open response questions were very similar to those on the workshop evaluations, but referred to the highlights and lowlights of the conference as a whole rather than a workshop specifically. The Likert scale responses were placed into a table and analyzed qualitatively, whereas the open ended questions were read through and common responses or themes were established.

A potential issue seen with surveys was that 14 and 15 year old pupils would likely have little interest in answering them. In order to combat this, two iterations of an idea tree were used. In essence, idea trees are a type of free listing exercise. In a publication through the University of Florida, it is stated, "Free listing is a deceptively simple but powerful tool. Its most important application is the identification of culturally relevant items" (Gravlee, 1998). At the beginning of the conference, the pupils were asked to write their definition of sustainability and how they felt about sustainability efforts around the world on a paper leaf and affix it to a banner with a tree painted on it. In addition to being a great illustration and a fun activity, this idea tree was an efficient way to measure the pupils' prior knowledge. A second idea tree was performed at the close of the conference, which was similar to the first except the questions asked how pupils' perception of sustainability changes and a sustainable pledge they would have liked to share. The goal of this second tree was to measure what the pupils learned over the course of the conference and how this new information changed their views regarding sustainability.

3.5 Next Steps

A Gantt Chart (Figure 6) was created to ensure the appropriate tasks were focused on for any given week in order to ensure all was completed in a timely manner. Note that while the item "Deliver Conference" is listed for the sixth week of the time frame, the event itself was only one day long, taking place on Friday, November 30th. The time after this was used to perform a thorough, in-depth analysis of the findings and allow ample time to identify and consolidate results and conclusion.

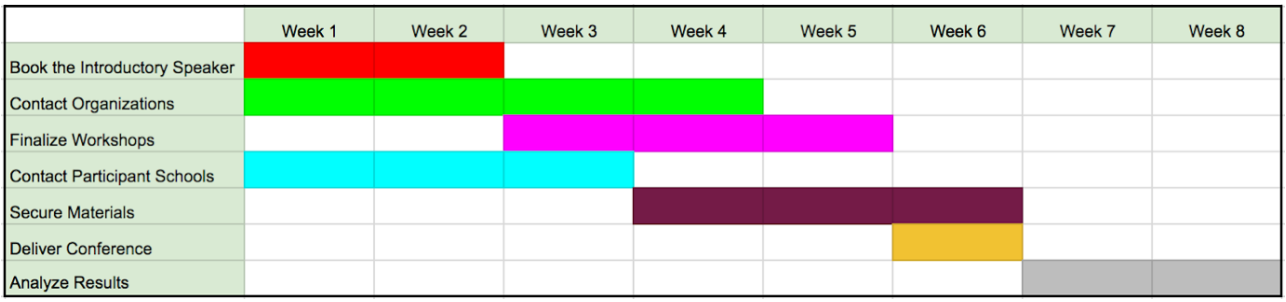

Figure 6. Project Gantt Chart.

Chapter 4: Results

4.1 Contacting Organizations

The SfT event was not one that the project team could run alone. Thus, it required the assistance of outside groups and organizations. The team's efforts to contact these organizations was met with mixed success. In total, four organizations responded and agreed to help: UP, OS, the RGS, and the HGN. UP and OS ultimately became the organizations to facilitate two out of the three workshops agreed upon by the team. The RGS donated educational materials to the conference, including posters and pencils. The HGN also responded to a inquiry on facilitating the Sustainable Cities workshop, although the team sought out other volunteers so that the workshop content aligned better with the conference goals. There were many organizations that were contacted that did not respond. These include GeoMentors, the RGS Ambassadors, and Oxfam (Appendix K). Overall, the project group received the necessary help to administer the event.

4.2 Opening Ceremony

There were multiple important decisions that went into structuring the opening ceremony for the day. The purpose of the introductory remarks was to properly introduce the conference in a way that would be exciting and engaging while still introducing the pupils to sustainability and the SDGs. First a video created by the World's Largest Lesson specifically to introduce the SDGs was shown. This covered an introduction to the goals, but did so broadly. Then the introductory speaker, Katy Boom, took over, going into a more in-depth discussion on the specifics of the asking each student to personally choose which of the SDGs he or she felt most interested in. Thus, the pupils created a direct connection between sustainability as a whole, the SDGs, and their own thoughts and feelings.

4.3 Food Security Workshop

The first workshop topic the team selected was Food Security, which is tied into the second major topic under the geography GCSE, which is challenges in the human environment and furthermore resource management (AQA, 2018). By incorporating the topic of Food Security into one of the conference workshops, pupils received in-depth information under one of the main categories under the GCSE guidelines, as well as a more detailed understanding which rendered the broader topic of resource management more comprehensible for this student age. This workshop was facilitated by United Purpose, an organization with a mission to reduce the number of people in need of aid. Specifically, UP has done extensive work in Malawi on food security. As of 2016, 39% of the population of Malawi faced extreme food insecurity (United Purpose, n.d.). This issue is a significantly large area of focus for UP, and therefore the workshop lesson plan was specific and provided pupils with multiple scenarios based on real-life examples and published academic research. The first portion of the workshop focused on developing a basis on the pupils' knowledge on food security through an interactive quiz. The pupils then participated in an activity in which they simulated Malawian farmers. They were tasked with selecting what they thought were the best crops to sustain themselves and their families. The pupils had the opportunity to select between a multitude of crops, each yielding a different amount based on environmental factors such as weather. This activity was based on the work of UP, and the representatives claimed that a portion of the foundational information was based on scholarly research conducted by a team at Oxford University.

The topic of Food Security not only corresponds directly with the GCSE exam topics, but it is also directly associated with goal 2 of the SDGs. Zero hunger is a prominent goal of both the SDGs and UP, as displayed through the workshop lesson plan. This correlation allowed for pupils to expand their knowledge base, gathering detailed information on a real

world situation that they can incorporate into their exam, as well as providing a well-rounded understanding of how different organization are combating hunger.

4.4 Geographical Information Systems Workshop

The second workshop topic selected by the team was GIS. This topic was chosen with the goal of providing pupils with knowledge and a hands-on experience with cartographic skills to prepare them for their GCSE examination. As part of the continued effort to provide pupils with detailed information under all four of the major topics under the geography GCSE, this workshop could be categorized under both geographical skills and cartographic skills (AQA, 2018). This workshop was facilitated by a representative from Ordnance Survey, a national mapping agency in the UK, to provide an in-depth focus on mapping strategies. In conjunction with the lesson plan set forth by the OS representative, the workshop structure was a series of short lectures followed by corresponding interactive activities. The session involved a general overview of cartographic skills and information on OS as an organization, followed by an activity that simulated a zombie invasion where pupils used maps to determine the best locations to keep members of the town safe. This activity was followed by a longer informational component that went into detail about the different types of maps and the purposes for which each kind would be used. The final activity was similar to Pictionary, in which pupils had to create map symbols for key city locations such as an airport, electric car charging point, and solar farm.

This structure was determined to provide pupils with valuable information that could be incorporated into their exam preparations, but also allow them to think critically and make decisions. The first activity, zombie invasion, exposed pupils to map usages and the value and utility of maps in disaster situations. After learning about the various kinds of maps, pupils were able to use this knowledge in the Pictionary activity to think critically about what the

symbols for important locations should be and why. They also were able to directly relate cause and effect through these activities, viewing how their decisions affected the results of the activity and how this could be amended or improved. Through the knowledge put-forth in this workshop, pupils gained a deeper understanding of how maps and cartographic skills can be applied in factors beyond directional guides, by visually providing information, knowledge of which can prove to be valuable on the corresponding exam.

4.5 Sustainable Cities Workshop

The final workshop chosen by the team was on Sustainable Cities. This topic was chosen because it links to the urban issues and challenges and challenges in the human environment sections of the GCSE exams (AQA, 2018). The structure of the workshop was designed with the intent of giving the pupils a sense of ownership to keep them more engaged and invested in the workshop proceedings. Having them create their own city made them more invested in its wellbeing, which in turn encouraged deeper thought about the best options for their individual cities. Additionally, the workshop ended with a vote on which fictional city the pupils would most like to live in. The city with the most votes was declared the winner of the workshop. This technique encouraged healthy competition amongst the groups of pupils, which further inspired critical thinking regarding how best to manage their city lest they lose bragging rights to one of their peers. Not only was the workshop engaging in these regards, but factors such as the news flashes helped illustrate the challenges and hardships associated with creating and maintaining a real world city.

The student teachers from the University of Worcester were chosen as the facilitators for this workshop. They were able to send a group of five facilitators to the conference, which allowed more individual students to interact directly with a facilitator. The second and more important reason they were selected was that the student teachers are in the process of learning

how to teach geography to secondary school pupils, which made them ideal for not only their expertise on the subject material, but their ability to present it effectively to this specific age group.

4.6 Interactive Activities

The two interactive activities, Woo Bikes and Unlocking the Severn, also helped to directly address the goals of the conference. In the case of the former, a display of electric bikes lined up with the message of sustainability very well, since they offered a fun example of a mode of sustainable transportation. Additionally, from the first visit to THA, the project group observed that a large number of the student population rode bikes to and from school. The team hoped to use this interest to provide the pupils with not only a demonstration of sustainable transportation, but an activity that they would enjoy doing on its merit alone. In the case of the latter, the show of volunteer work on local habitats such as the Severn River provided a great example of how the sustainability knowledge learned in the conference is used in the real world and how the pupils, too, could use their knowledge to positively affect the world around them. Additionally, their activity covered content involved in the living in the environment section from the GCSE exam (AQA, 2018). Both of these interactive activities had the overall objective of addressing the goal of the conference: to link pupils with geography and sustainability in order to make preparations for the GCSE exams.

4.7 Closing Remarks

The closing remarks were the final step in achieving the goals of the event. As the main activity during the remarks, pupils repeated the idea tree activity that was done during the opening ceremony. This allowed a comparison of the pupils' views and ideas on both the definitions of sustainability and what it means to be sustainable from the beginning of the day

to the end. It gave a before-and-after sample of the general ideas and beliefs regarding sustainability and represented a large portion of the overall success evaluation strategy. This was an additional time to thank all those who helped the team facilitate the conference.

4.8 Evaluations

Through the course of the conference, there was a need for a survey evaluation of some kind. The team decided to incorporate two different surveys in order to thoroughly examine the day. The first survey was a workshop evaluation survey (Appendix I). This survey was administered after every individual workshop in order to glean the pupil's immediate reactions, be they positive or negative. The group decided this so that the pupils would not lose their thoughts on each of the workshops before they moved on to the next one. Additionally, data collected on the entire day was required. To accomplish this, a general evaluation, asking for comments on the day as a whole and opinions on the extra activities, was administered with the workshop evaluation at each group's last session for the day (Appendix J). In addition to opinions, this evaluation asked pupils to list their greatest takeaway from the conference. To encourage participation in each of the four evaluations pupils were given throughout the day, each evaluation a student completed earned them a raffle ticket.

Chapter 5: Analysis

5.1 Pre-Conference Events

In regards to the planning of the conference, there were several events that produced positive results. The first out of two focus group facilitated gleaned positive results as well, although for different reasons. With the University student teachers, the goal was to examine what aspects of a workshop would best produce pupil interest. This was used to further develop the workshop on Sustainable Cities. This group of teachers was extremely helpful in the team's endeavors, as they were not only interested in the event and the workshop, but a portion of them agreed to facilitate the workshop. The focus group purpose then shifted to developing an activity for the lesson. The group brainstormed different aspects that made a lesson engaging, including opportunities for ownership and having constantly changing circumstances (Figure 7). Then, the teachers developed the lesson plan itself, incorporating an activity in which the pupils would create a city and chose the respective services based of a budget. The focus group was a great success for the team, as not only did the team receive the data necessary on what engages pupils, but the teachers used those aspects to develop an activity to teach about sustainable cities and agreed to facilitate it on the day of the event.

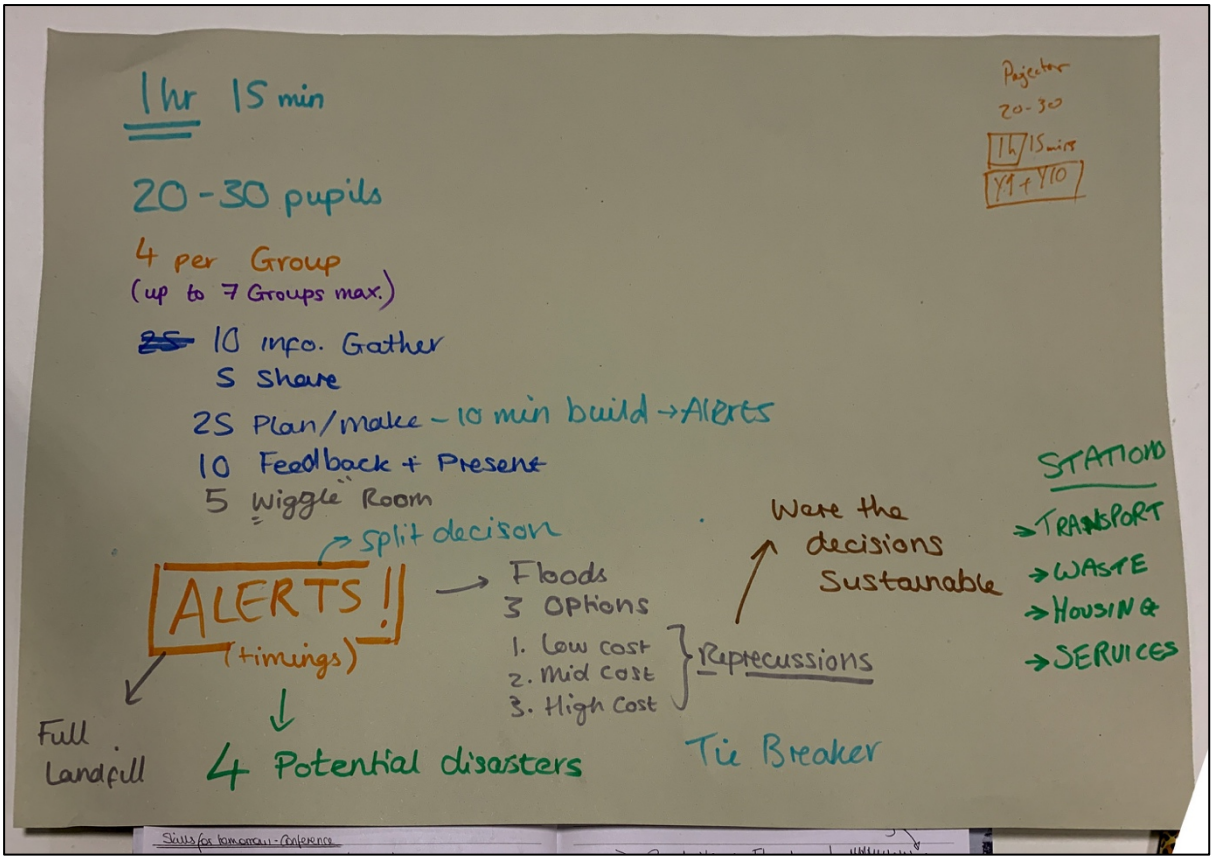

Figure 7. Sustainable Cities Workshop Lesson Structure.

The second focus group was conducted in the SUST1001 class on the University campus. The students were walked through an early iteration of the Sustainable Cities workshop (Appendix L), and provided constructive criticism on its proceedings. What quickly became apparent to the team was that having the students work in medium sized groups improved their experience significantly. With wildly differing opinions amongst the group members, every decision required thorough justification which overall produced a more successful city. This also meant that the students had to think critically about the specifics of creating a city, which they had never done before, and led to a deeper understanding of the obstacles that city planners face.

5.2 Opening Ceremony

At the beginning of the conference, once all the pupils had arrived and entered the cafeteria, they were moved into the auditorium for the opening ceremony. While they were

making their way in, there was a slideshow playing on a continuous loop which contained detailed information about the day, such as the activities offered and directions to the restrooms. This was purposed to promote both a general knowledge of the available activities as well as to get the pupils excited about the various aspects of the conference. A copy of this presentation is included in Appendix M. Once all pupils were seated, the team commenced with the idea tree activity. Each pupil was given a leaf and asked to write what sustainability meant to them, or rather what prior knowledge they had of sustainability. After finishing their thoughts, the leaves were posted on the idea tree. After analyzing the leaves turned in from before the first workshop, the answers were relatively broad and short-worded. Below a word cloud can be found that shows the frequency and variety of responses provided (Figure 8). In total, there were 57 initial responses, seven of which indicated pupils who did not know what sustainability meant as their responses were simply question marks. Common words and phrases such as "something" and "lasting" were seen throughout the responses, although in general, responses were relatively vague. Another common theme found among the leaves was the association of sustainability with renewable energy. The team concluded from these results that the pupils' prior knowledge on sustainability was limited.

Figure 8. Opening Ceremony Idea Tree Word Cloud.

In the second half of the opening events, Katy Boom led a quick activity where she asked the pupils simple questions about geography and sustainability. One question in particular that the team found important was asking who has previously heard of the SDGs. No pupils from THA stood, and only around a dozen of the EMC pupils had heard of the goals prior to the conference. Another important topic Katy Boom asked the pupils about was who knew the definition of sustainability. This prompted only around a quarter of the pupils to stand up. This was a surprise, and while not a particularly pleasant one, meant the pupils had a great deal to learn and the conference had a large potential to influence their perception of sustainability.

After the pupils participated in Katy Boom's activity, they had the opportunity to pick out the SDG they resonated with the most and hold it up for the other pupils to observe. This brought the unifying theme of the SDGs to light. The pupils holding the SDGs can be seen in Figure 9.

Figure 9. Earl Mortimer College Pupils Holding SDGs.

5.3 Geographic Information System Workshop Review

Upon review of evaluations, the GIS workshop was the least popular workshop among the pupils yet also the most informative (Figure 10). The team found a correlation between the responses to the prompts asking pupils what they enjoyed (Figure 11) and what they would change about the workshop. Many responses stated that their favorite aspect of the session were the two activities, while a common response to what they would change in the workshop was adding more interaction into the lesson plan. While pupils enjoyed the two activities that were set in place, it was found that there was a desire to do an activity that involved the actual software the facilitator was displaying on the board, as opposed to activities that related to the lesson but did not involve the software. Additionally, the pupils were not in favor of the lecture-style formatting of the workshop. This was supported by the responses to the workshop evaluation (Figure 12). The team found through participant observation that pupils tended to be more distracted or disengage from the workshop when there was a lecture component instead of activity or discussion. A common positive response to the workshop was that pupils claimed the GIS session to be the most informative workshop as a majority of the information presented was on concepts that had not previously been exposed to.

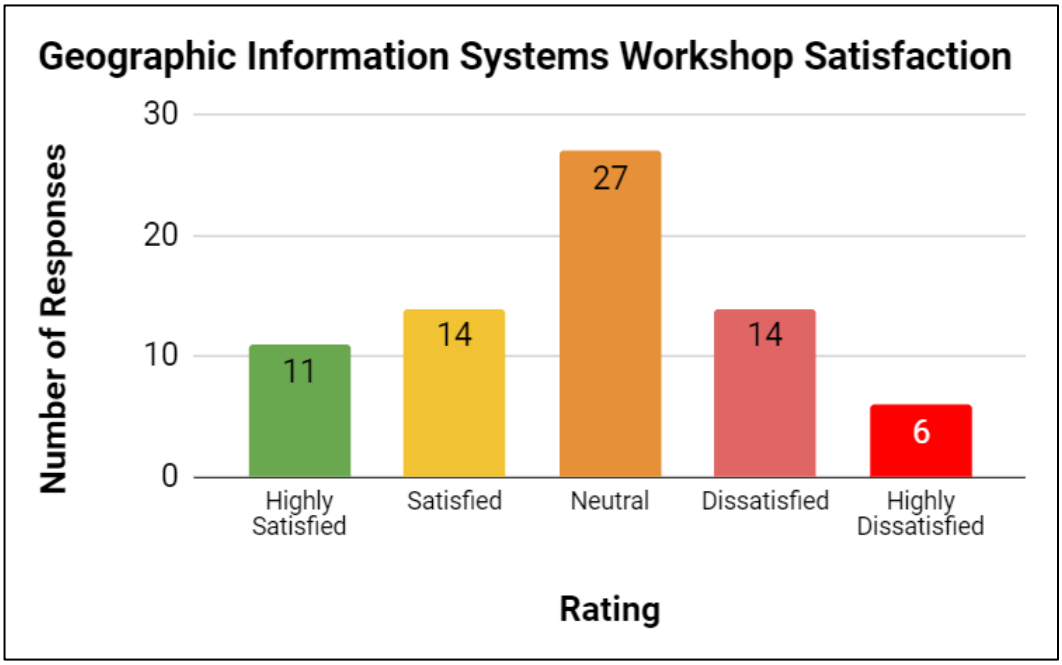

Figure 10. GIS Workshop Satisfaction.

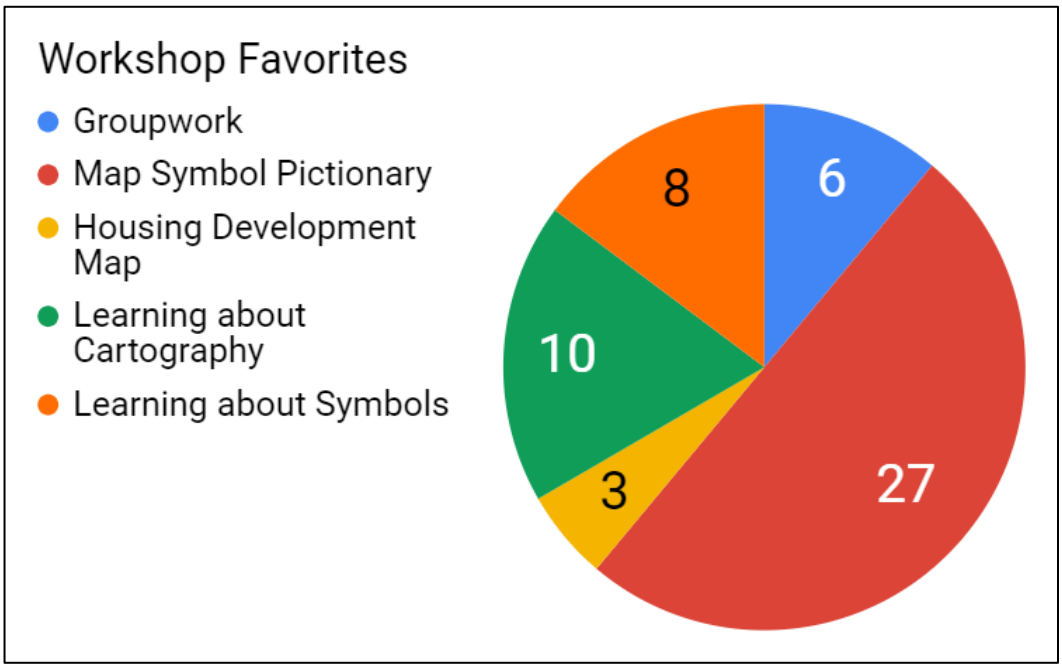

Figure 11. Pupils Favorite Aspect of the GIS Workshop.

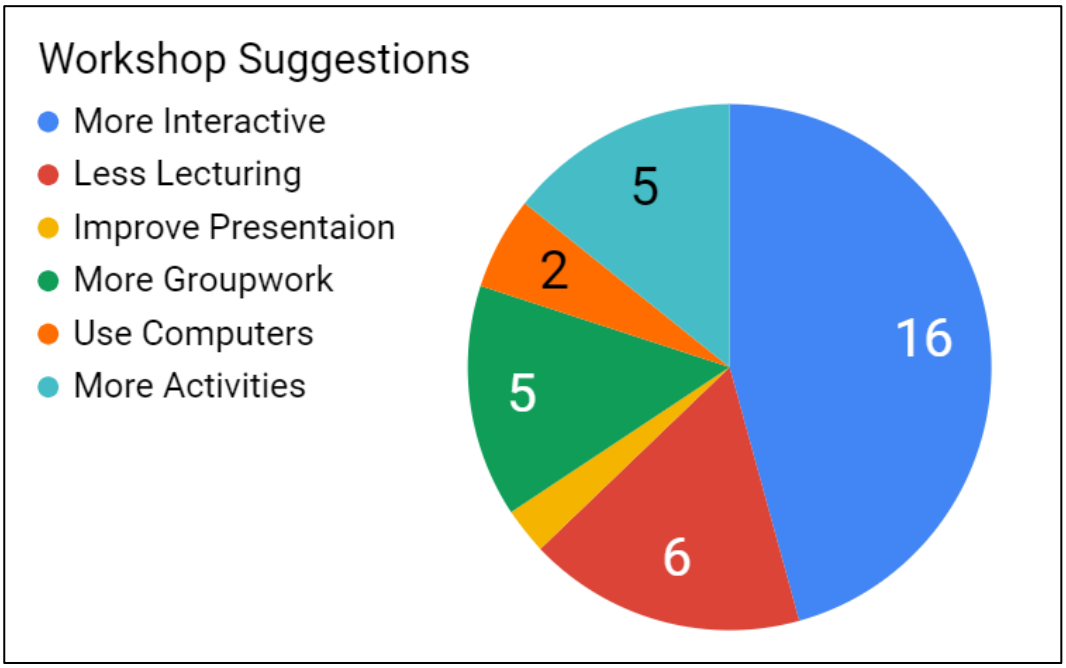

Figure 12. Pupils Suggestions for the GIS Workshop.

Upon review of team observations, while pupils did not enjoy the lecture component overall, they did enjoy when they were allowed to go up to the board and point out the answer to a prompt during the lecture. This aspect was engaging and allowed the other pupils and the pupil at the board to physically show that they had understood and retained the information taught to them. The pupils appeared more engaged in the alien invasion activity that explored how to use a map to determine the feasibility of locations as opposed to the housing development activity that was strongly word-based and focused on how to determine the best locations for building new structures.

5.4 Food Security Workshop Review

After a thorough review, the Food Security workshop was largely successful. Through observations, it was noted that pupils were engaged for the duration of the workshop. Based on the reviews received on the exit surveys, it was viewed as the second most popular workshop, but was also a close contender for the most popular. After analyzing the surveys the pupils where given after completing this session, the overall response of the workshop was positive (Figure 13). During the first portion of the session, where the pupils answered quiz-like

Figure 13. Food Security Workshop Satisfaction.

questions on a piece of paper, the pupils seemed excited for what was to come. The facilitators from UP did a satisfactory job at making sure the pupils stayed focused and participated in the quiz. They would walk around the room and ask questions to the pupils to guide them to the correct answer. Similarly if they noticed that a pupil was consistently getting the answers correct, they would mention it to the room, increasing the sense of competition. This encouraged the pupils to speak up and contribute more to the session.

Once the quiz component was completed, the workshop shifted into the farming activity. At first, a few of the pupils where confused on the instructions, but once the game began, all confusion was relieved. Pupils found it enjoyable to select which crops they wanted to plant for the year. Initial observations noted that the pupils would just randomly select crops, but towards the end of the activity, it was clear that they were learning through the process and as a result selected the options based on reasoning. Towards the end of the event, pupils were each given a chance card. The chance cards had different values, some cards added additional crops, such as the working well card. Others made pupils lose crops, like the swarm of locust card. The pupils who had beneficial cards where quite content with the events that took place, while pupils who had negative chance cards were upset. The pupils who lost crops due to chance asked the facilitators why they lost crops and this turned into arguably the best teaching point of the workshop. The crop yields and chance cards where not arbitrarily made values, rather, these were all based on the work UP has done in the past as well as research published by Oxford. This resonated deeply with the pupils once they heard that Oxford research backed this seemingly made-up game.

The majority of the negative opinions expressed on the surveys said that the farming game was too long, and they would have liked to complete two shorter activities instead (Figure 14). While this would have been a good change, it would also have presented a logistical challenge. Having two shorter activities instead of the one longer one would have resulted in less depth of knowledge in the workshop, and being that each workshop was only allotted 75 minutes, starting and stopping different complex activities would have wasted valuable time. The breakdown of the favorite aspects of the workshop can be seen in Figure 15.

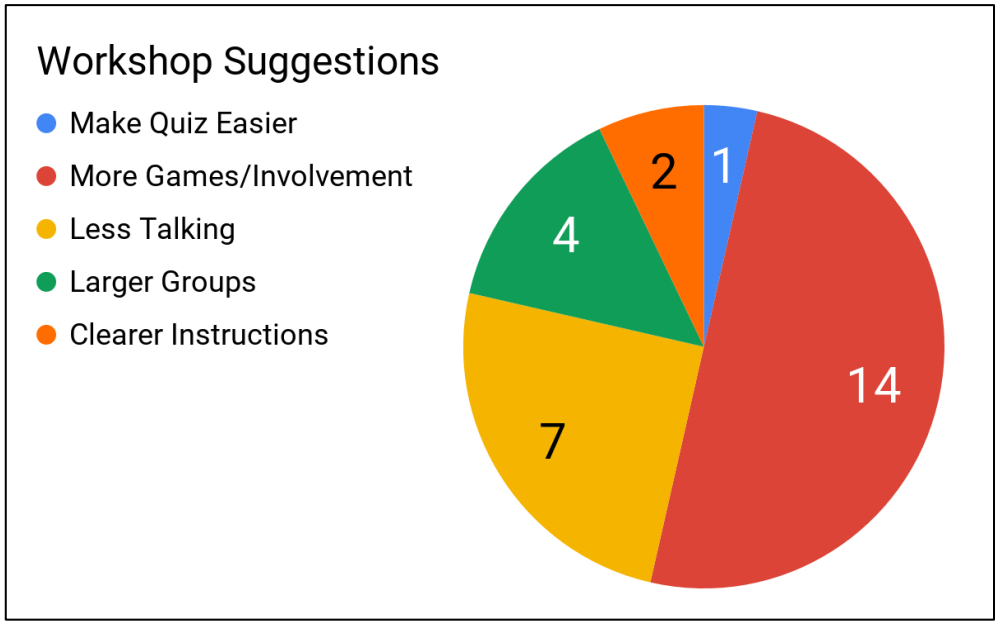

Figure 15. Pupils Suggestions for the Food Security Workshop.

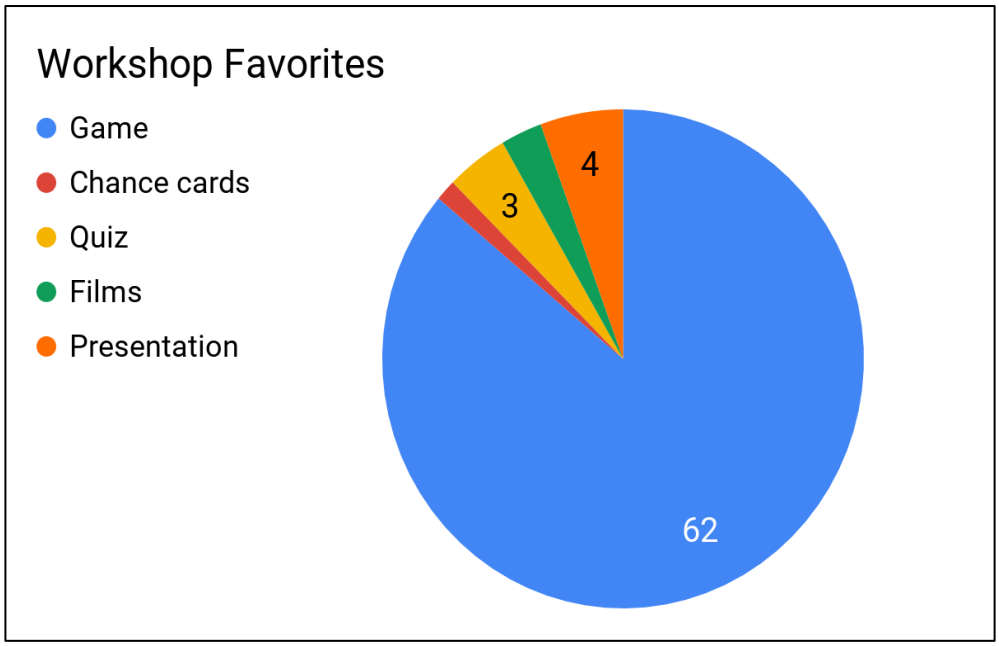

Figure 14. Pupils Favorite Aspect of the Food Securities Workshop.

5.5 Sustainable Cities Workshop Review

The Sustainable Cities workshop was undoubtedly the most popular of the three workshops at the conference (Figure 16). There are several factors that contributed to this, one being the number of facilitators present. This workshop had five facilitators, more than any

other of the workshops. This allowed for a high amount of interaction between the individual pupils and the facilitating staff. During the times when the pupils were left to work on their

Figure 16. Sustainable Cities Workshop Satisfaction.

own, the facilitators did not simply stand idly and wait for them to finish, they moved about the classroom, talked with as many groups as they were able, and helped to keep the pupils focused. The number of facilitators also meant that when the pupil groups broke up at the start of the workshop to learn about the various facets of running a city, each facet was presented rather than simply left to the pupils to read off a fact sheet. This not only allowed the pupils to ask clarifying questions, but made sure they were actually relayed the information needed to complete the workshop successfully, rather than just skimming a handout and not as fully retaining the material. The fact that the facilitators were students training to be secondary school geography teachers was also of no small importance. They were not only very knowledgeable on geographical material, but also how to present it in a manner that was easily understood by the pupils, but interesting and engaging as well.

Another factor which was essential to the success of the Sustainable Cities workshop was the nature of the activity (Figure 17). Letting the pupils name their cities and take ownership of them encouraged more thought-out design, as the activity stopped becoming something they were simply being told to do and became something they had created themselves. The large groups this workshop was divided into also increased the likelihood of differing opinions on the priorities for a given city. This in turn increased discussion as pupils were responsible for providing their peers with a rationale for their disagreements.

A final factor which led to the workshop's popularity was the inclusion of the news flashes. These not only kept things interesting, but had potentially disastrous, long term effects on the fictitious cities. This, combined with the fact that the workshop ended with a vote for the best city, meant that the pupils thought critically about their reactions to the news flashes,

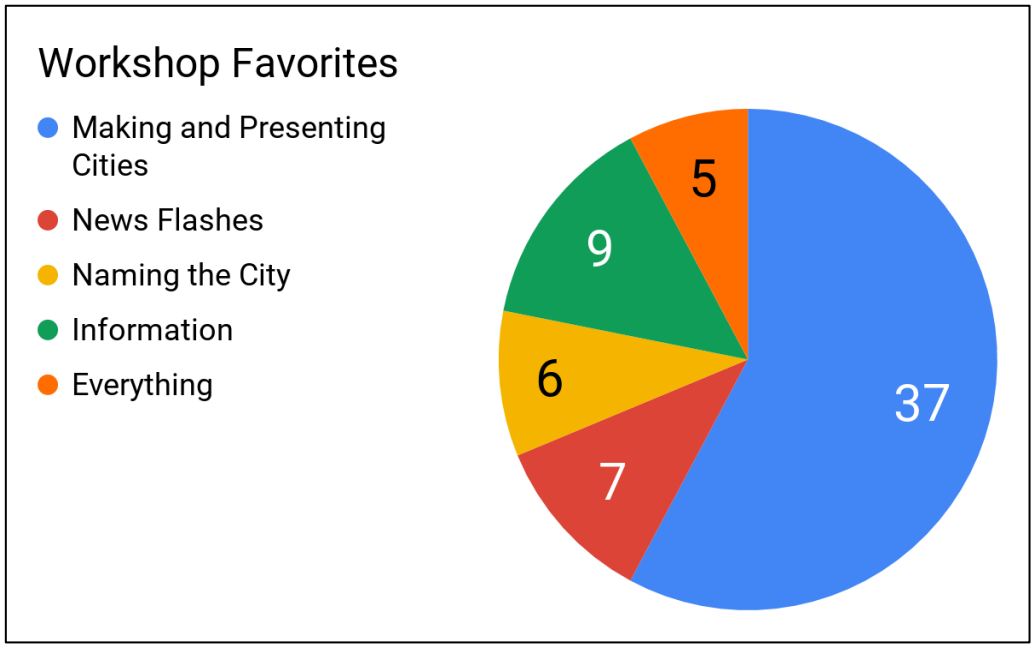

Figure 17. Pupils Favorite Aspect of the Sustainable Cities Workshop.

rather than going with their first instinctive reactions. They wanted to not only protect the city they had worked hard to create, but also work towards gaining every advantage possible when it came time for their peers to vote which city was best. These news flashes proved to be so popular that the only complaint students had about this workshop was that they would have liked more of them (Figure 18).

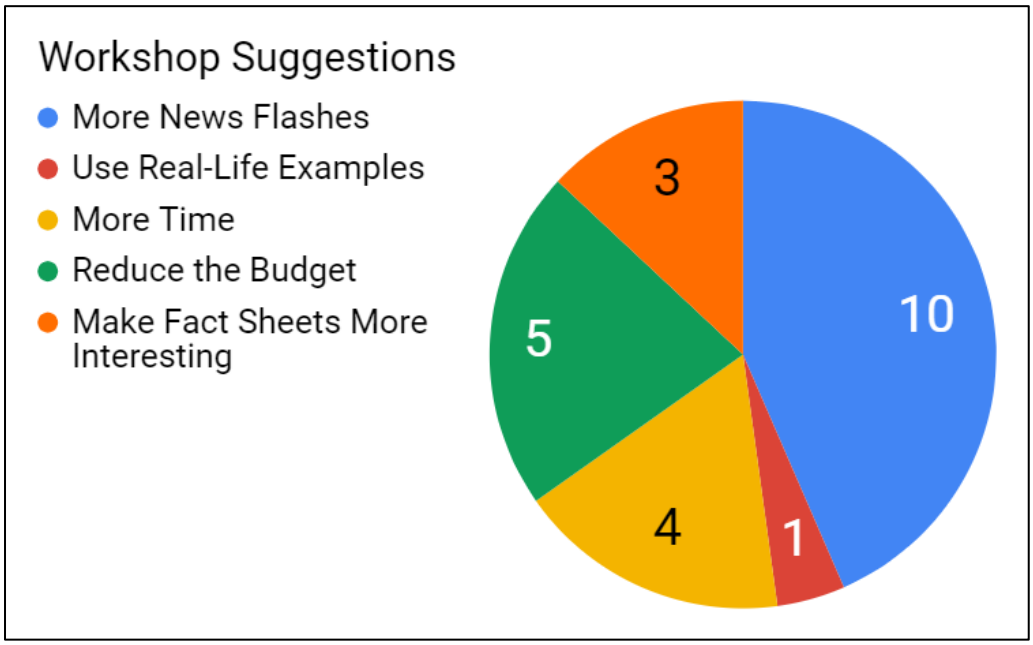

Figure 18. Pupils Suggestions for the Sustainable Cities Workshop

5.6 Woo Bikes and Unlocking the Severn

The special activities the pupils were offered outside of the scheduled workshops were also uniquely successful. Neither of the activities were able to accommodate the entire population of the conference (Figure 19). The Woo Bikes electric bike trial run was one of the most popular sessions at the event, having reached 54% of conference attendees. In general, the pupils enjoyed riding the bikes and it was one of the most common activities that received positive mention on the general survey. Almost every pupil who participated rated the activity highly. Additionally, a few of the sustainability pledges that were made on the idea tree were related to Woo Bikes and sustainable transportation. For Unlocking the Severn, responses were also highly positive with 48% of conference attendees participating. The activity provided pupils with information on caring for life under water as well as collected data on volunteering and social media preferences. Pupils expressed positive reactions to this activity, although unlike Woo Bikes, it was not mentioned in the general survey.

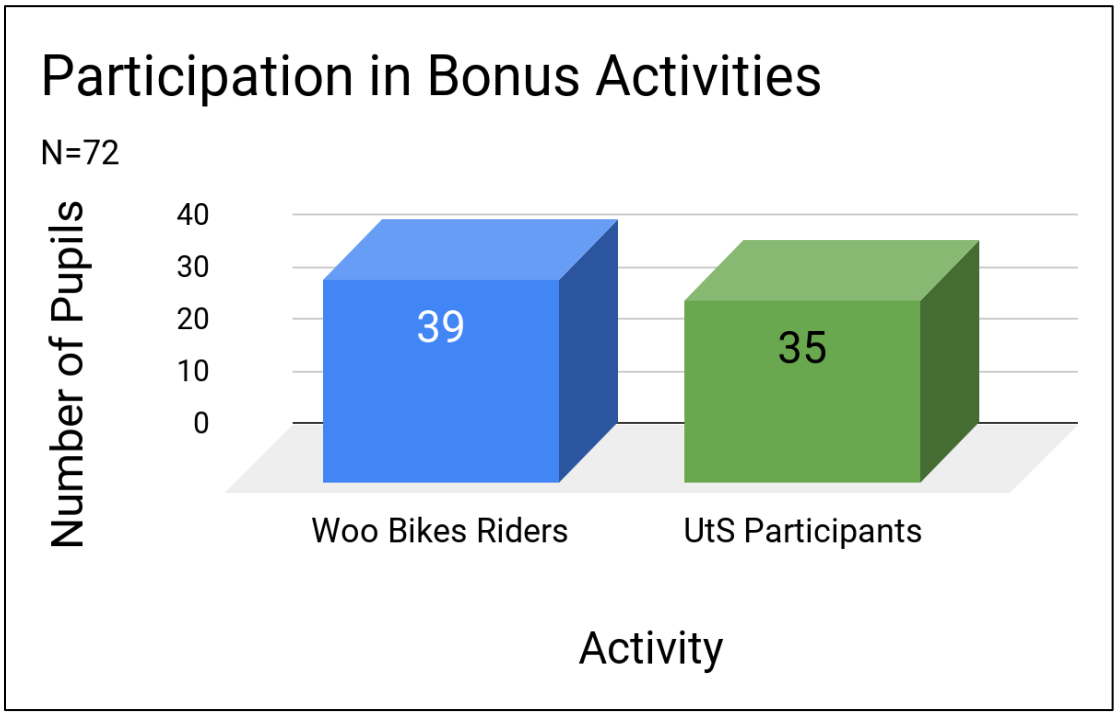

Figure 19. Pupils Participation in Bonus Activities.

5.7 Analysis of Closing Remarks

The closing ceremony consisted of an iteration of the idea tree, as well as closing remarks given by Elena Lengthorn from the University of Worcester. Upon observation, there was an increased enthusiasm among the pupils to complete their leaves in comparison to the reactions to the activity in the first rendition. Pupils were more receptive to the instructions, and in turn the team received focused and detailed responses. In contrast to the opening ceremony, where it was found that many pupils did not know what sustainability meant, many of the responses during the closing ceremony had a newfound understanding of the term that the pupils gained throughout the conference. A word cloud can be seen below with the most common phrases gathered from the responses (Figure 20). There were significantly fewer miscellaneous responses than the morning iteration, and the majority of responses proved to be positive. Fifteen pupils shared their newfound understanding of what sustainability is, incorporating aspects that they learned in the workshops. There were also three responses that acknowledged the SDGs and their importance regarding the future. The pupils were also prompted to share a sustainability pledge if they felt inclined, along with what they learned about the conference. As a result, there were eleven sustainability pledges that expanded from reducing energy usage to spreading the word about some of the sustainable concepts shared during the day. Based off of the collected data, the team determined that the overall success of the conference was positive and met the major goals. Pupils learned new information that can be applied to their GCSE exams and also collected a newfound understanding of the concept of sustainability. This is supported through the idea tree responses, which displayed not only an understanding of sustainability, but also that the pupils were willing to take what they learned during the conference and apply it to their personal lives.

Figure 20. Closing Ceremony Idea Tree Word Cloud.

5.8 Final Evaluations

The general survey sought to glean the pupils' feelings regarding the areas of the conference not covered by the workshop evaluations, such as the opening session and bonus activities, the specific questions asked can be found in Appendix J. One of the open responses asked for the pupils' favorite aspect of the conference as well as what their biggest takeaway was. This survey was crucial in that it expressed whether or not the pupils thought the conference overall was a cohesive and enjoyable event, regardless of their varying opinions of the individual workshops. Holistically, the pupils had a very positive view of the conference, in particular the bonus content, see Figure 21. This evaluation also provided a numerical count of how many pupils participated in the additional activities, which proved to be roughly half of the attendees.

Conference Activities Satisfaction Scale of 1-5, with 1 Being Positive and 5 Being Negative	
Opening Remarks	2.134
Opening Activities	1.867
Break Activities	1.774
Unlocking the Severn	1.945
WooBikes	1.256

Figure 21. Pupil Response to Non-Workshop Conference Aspects.

Chapter 6: Conclusion and Recommendations

6.1 Conclusion

This project expanded upon the established Skills for Tomorrow conference, created through the Department of Sustainability at the University of Worcester. Previous iterations of the conference were centered around STEM and corresponding careers while this project was focused on exploring sustainability through geography. The new conference was also introduced in Hereford instead of Worcester, in an effort to reach a new audience. The overall goal of the conference was to assist in preparing pupils for their geography GCSE exams while also introducing and reinforcing sustainable concepts that can be applied to both their local communities and the world as a whole.

The process of planning and facilitating this event was made possible by the support of many contributors. The University of Worcester provided a foundation the team could build upon, through the provisions of past conference materials and professional contacts. The team received facility, logistical, and publicity support that worked to propel the planning process given the short amount of time. The team observed that the synergy that resulted among the workshop facilitators and break time activities was due to the common focus and regard for sustainability. All the participating organizations contributed to the conference in hopes of creating a substantial impact among the pupils. The workshops were geared towards providing pupils with real-life examples and encouraged critical thinking and decision-making. It was found that pupils reacted positively to interactive activities, in which they were able to gain hands-on experience. Lecture-style components were less appreciated, although valuable information was still obtained. Review of conference evaluations showed that overall, what

resonated the most to pupils was the information presented to them in the form of an activity, see Figure 22.

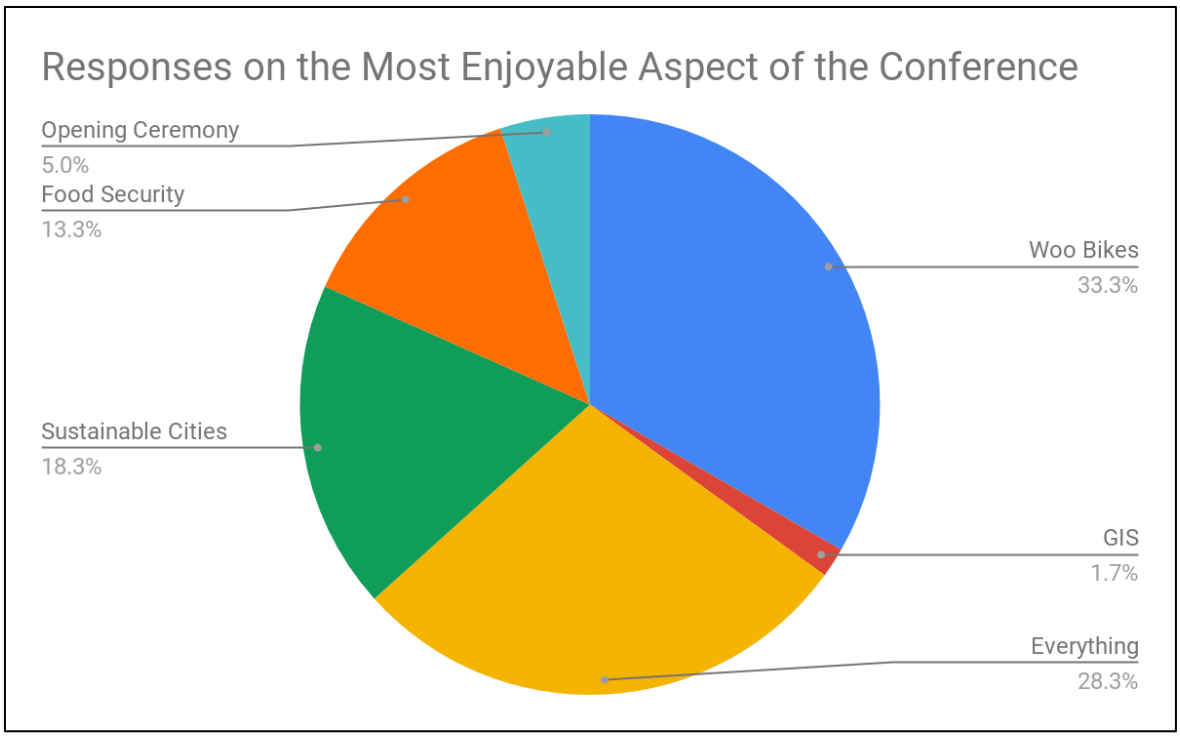

Figure 22. Pupils Most Enjoyable Aspect of the Conference.

The incorporation of break time activities proved to be successful, not only providing pupils with information on sustainable transport and life under water, but also fun activities that engaged the age group. The pupils that attended the conference were selected by teachers at both respective schools, and therefore there was some diversity in regards to age and level of experience. The team found that there was a range in the level of understanding of sustainability between the schools, therefore the separation of pupils by school proved to be a good decision as facilitators had more room to specialize the presented content. Through reviewing all forms of data, the team concluded that the conference was successful in serving as a positive experience for the pupils and meeting the pre-set goals. The major goals of the conference were to expose pupils to sustainability under geography, prepare them for the GCSE examination, and encourage the expansion of the concepts displayed throughout the conference

into their personal lives. The acknowledgement of these goals were observed through the free response results collected from pupils.

The success of this project was ultimately contingent on the impact it had on the pupils. While the team was able to measure the immediate impact, the lasting impact is something that can only be seen in future generations and through future projects. While this is not something that is viewable in the time span the project was given, future projects can be developed for longer term analysis. By making an impact on these younger generations, the world will continue to move in a healthier and more sustainable direction.

6.2 Recommendations

6.2.1 Reforming Evaluations

One of the recommendations the team has for future project groups is to create clearer instructions and provide sample answers or prompts on evaluations. The team had created two separate evaluation sheets, one that was distributed after each workshop and another that was distributed at the end of the conference and asked for opinions about specific conference characteristics as well as the event as a whole. On both evaluations, a common problem was the mis-reading of the Likert scale directions. Above the scales, the directions states that 1 was highly satisfied while 5 was highly dissatisfied, this was also said verbally whenever possible. Many pupils however, did not heed the directions and marked their responses with the mindset that 1 was on the dissatisfied end while 5 was on the satisfied end. The team then had to interpret whether open-ended responses were positive or negative and flip the scales accordingly to collect accurate data. As a result, it is recommended that future scales be flipped to make them more intuitive.

Regarding open-ended questions, the most common issue the team faced was one-worded or blank responses. Particularly, the question left blank most often was the one that asked pupils about their biggest takeaway from the conference. Upon review, this appeared to be an issue of formatting as the question was placed next to the Likert scale, separate from the other open-response questions. The intention of this setup was so that the question would stand out to the pupils more than the other questions. Unfortunately, this ended up having the opposite effect and the team would recommend that future groups place the most critical question first, and indicate its importance. Given that the age group was fairly young, the team also suggests providing pupils with either a prompt or sentence structure that can be used to promote more in depth responses. For example, indicating what information the question is trying to extract and providing large topics that pupils can then expand upon. It is also recommended that a fill-in sentence structure be provided, such as "Through the _____ workshop, I learned that _____ impacts_____." This provides a foundation for pupils and helps them think critically about their experiences.

6.2.2 Activity-Centered Workshops

Another recommendation should this project be recreated or a similar project undertaken, would be to structure the workshops to be almost entirely activity-focused. As the survey results showed, the pupils were most engaged when they were in a hands-on activity, either creating, designing, or making decisions. The most popular workshops at the event were the Sustainable Cities and Food Security workshops, and the reason for this, as cited by the students themselves, was the games these sessions incorporated. For example, the Sustainable Cities workshop was the most popular workshop. The pupils said how much they enjoyed the decision-making aspect involved in choosing the levels of service their city would provide and the spontaneity of the news flashes kept things interesting. Additionally, the pupils enjoyed

that the workshop was structured into a pseudo competition, with a vote deciding the winner. This served as a contrast to the GIS workshop, which was largely lecture-based and did not have much hands-on activities to illustrate its key points. Survey results showed this to be the least popular workshop at the event.

Additionally, the workshop activity should not be a stagnant event, it should be constantly changing in order to make things interesting and keep the pupils engaged. This was the main difference between the Food Security and Sustainable Cities workshop. In the case of the former, the activity consisted of four rounds. While there was a chance card aspect of the game, it largely consisted of the same process being done over and over four times. This meant that the pupils were very interested during round one, but lost interest over time. This was not the case with the Sustainable Cities workshop. The news flashes were different each time, thus they remained interested throughout the entire session. The most interesting and effective workshop sessions consisted of hands-on and interactive activities that constantly introduce other variables.

6.2.3 Confirmation of Logistical Information

A further recommendation the team has is to solidify every logistical detail well in advance. As previously stated, the conference had two schools in attendance, so there was not a great deal of difficulties in reaching an appropriate amount of attendees. THA alone had pledged to have 60 pupils attend. This was fantastic news, and the team promptly inquired about receiving a list of the names of the pupils who would be attending. This was desired in order to have each pupil's individual folder labelled in advance, which would streamline morning admissions. The contact at THA worked on putting together the list and getting it into the hands of the team, but there was an unexpected difficulty. It was brought to the team's attention that pupils who were in year ten, from THA, would have to leave early and miss a

portion of the third workshop. The team was able to cope with this, but this issue further complicated the student roster. Ultimately the list of pupils who would be attending from THA was not finalized the morning of the conference. This was by no means ideal, and the team highly recommends that the list of pupils in attendance be finalized well in advance to allow for adequate time to prepare materials. This issue only came up with THA, the administration from EMC needed to have a finalized list of pupils as they were leaving their school for the day, and needed to fill out appropriate paperwork. This helped the team as they knew well in advance who would be attending from EMC.

Additionally, during the team's second week in the UK, they visited THA for the first time and were met with the pleasant surprise that administrators at the school had allocated them four classrooms, and the auditorium for the entire day. The team utilized three of the classrooms and had plans of using the extra room as a backup for Woo Bikes in case of poor weather. During the team's fifth week on site, they were informed that the school needed to use the auditorium during the afternoon for a GCSE prep activity. THA gave the team ample time in advance to cope with this, and was not an issue; closing activities could be moved to the cafeteria. The team ran into a bigger issue during the day of the conference when they were informed that another teacher from THA booked the auditorium from 8:00 AM to 9:00 AM. Administrators from THA approved the use of the room for that time without first checking to see if it was already being occupied. This was a sizable inconvenience, but the team worked around it and started the first half of the morning activity in the cafeteria, then transitioning to the auditorium to watch a video on the SDGs. With quick thinking and an active support network on the day of the conference, the team was able to persevere and have a smoothly run morning. To any future group who is planning a similar conference, it is advisable to ensure with venue administrative staff that the venue is reserved for the desired day, and will not and cannot be booked for use by another group.

6.2.4 Better Suited Classrooms

The classrooms used for the conference had to meet several of criteria. Firstly they had to be close to one another. The longer the transit distance between each workshop, greater the likelihood the pupils, many of which were not familiar with THA's layout, could become lost. Also the rooms had to be close to the auditorium and the cafeteria, where the opening and closing remarks took place respectively. Finally and perhaps most obviously, the rooms could not have classes in them at the times of the workshops.

For the most part, the three rooms that met all these requirements were satisfactory. Two of the rooms were music rooms, but the piano keyboards laid out there were simply stowed away before the pupils arrived, leaving only empty tables and chairs. The room which presented a problem was that which held the GIS workshop. The pupils from THA had login credentials and some pupils made use of the computers during the session, distracting them from the workshop content. Teachers were present, and disciplined any pupils caught using the computers, but there simply were not enough faculty present to keep an effective watch. What would be recommended for future conferences however, is to ensure the venue has rooms appropriate for all of the workshops. If this ideal scenario is not the case, it is recommended the computers be rendered unusable before the onset of the conference. A different alternative would be to utilize the computers in a manner by which pupils could use them to learn more about the content. This would have involved developing an in-depth lesson plan for the pupils based on the computer system and software that the team was not familiar with. Given the short time frame the team had to organize the conference, creating and facilitating this workshop would have not been feasible. In the future, utilizing the technology is recommended if appropriate rooms cannot be found.

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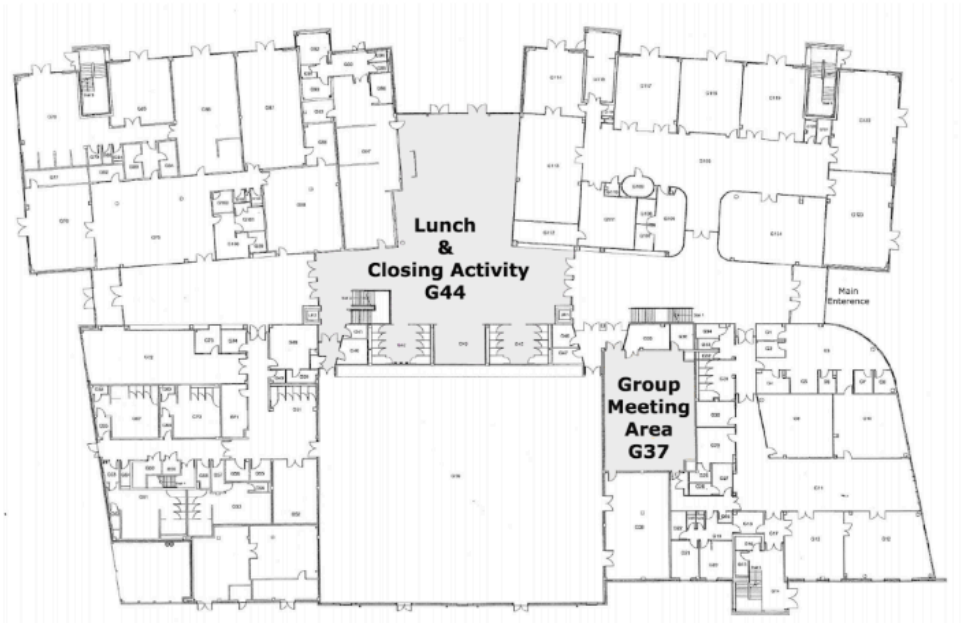
Appendices

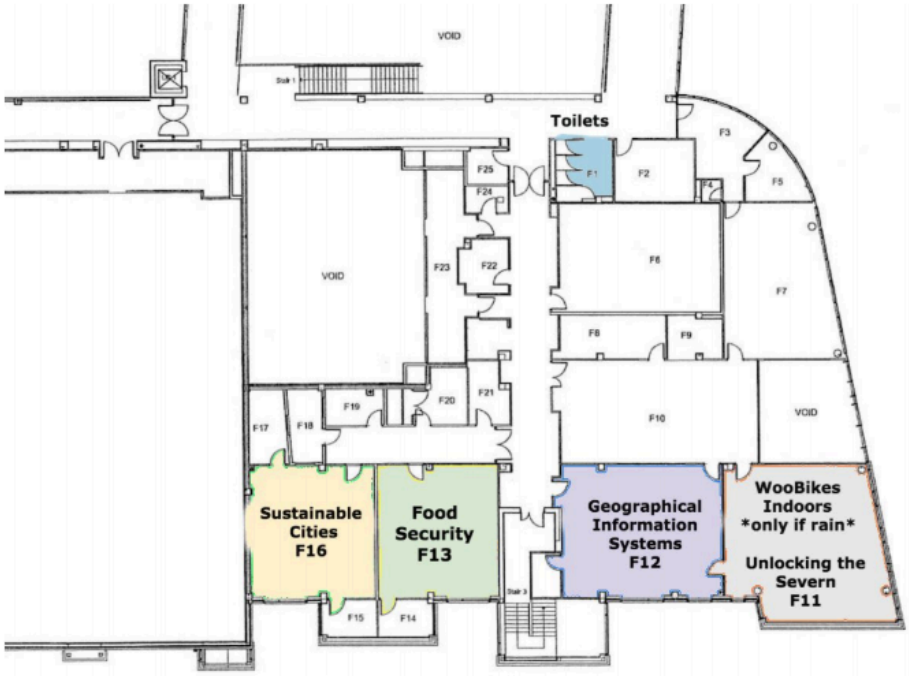
Appendix A: Labeled Map of The Hereford Academy

Map

First Floor



Second Floor



Appendix B: Skills for Tomorrow Invitational Flyer

THE HEREFORD ACADEMY
MARLBORO ROAD
HEREFORD, HR2 7NG

SPECIAL FEATURE;
TEST OUT AN E-BIKE!

PERMISSION SLIP MUST BE FILLED OUT BY A PARENT/GUARDIAN AND BROUGHT IN ON DAY OF CONFERENCE

LUNCH PROVIDED ONLY FOR STAFF AND GUESTS

PUPILS ARE EXPECTED TO BRING A PACKED LUNCH

skillsfortomorrow

JOIN US AT THE SKILLS FOR TOMORROW CONFERENCE TO PARTICIPATE IN INTERACTIVE ACTIVITIES TO FURTHER YOUR UNDERSTANDING IN GEOGRAPHY AND PREPARE FOR THE GCSE

WORKSHOP TOPICS
FOOD SECURITY
GEOGRAPHICAL INFORMATION SYSTEMS
SUSTAINABLE CITIES

SCHEDULE

9.00AM	ARRIVAL
9.15AM	OPENING REMARKS
9.30-11.45AM	WORKSHOP 1
10.45-11.00AM	BREAK
11.00-12.15PM	WORKSHOP 2
12.15-12.45PM	LUNCH
12.45-14.00PM	WORKSHOP 3
14.00-14.30PM	CLOSING ACTIVITY
14.30PM	END OF EVENT

*SCHEDULE SUBJECTED TO CHANGE

FRIDAY 30TH NOVEMBER

Appendix C: Unlocking the Severn Case Study

CASE STUDY: Unlocking the Severn

Background

In the seventeenth century, the Severn River was an important waterway for trade (Willan, 1937, 68). During this time, the Severn River was considered a "free river" (Evans, 1988, 384). This meant that locks, weirs, and any other man-made interruptions, as well as tolls for using the river, were illegal (Evans, 1988, 384). In the mid-nineteenth century, Parliament passed several acts allowing the construction of locks and weirs on the Severn, effectively canalising the river. (Willan, 1937, 68) The acts were passed primarily to prevent the flooding and erosion of the Severn River Valley. Allowing the construction of these locks and weirs also made it easier for larger ships to navigate up and down the river (Evans, 1988, 386). The construction of these barriers have since made it difficult for fish, like the shad, to migrate up the river. A picture of a weir can be seen above.

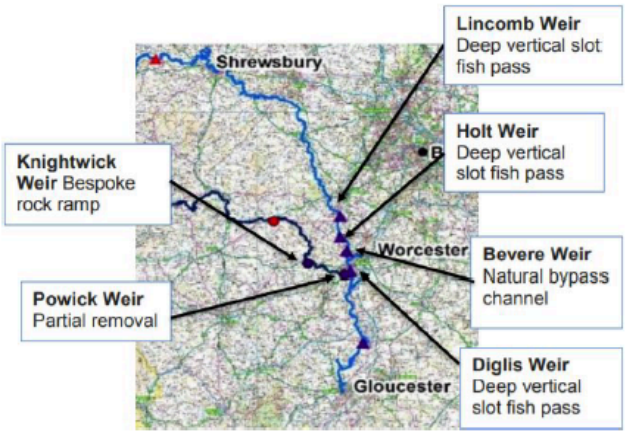
The Severn Rivers Trust (SRT) is a non-profit environmental charity that promotes the preservation of the waterways to ensure the health of marine ecosystems. The SRT is currently working with the Canal & River Trust (CRT), the Environment Agency, and Natural England to reopen the river to migrating fish and to increase community awareness of the twaite shad. They have received £20,000,000 in funding from the European Union LIFE Nature Programme and heritage Lottery Fund to complete this project.

Problem

The twaite shad is a small fish that lives along the west coast of Europe. One of four remaining rivers known to provide spawning grounds for the twaite shad in Britain is the Severn River (Maitland, 2003, p. 10). This is also the longest river in the UK, spanning 220 miles from the Welsh Cambrian Mountains to the British Channel. The population of the shad has decreased

over the last century, leading to their UK BAP Priority status. This means it is a threatened species requiring conservative action under the UK Biodiversity Action Plan (Maitland, 2003, p. 10). The decline of the species is largely due to the construction of obstacles, such as weirs, which interfere with the migratory pattern of the fish. This prevents the species from travelling up river to find a suitable place to spawn.

Solution



The Unlocking the Severn project will be doing work on six weirs along the Severn River and its tributaries. This will reopen 158 miles of river to migrating fish. These construction projects will all be slightly different, depending on the water flow conditions and area surrounding the weir. A map of weirs on the Severn River can be seen to the right. This work will allow for many species of fish that live in the Severn River to once again spawn to their full potential.

In June, 2018, at the Powick Weir on the River Teme, The UK Environment Agency began lowering the central sections of the weir to facilitate shad migration upstream. According to the UK government,

> "The existing salmon fish pass will be removed and public safety improved by placing locally sourced rock from the remaining concrete abutment at a gentle slope towards the center of the river, removing the existing height between the abutment and the water. There will be a naturalized rocky bed with a low flow channel to ensure a section of water is at the right depth and velocity to best assist the twaite shad migration upstream." (Environment Agency, 2018).

However, this method of just simply removing weirs is not the only way planned to help the migration of the shad.

The Bevere Weir will have a natural bypass channel installed starting in 2019. According to the Severn Rivers Trust (SRT), three more weirs at Diglis, Holt, and Lincomb will have fish passes put into place by the summer of 2021. The fish pass at Diglis will also have a viewing chamber, an area where people can go to watch the fish migrate. These three are classified as deep vertical slot fish passes. Vertical slot fish passes are generally sloped channels usually made of concrete that attract migrating shad with slow currents of water. The shad enters the channel through vertical slots which also create small pools of water for fish to rest. Gradually, the shad pass through more slots and more pools until they eventually pass the weir, thus allowing them to continue their migration (Environment Agency, 2010).

Challenges and Future Possibilities

One of the main challenges facing the many groups working together on this project is people who are opposed to removing weirs. This group is largely comprised of Anglers who like to fish near the weirs. There are also people who believe the weirs are historical landmarks and should be preserved. As the project progresses, it is doubtful these issues will still arise. Only one weir was reported to be fully removed, and as a compromise it was only partially removed. This removal created a channel for fish to swim through to bypass the weir in all water flow conditions, but maintained some of the historical value of the weir.

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Appendix D: Woo Bikes Case Study

CASE STUDY: WooBikes

Background

The average person elects to travel on foot for trips that are under one mile. For longer journeys, automobiles are by far the most popular mode of transportation. In fact, more than half of car trips are less than 5 miles long. The primary situation in which car trips persist longer than 5 miles is when they involve motorways or other high throughput thoroughfares (Department for Transportation, 2017).

With so many people traveling by car, however, traffic becomes inevitable as the sheer volume of vehicles becomes more than a motorway can handle. The worst instances of traffic occur during the rush hour in the morning and evening when people commute from their homes to their jobs and vice versa. Rush hour traffic is not only a frustrating inconvenience for the working person, but represents a significant waste of gasoline and in turn a sizable source of harmful emissions, as cars continually burn fuel to keep the engine running despite barely moving. When this effect is magnified over an entire motorway full of vehicles, twice a day, 5 days a week, the impact on the environment and personal finances becomes impossible to neglect.

The Problem

People regularly use cars for relatively short commutes where bikes could be a viable alternative. Cars are problematic in that they produce emissions which have negative effects on

the atmosphere and serve as an expedient for climate change, not to mention how detrimental they are to human respiratory health. Additionally, an excessive amount of transit via cars leads to traffic which wastes the time and patience of drivers and squanders fuel.

The Solution

Bikes shares offer a great solution to the above problem. Bikes share programs are cheap and convenient. Riding a bike not only reduces your carbon footprint, but the activity also helps your health. Riding a bike is an excellent exercise because it has comparable cardiovascular benefits to running or jogging, but is low impact and presents a greatly reduced risk of chronic joint damage (National Health Service, 2016). What makes bike shares more appealing than simply purchasing a bicycle is the fact that it not only cheaper up front, but also frees the user of having to worry about maintenance or repairs.

Source:https://www.worcester.ac.uk/content_images/logo(1)_rdax_557x271.jpg

Furthermore, bike shares eliminate cars from the roads and motorways, relieving rush hour congestion and cutting down on the waste associated with it. This is a particularly important point in Worcester specifically, which is home to the 3rd worst rush hour traffic in the whole of the United Kingdom (Connell, 2014). Operating a bike gives the rider the opportunity to not only use biking pathways inaccessible to cars but also weave between cars stuck in traffic. Avoiding the traffic all together through footpaths also allows bikers to breathe air free from exhaust fumes, which promotes respiratory health.

Challenges and Future Possibilities

One of the main challenge facing bike shares today is that they are not profitable. Bike shares, run at a loss of profit in order to give their users an affordable bike to ride, while trying to

minimize their own losses. This is currently the problem affecting bike shares, but in the future, this ideally will no longer be the issue plaguing the programs. By 2040, "the sale of new conventional petrol and diesel cars and vans" will cease in the UK (Department for Environment Food & Rural Affairs, 2017). This will force consumers looking to purchase a gas vehicle to consider other options such as using a bike share or purchasing an electric vehicle.

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Appendix E: Rio de Janeiro Sustainability Case Study

CASE STUDY: Sustainability in a Newly Emerging Economy – Rio de Janeiro

Background

Rio de Janeiro is a large city on the southern coast of Brazil. It is home to 6.3 million people and is the capital of second wealthiest Brazilian state. The city is a hub for tourism, as it's the home the the Christ the Redeemer statue and the popular Carnival festival, as well as a recent site of the Olympic Games. Brazil's economy as a whole is rapidly growing, beating out countries like Canada and Australia in recent years and seeing an average foreign investment of £23 billion per year (Brazilian Government 2005).

The Problem

Rio is not without its problems however, one of the most prominent being favelas, which are a kind of slum. There are about 1,000 favelas in Rio, tightly packed settlements often built on steep hills. Favelas have narrow streets, which makes transportation a challenge, as well as poor sanitary conditions, such as open sewage drains and a lack of formal waste collection. On top of this, access to electricity and clean water are extremely limited in these areas (Wallenfeldt 2016). Crime rates are also very high in favelas, and in the past the Brazilian government has sent the army into Rio in an attempt to clear out the gangs and cartels present there (Woody 2018).

The Solution

The city of Rio has undertaken numerous different solutions to combat these rising problems. In an effort to quell the transportation crysis, a project has been taken to build cable cars linking the Favelas and the city center. This will provide the residence with a cheaper and more sustainable mode of transportation when commuting (Wired 2011). Additionally, the city has invested in a bike share program and has created an infrastructure of more than 400 km of cycle paths connecting its residence. The hope is to promote cleaner transportation by its residents (Anonymous 2017). In regards to solving their sanitation issues, a welfare program was created to allow residents to exchange bags of rubbish for gallons of milk. The program aims to simultaneously reduce the cities sanitation problems as well as promote better nutrition among the Favela inhabitants. Finally, in a bid to fix the rampant crime problem, the city has started an exchange program to target the younger generation. The plan is similar to a gun buyback, but instead of buying real weapons the program allows children to exchange toy guns for comic books. Ideally, this will not only discourage violence but encourage reading and literacy (Logan 2015).

Challenges and Future Possibilities

Rio de Janeiro has a bright future ahead of it if it can successfully tackle the problems of its favelas and the crime associated with them. The more successful programs the Brazilian government has implemented to this end are the waste exchange program and the bike paths. The waste exchange program is both improving sanitary conditions by removing garbage from

favelas, as well as improving health by distributing nutritious milk, which is especially beneficial in areas where clean water isn't available. The bike paths relieve some of the congestion present on the streets of favelas and also provide a means for people to commute from to Rio's center, where the offices and factories are. The community engagement program that provides books in exchange for guns hasn't been as effective as was hoped. Crime is still very high in Rio and shows no signs of slowing its growth. The cable car program has also been halted, as there was strong opposition from the locals who believed the project was a waste of money that could be used to improve security or build sewers instead (Richardson 2017).

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Appendix F: Woo Bikes Fact Sheet

100

Bike Fleet

50

Pedal Bikes

50

e-bikes

45

pounds for annual membership

30

miles per battery

15

miles per hour

24

hour rental of e-bikes

7

day rental for pedal bikes

BIKE SHARE PROGRAM at the UNIVERSITY OF WORCESTER

FACT SHEET

skillsfortomorrow

Appendix G: Unlocking the Severn Fact Sheet

UNLOCKING THE SEVERN

FACT SHEET

A COLLABORATIVE PROJECT BY

Canal & River Trust
Making life better by water

Severn Rivers Trust

NATURAL ENGLAND

Environment Agency

FUNDED BY

heritage lottery fund
LOTTERY FUNDED

Life

NATURA 2000

Unlocking the Severn for LIFE
LIFE15 NAT UK 000219 / HG-15-04573

skillsfortomorrow

20,000,000
£ funding the project

12,000
shad on average reach Worcestershire but are blocked from going further

158
miles of the river habitat will be opened for migrating fish

15
protected fish species

6
major barriers will be modified to let migrating fish pass

3
years to Unlock the Severn

Appendix H: Introductory Speaker Checklist

Introductory Speaker Checklist

This checklist will be used to evaluate potential introductory speakers for the Skills for Tomorrow Conference by assessing the candidates in concurrence with the stated criteria. The candidates will be made aware of the checklist as a tool of assessment and note-taking. Verbal consent will not be asked as none of the information recorded will be reproduced in final reports nor the conference itself. The information will only be used for the reference of the WPI Skills for Tomorrow student group.

- ☐ Available on November 30th (Exact time to be determined, morning given preference)
- ☐ Sufficient knowledge and experience in sustainable practices
- ☐ Credible
- ☐ Flexible

Based on background research and interactions, do they appear to have the ability to be engaging to the target audience?

Are they dedicated to putting sufficient effort into their presentation?

Additional Notes:

Appendix I: Workshop Evaluation Survey

skillsfortomorrow

Thank you for taking our workshop evaluation survey.
We are conducting this survey as part of our research project to create a sustainability conference for secondary schools in Herefordshire, UK. Our findings and results for this research will be published by Worcester Polytechnic Institute. We are hoping to judge the effectiveness of the workshop you just participated in. This will most likely take between 5 and 10 minutes. Your name or personal information will not be collected or used in any way. Please know that this is entirely voluntary and you can stop, skip questions, or refuse to answer any question at any time. If you have any questions or concerns, please contact us at our group alias gr-skills-b18@wpi.edu.

On the chart below, rank these aspects of the conference from 1 to 5, 1 being highly satisfied and 5 highly dissatisfied.

	1	2	3	4	5
How informative did you find this workshop?					
How likely are you to take what you learned and apply it outside the classroom?					
How engaging did you find the facilitator?					
How did you enjoy the workshop as a whole?					

Which workshop did you just participate in?

- **Food Security**
- **Geographical Information Systems (GIS)**
- **Sustainable Cities**

What was your favorite part of the workshop?

What aspect of the workshop would you change?

What was your greatest takeaway from this workshop?

Do you have any suggestions for this workshop in the future?

Appendix J: Conference Exit Survey

Thank you for taking our general evaluation survey.
We are conducting this survey as part of our research project to create a sustainability conference for secondary schools in Herefordshire, UK. Our findings and results for this research will be published by Worcester Polytechnic Institute. We are hoping to judge the effectiveness of the workshop you just participated in. This will most likely take between 5 and 10 minutes. Your name or personal information will not be collected or used in any way. Please know that this is entirely voluntary and you can stop, skip questions, or refuse to answer any question at any time. If you have any questions or concerns, please contact us at our group alias gr-skills-b18@wpi.edu.

On the chart below, rank these aspects of the conference from 1 to 5, 1 being highly satisfied and 5 highly unsatisfied.

	1	2	3	4	5
Opening Remarks					
Opening Activities					
Break Activities					
Unlocking the Severn					
WooBikes					

What was your biggest takeaway from the Conference?

What aspect of the conference did you find most enjoyable?

What aspect of the conference would you change?

What would you suggest we add for future conferences?

Appendix K: List of Contacted Organizations

Be the Change - contacted about donating materials - negative response

British Cartography Organization - contacted about GIS workshop - received no response

Catapult: the Future of Cities - contacted about Sustainable Cities workshop - received no response

Cluster for Sustainable Cities - contacted about Sustainable Cities workshop - received no response

The Environmental Association for Universities and Colleges (EAUC) - contacted about Sustainable Cities - received no response

Health GIS - contacted about GIS workshop - received no response

Hereford Green Network (HGN) - contacted about Sustainable Cities workshop - received an offer but was declined

Geomentors - contacted about GIS workshop - received no response

Global Dimensions - contacted about GIS workshop - organization was shut down

Kinect Recruitment - contacted about GIS workshop - received no response

London Sustainability Exchange (LSX) - contacted about Sustainable Cities workshop- received no response

Love Food Hate Waste - contacted about donating materials - negative response

Lush - contacted about donating materials - positive response

Ordnance Survey (OS) - contacted about GIS workshop - confirmed to facilitate workshop

Oxfam - contacted about Sustainable Cities workshop - attempted to email and call but were

Appendix L: Sustainable Cities Focus Group Instructions

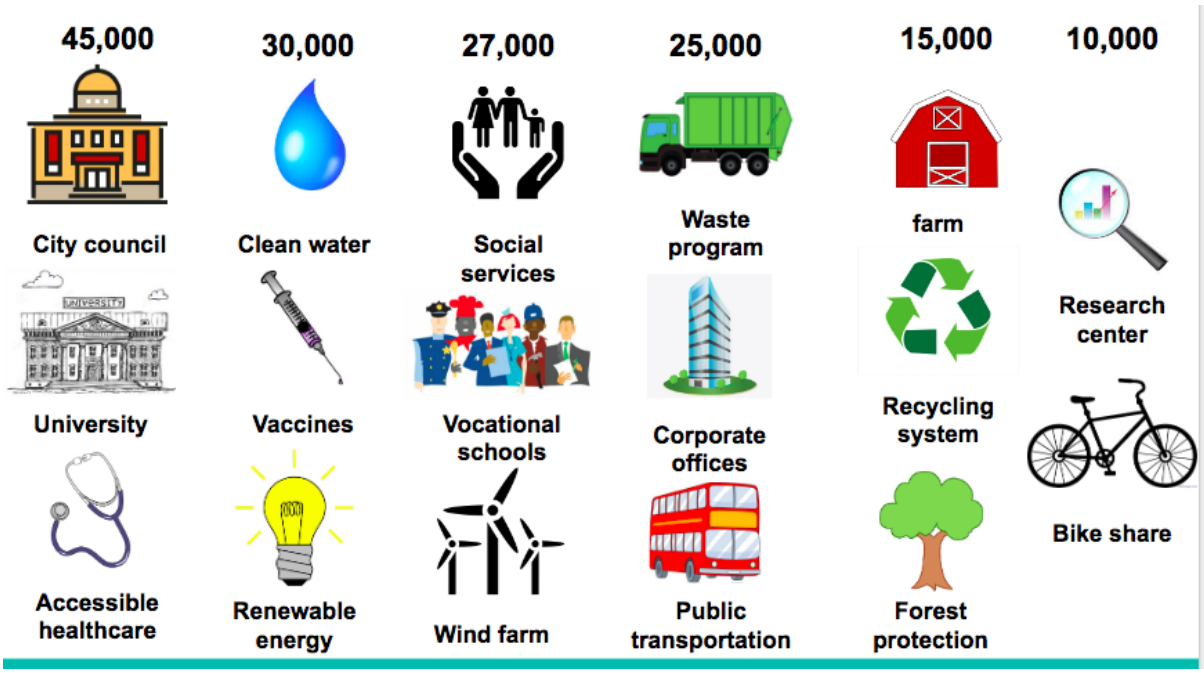
Activity: Sustainable Cities

- Get into groups of 3-4
- Take a sheet of paper and drawing tools
- You will have a designated amount of time to design your sustainable city
  - Based off the sustainable development goals and your prior knowledge
  - Can get as many of anything as like
- Constraints:
  - Time
  - Paper space
  - Resources
- Once time is up, the best city will be chosen!

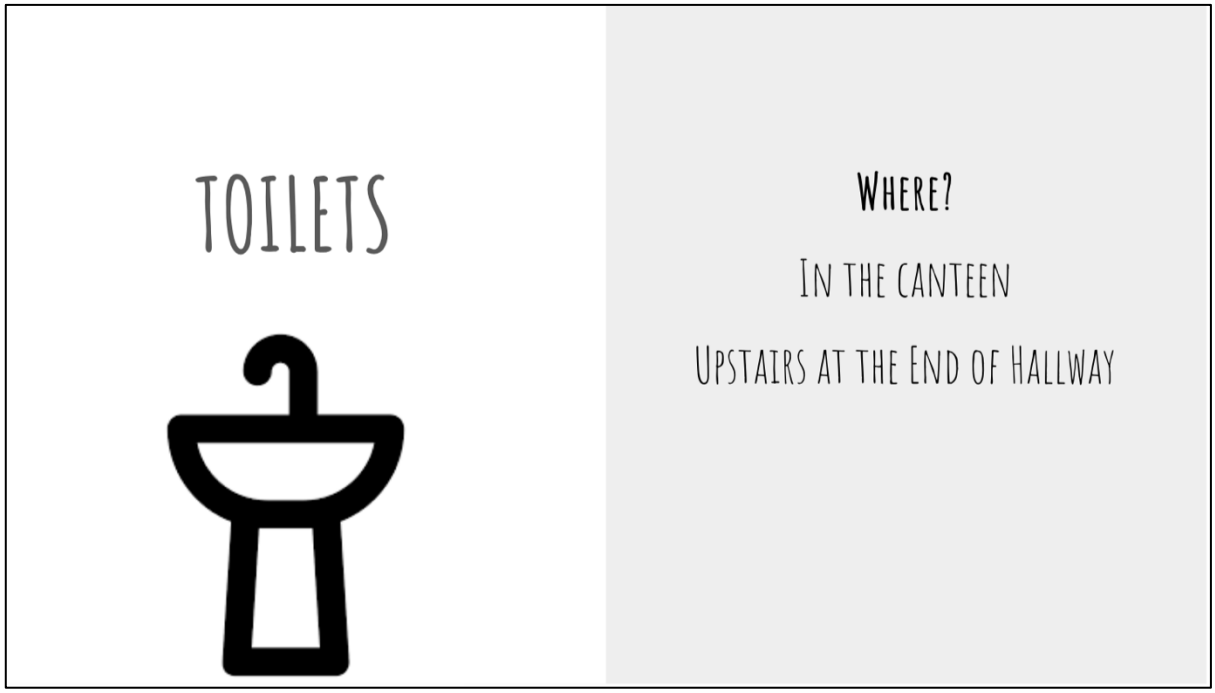
Specification:

Budget: 250,000
Population: 50,000
% under the poverty line: 7%
2 primary schools
2 secondary
1 college
2 rivers
1 lake

1 park
10 apartment complexes
1 local court
2 grocery stores
4 gas stations



Appendix M: Conference Morning Slide Show



Win a Prize!

Collect Raffle Tickets by:
Handing in your surveys
Trying out a woobike
Activity with unlocking the severn
Participation in the idea tree

Submit your tickets at designated stations

Idea Tree

Take a leaf
Please Write:

What does sustainability mean to you?

How do you feel about current sustainability efforts around the world?

Tack it onto the tree!
Do not write your name

Try out a WooBike!

Where?
Outside along the footpath (outside of the canteen)

When?
Available during any free time

What to remember!
Make sure to bring your permission slip with you

Interest Activity

UNLOCKING THE SEVERN

Where?
Room F11 (map in your folder)

When?
Available during any free time

Fun Facts!
Charity focused on protecting the UK's longest river