

## Worcester Polytechnic Institute Digital WPI

---

Interactive Qualifying Projects (All Years)

Interactive Qualifying Projects

---

March 2017

# Developing Adventures in Sustainable Urbanism's Web Site

Amile Zaaf

*Worcester Polytechnic Institute*

Benjamin Huchley

*Worcester Polytechnic Institute*

Patrick Malone

*Worcester Polytechnic Institute*

Follow this and additional works at: <https://digitalcommons.wpi.edu/iqp-all>

---

### Repository Citation

Zaaf, A., Huchley, B., & Malone, P. (2017). *Developing Adventures in Sustainable Urbanism's Web Site*. Retrieved from <https://digitalcommons.wpi.edu/iqp-all/3270>

This Unrestricted is brought to you for free and open access by the Interactive Qualifying Projects at Digital WPI. It has been accepted for inclusion in Interactive Qualifying Projects (All Years) by an authorized administrator of Digital WPI. For more information, please contact [digitalwpi@wpi.edu](mailto:digitalwpi@wpi.edu).

# **Developing Adventures in Sustainable Urbanism's Website**

An Interactive Qualifying Project  
submitted to the Faculty of  
WORCESTER POLYTECHNIC INSTITUTE  
in partial fulfilment of the requirements for the  
degree of Bachelor of Science

by  
Benjamin Huchley  
Amile Zaaf  
Patrick Malone

Date:  
5 March 2017

Report Submitted to:

Project Advisor:  
Professor Robert Krueger  
Worcester Polytechnic Institute

*This report represents work of WPI undergraduate students submitted to the faculty as evidence of a degree requirement. WPI routinely publishes these reports on its web site without editorial or peer review. For more information about the projects program at WPI, see <http://www.wpi.edu/Academics/Projects>.*

## **ABSTRACT**

We designed and built a portion of a website to accompany Adventures in Sustainable Urbanism, a book co-written by Robert Krueger (our advisor), Tim Freytag, and Samuel Mössner. Specifically, we had to design and partially implement the Field Trips section of the site. We looked into what the elements of good website design (especially educational website design) were, and from there created two examples of good field trips and a means for people to add their own field trips.

# TABLE OF CONTENTS

ABSTRACT.....	2
TABLE OF CONTENTS.....	3
CHAPTER 1: Introduction .....	4
CHAPTER 2: Literature review.....	5
Complexity and Coherence .....	6
Embedding a Map in the Page .....	7
Two-Dimensional Map .....	7
Three-Dimensional Map.....	7
Embedding Pictures and Videos.....	8
Displaying the Text .....	9
Summary.....	9
Our Design .....	9
CHAPTER 3: Methods .....	11
CHAPTER 4: Results.....	13
CHAPTER 5: Conclusion and Recommendations .....	15
Google Maps Integration.....	15
User-Uploaded Field Trip Form .....	15
Layout of the Text.....	16
Layout of the Images .....	16
Limitations .....	16
Final Conclusions .....	17
Recommendations.....	17
REFERENCES .....	18
APPENDIX A: Instructions on Using the Field Trip Template .....	20

## CHAPTER 1: INTRODUCTION

Adventures in Sustainable Urbanism is a book that deals with the history of sustainability in urban areas, as well as research and theory into techniques that help accomplish sustainability. In addition, it contains information on sustainability endeavors in specific urban areas across the world. The book has a website associated with it, but as of the beginning of this project that website did not show the content referring to the specific cities it mentioned. Our job, therefore, was to add the content about those cities to the site, in the most attractive and user-friendly way possible.

The book's target audience is interested college students or recent graduates with no particular background in urban sustainability or obligation to study it, and the site is intended to appeal to the same audience. Therefore, the site must be engaging enough to keep people interested in the topic as well as being informative, and assume no prior knowledge of the issues or areas under discussion. If the page is able to keep the attention of users unfamiliar with urban sustainability, then it should also be able to hold the attention of people more experienced in the field (assuming that the content is new to them). The content that we added, which was just the field trips to specific cities, therefore had to describe the city itself in addition to explaining the problems they faced and the solutions in order for the user to have any context for the details of the problems. In addition to making the site easy to understand and appealing to people with varying amounts of background information, we have also added a feature which allows users who wish to create their own field trip pages, and fill those pages with information they have gathered.

We based our design on published articles about creating usable websites, especially those that teach geography (since our goal of teaching people about the problems that cities are facing is quite similar to the goal of teaching people about the properties of geographical areas) and/or complement books. Then, after designing multiple concepts for our site, we chose to pursue the one with an embedded 2d/3d map as the main feature. We conducted student surveys about the usability of the site, along with receiving feedback for the site from participants in the survey. Taking those into consideration, we made final improvements to the usability of the site.

## CHAPTER 2: LITERATURE REVIEW

When thinking about how to design the site for this project, we first decided to look at the basics of educational website design in general, so as to lay out groundwork for our project. We discovered that there are four major design elements that must be taken into account when designing any website: coherence, legibility, complexity, and mystery (Rosen, July 2004).

Coherence refers to the site's natural flow, and how easy it is to follow what is being said (Rosen 2004). This is important to our project in particular, as we are trying to make the content on the site easy to understand to everyone, whether they have some sort of background in the field, or not. Legibility refers to the unique layout of the content on any given page that helps readers distinguish it (Rosen 2004). While this may be important in certain cases, it does not matter as much here, as our focus should be on figuring out a layout that works, rather than one that is unique. Thinking of ways to make the website truly memorable may become more important later in the site's lifetime, but for now, having a site that is similar to other sites is acceptable.

Mystery is a website's ability to give a reader the sense that there is more to learn than what is on that particular site, and, like legibility, not as important for this project as it might be for others (Rosen 2004). That's because the site is meant to complement a specific book, and that book holds any additional information, and so, unlike other sites, which might reference whatever other sites it got its information from, this site would only perhaps have references to page numbers in the book. Lastly, there is complexity, which deals with the different ways information is portrayed on a site (Rosen 2004). Because this site relates to learning, and an important part of education is how information is taught, it makes sense that complexity is a major part of this particular site's design.

Through years of research and study, many people have found that there are certain tricks which help to make a website good. These include keeping important content on its own page and having some sort of navigation bar or some other tool to help navigate through content. The former tip is our reason for keeping each individual field trip on a single page, and the latter is why we thought of using an interactive map to help the site's visitors move from one page to another.

In regards to our using a map, as well as how we would use it, we looked into accepted practices for building educational websites, especially ones designed to teach geography. We did this because the site is fundamentally educational, but because we are designing it to complement a book, we want the site to be more effective at conveying the concepts in a form that the text of the book cannot, specifically giving the textual descriptions of the places a spatial context. The book we are complementing has about twelve pages per location. We are trying to visualize the information written about the location in an effective manner. This led us

to discover and draw inspiration from studies about taking geographical information from books and displaying it on a website.

## **Complexity and Coherence**

As mentioned above, two major factors of good website design are complexity and coherence. In order to figure out how to provide our site with these attributes, we must think in terms of learning objects, such as which types we will use (complexity) and how we will and arrange them (coherence).

Learning objects are resources that can be used and reused for teaching online. Learning objects include things such as quizzes, narrated powerpoints, diagrams, cartoons, and more, with each type of learning object appealing to a different learning style (Mestre, 2010). For the sake of this project, we are trying to make the content on this site easy to understand for as many people as possible, which means accounting for as many different learning styles as possible, and finding a way to accommodate those different styles (Zapalska, A., & Brozik, D. 2006).

Two of the different types of learning styles are active and reflective learning, both of which involve how a person applies the information he or she has learned to help cement it in their minds. For this reason, neither of these learning styles pertain much to website design. Similarly, whether someone is a sensing or intuitive learner, which describes whether people prefer reading facts or discovering answers for themselves, also does not matter when designing a website (at least in this case). This is because the website will be stating facts; it will not be providing a series of logic puzzles to help readers “figure things out on their own.” As such, the only learning styles that really matter when designing a website are auditory and visual (Felder & Soloman n.d.).

Therefore, the best design for this website would be one that incorporates auditory learning and visual learning. For this reason, one of the major design features we have thought about using for our site is a narrated PowerPoint. This would appeal to both visual and auditory learners, at the same time. That way, even people who prefer a mix of the two learning styles will be accounted for. The value of using PowerPoints to teach has already been studied, as shown in PowerPoint Presentations as Motivators for Visual Language Learners. In addition to a narrated PowerPoint, the information will be repeated in text form beneath the PowerPoint, with diagrams spread throughout the text. This redundancy will allow people visiting the website to learn the content at their own pace. By providing the information in so many different ways, this particular design possibility would provide complexity. By having a relatively simple layout, with a powerpoint on top, text that repeats the information below, with diagrams to help repeat the information yet again (this time visually) placed at relevant locations, this layout would also allow for coherence.

However, because we chose to not use a narrated PowerPoint, we thought to use the next best thing: YouTube videos. That way, the sound from the video of someone narrating will still appeal to auditory learners, while the video itself will help more visual learners.

## **Embedding a Map in the Page**

Much of the recent research on teaching geography has been on how to use technology to help students visualize areas. This is also applicable to our website design because one major feature of the website is the ability to help the user visualize the city as he or she experiences the field trip. More precisely, a lot of the geography research has covered how to help the students understand the spatial position and relationship of areas, as it is critical for them to be able to place specific areas that are being studied in a larger map. Since it has long been known that showing the students the places of those areas on a map is very useful in that regard, but traditional paper maps have extremely limited interactivity, studies have gone into how to use technology to produce more engaging and interactive maps.

### Two-Dimensional Map

One map related concept is to model the framework around the use of a 2d map embedded in the site. We have found research that shows that in the case of online learning, the structure that map-based site used was more effective in teaching than that of a conventionally structured site, for geography-based learning. In addition research shows that 2d maps can be more beneficial than 3d maps (Patterson, T. C. 2007).

The main feature of this concept is that it will use a 2d map to display the layout of the city that is being explored and the locations of the various stops. In an online geography learning study, learners used 2d map interfaces on a site to look for information about certain countries. The site was compared with a conventionally structured site without visual aid. The most important feature of the exploratory site was the use of a geographic information system (GIS). The exploratory site had embedded information into the GIS so students could learn details about the location they were looking at. The study found that students comprehended more of the information from the exploratory website than the conventionally structured website (Patterson, T. C. 2007).

### Three-Dimensional Map

Alternatively, we could embed a three-dimensional map in the site. Studies have found that the most useful three-dimensional maps are “virtual globes”, software that streams photos taken by satellites from the Internet in order to allow the user to view the Earth from any distance and any perspective in real time (Schultz, Kerski, & Patterson, 2008). These score very well in engagement and interactivity, as the user can explore the world freely by “flying” to any point above its surface and seeing the world from that point. For instance, users can explore the Grand Canyon by flying down from a starting point very high above the Earth’s surface



(getting a sense of the Grand Canyon's location on Earth in the process) and then flying in and around it to get a good look at it from all angles. Google Earth was the most broadly accepted virtual globe for this purpose (Patterson, 2007), although for technical reasons we cannot implement it in a website anymore (the API for that was deprecated at the end of 2015). However, the Google Maps API has incorporated all of the relevant functionality for our purposes, as it can show satellite pictures of cities and the user can zoom out as far as desired. Therefore, using a virtual globe to allow the user to explore the city during the field trip seems like the best way to teach the user about the spatial location of all the elements discussed in the field tip while increasing engagement and immersion.

Another study directly compared the use of 2d maps and 3d maps in online learning. It concluded that 2d maps are more effective for displaying data and statistics than 3d maps. This is because 2d maps more directly communicate information rather than having 3d spatial structures and representations get in the way of analysis and visualization. This information helps us in our project because now we will be aware that, when including statistics on maps, the maps should be 2d for more effective communication of data. We could embed 2d map statistics on the main map of the page or separate from the main map; either way all statistics that include geography will be displayed on a 2d map. Also, the study found that students that used the 2d map recalled significantly more information than those who used the 3d map to learn the exact same type of information, further supporting use of 2d maps in our project (Niedomysl et al, 2013).

The main advantage to using a 3d map is that it is more smooth, fun, and visually striking than a 2d map, but there are several arguments in favor of using a 2d map. It remains a more reliable and easier feature to implement. Also, it will require less plug in downloads than a 3d map like Earth might require. Finally, 2d maps are quicker and more effective in communicating information and statistics about a location (Niedomysl et al, 2013). We eventually concluded that Google Maps would be the most appropriate for our purposes, as it displays information like a 2d map but can still show satellite photos and three-dimensional Street View to provide the sense of immersion that 3d maps provide, making our site more enjoyable.

## **Embedding Pictures and Videos**

Including pictures and videos in our site would make the site's content more visually engaging to its users, as opposed to being composed of only text, while also aiding people on the site who are more auditory learners than visual learners. There are some pictures taken as part of the original field trips that we can use. We can also search the Internet for more pictures and/or videos relating to the stops on the field trips, although we have to be careful to only use those that are in the public domain. We plan to include pictures that are relevant to whatever field trip the user has selected to explore, embedded in the scrollable page along with the textual description of that field trip.

## Displaying the Text

There has also been a lot of research on how to most effectively display more text than can be shown on a single screen, which is important to us since the text of each field trip is too long to fit on a single page. The simplest and most obvious solution is to simply have the page scroll, but it is easy for users to lose interest in large blocks of scrolling text. Research has shown that a solution is to paginate the text into smaller pieces, using another panel to navigate between each of those (Niedomysl, Elldér, Larsson, Thelin, & Jansund, 2014). Since we are already planning to allow the user to navigate the city via a map, we could simply paginate the text by having the site show pages of text based on where the user is in the map. This would also make the text feel interactive, as it is determined by the user's interaction with the map.

## Summary

To design our website, we listed out the main advantages and disadvantages of each concept. One common thread that is fundamental to all our concepts and designs is the use of a good web design and user interface. When it comes to using a narrated PowerPoint, the main advantage comes from how it appeals to multiple types of learning. The major issue with this idea is that it forces people to learn at a pace that is not of their own choosing. To combat this, the information from the PowerPoint can be displayed again on the page in text-and-picture format, but doing so makes the PowerPoint feel redundant. Furthermore, it would restrict site navigation to a simple bar at the top of the screen, as opposed to something interactive and unique. Because of these cons, we decided to not use the narrated PowerPoint, but instead simply have the information appear on the screen as text and images/diagrams.

For our 2d map concept, the main appeal lies in how it is more straightforward to implement than a 3d map. In addition, it would have fewer plugins than a 3d map, if any at all. Furthermore, with 2d maps, communication of statistics would be more effective if we chose to do so. However, 3d maps are generally more engaging and immersive, and just more fun to explore. The downside of implementing a 3d map is that it is more difficult to implement because it requires us to provide more complicated data. because, even if we embed a third party map to deal with the actual photos, we still need to provide 3d coordinates to show information in and to use as the point from which the user sees each stop in the field trip. A 2d map could simply show a stock map of the city with labels on all the relevant points, perhaps with photos of specific buildings or areas that we stop at. We also do not really need to communicate much information via the map other than showing the user where they are; the text should handle that.

## Our Design

We chose to proceed with the development of a 3d map feature using Google Maps' satellite images and Street View. Our website's design includes a 3d map at the top center of

the page, with a list of the field trips in text to the left, in addition to certain markers on the map, both of which will be clickable. The other side of the map shows a brief introduction to whichever field trip you click on. This can be done by having the map display a KML file with the data on the locations of the field trips and the specific locations that we want to visit in each. Once the user clicks on a specific field trip, a closeup of the city will appear with labeled information on what locations are important to the field trip, and with a scrollable page appearing below containing embedded statistics and images. This will consist of a short excerpt of the text from the book and/or some other media relating to the place and the issues taking place there, such as a video.

## CHAPTER 3: METHODS

For this project, the overall architecture of the website was not really a concern since we added the field trips to a preexisting (although formerly blank) page on the current site. The original site was built with a Wordpress.com theme, so we used that to maintain the same format and layout throughout all the pages we created, including the embedded map. From there, we simply needed to add the raw content for each of the stops in the field trip (which is partly from the book and partly original), adding links to the next where appropriate.

In order to understand what the best way to display the site's content would be, we studied various educational concepts, such as different forms of learning, and what types of teaching appeal to different types of learners. We then looked at other sources to figure out what the best way to use these various teaching techniques. We discovered that the best way to teach via web-based content is to appeal to multiple learning styles, and in this case, visual and auditory learning, specifically. For this reason, we decided on the usage of simple, easy-to-read text, and diagrams, with information in and around them.

The content for the field trips that we adapted from the book consists of a short narrative taken from the text field trip in the book and any photos or figures used in the book, along with any relevant external data such as demographics or statistics not mentioned in the books. We found more interactive content for each of the field trips where available, such as videos on YouTube talking about a particular topic of interest in a field trip (provided that they are available to reuse in a commercial site). We have also proceeded with caution when looking for an external photographs to include, in order to avoid any copyright issues.

Since Wordpress allows you to insert raw HTML (Hypertext Markup Language) into pages that are using a certain theme, we wrote all the content in HTML. Since none of us had much prior experience with HTML, we used various tutorials online, such as Code Academy, to help us learn how to use it. For embedding Google Maps, we simply used the embedded HTML Google Maps API, marking all the cities with field trips on the map and moving to Street View to view individual landmarks when the user reaches the appropriate points in the field trip. We started by getting an API key from the Google Maps site. On the main field trips page, we displayed the map by adapting example code from the same site to produce a static image of a world map with pins on certain locations (the cities that the field trips are at). Unfortunately, we had to give up on the idea of allowing the user to navigate to individual field trip pages by clicking on the markers, as that would have to have been implemented in JavaScript, which is not supported by Wordpress. For the individual field trips, we again adapted example code that shows a specific place on a map to display the field trip's city on the main page of that field trip. We then used a different component of the API to show the actual landmarks referenced in the field trip in 3D using Street View at the appropriate points in the field trip.

We started by manually adding two prototype field trips, Calgary and Luxembourg, to the site, based on the content from the book. To produce the content for those, we started by taking the text field trips from the book and inserting the images as appropriate. Then, we

broke up the field trip into smaller sections and stripped the text down to just the salient points to make the website feel more dynamic and less dry than the book. Once that was done, we created a template to use in future field trips based on all the elements that were shared between those two. The template will be used to both add more field trips from the book, although the condensing of the text still has to be done manually, and to add field trips created by users and uploaded via another page on the website using a form that we designed.

After getting the fundamental prototypes finished, we focused on polishing the site. We realized we did not correctly source all the images during our initial construction of the prototype, so image manipulation was not possible. We had to make sure all the images used in the prototypes were sourced correctly through HTML so we could change their size and alignment. We wanted the images to be aligned in the center of the page, and the sizes to be bigger or smaller depending on their aspect ratio and pixel resolution; this would make the page easier to read and more aesthetically pleasing. So we corrected the image sources in HTML and then aligned and sized each image correspondingly.

We created the form to allow users to upload their own field trips using a third party tool that WordPress allows you to embed in the site, called JotForm, since WordPress does not allow custom HTML forms for security reasons. We did this by making a JotForm account for the team, which the professor can use to maintain it in the future, and building a form that had fields for header images, titles, and text (with embedded images), which would email the user's input to the advisor's email address when they submitted it. We also created a dropdown menu on the form allowing the user to select a number of pages to split the field trip into, up to 5, and it would replicate the title, header image, and text fields that many times to allow the user to create each page for their field trip individually. The advisor could then use the contents of the email and the template we created earlier to add the field trip to the site. That part of the process might be automated in future work on the site, but within the scope of this project it was left as the advisor's responsibility to add the custom field trips to the site.

## CHAPTER 4: RESULTS

Initially, we set out to create a template for field trips that matched as many of the good website design practices from earlier as possible, and make two prototypes to demonstrate and test it. We wanted to add content about the two example field trips in the most engaging and user-friendly way possible, and then create a template using the common elements between both prototypes that could be used to easily create more field trips using the same good practices. We also had a set list of features we wanted to implement. These features included the embedding of Google Maps, the inclusion of images, videos in the content of each page, and a form that users could use to upload their own field trips which would then be added to the site with the template.

We prioritized the embedding of Google Maps as the most important feature to add to the site. At the end of our prototyping, we ended up managing to include the majority of our Google Maps features. We used a static image with multiple markers on the field trips page to display the locations of each of the field trips, although because Wordpress' hosting service does not support custom JavaScript we could not make the markers interactive and had to give up on the idea of making the markers clickable and having them link to the field trips. On the individual pages of each field trip, we used Google Maps to create a high-level view of the city or a street-level view of specific relevant buildings, whichever was more appropriate to the page at hand, which was the goal. The maps on the individual pages also allowed the user to zoom and move the virtual camera, which was a built-in behavior of Google Maps. This was not a part of the original plan, but we left it intact after deciding that it would just benefit the level of user immersion.

An additional design aspect we implemented was text layout, as having text flow is important in making any website user friendly and easy to navigate. We realized before we started making prototypes that the amount of text in the book for any given field trip would make the page regarding that field trip incredibly long, thus requiring an unnecessary amount of scrolling while navigating the page. To counteract this, we split up the text into sections, based upon the sections that the field trips themselves were split up into. Placing links to later sections along the bottom of the screen helps readers follow along with the field trip, being led to the next section immediately after finishing the current one. What's more, images were added to each section. While these images did not contain any necessary information that was not in the text, it did provide variety to what the reader was looking at. By preventing each page from being completely monotone, the pages of the sight are able to hold readers' attention more easily. This aided in the task of making the page more user-friendly and making the text easier to get through.

Furthermore, another design feature we wanted to included was visually-engaging-image insertion. It was important to break up the text with visuals, so we implemented multiple images in appropriate sections for each field trip. The images were adjusted manually using HTML to be centered in the page, and have an aspect ratio and size that would fit the page and not substantially differ from the other images. With all of these design aspects implemented,

the user readability and engagement would be substantially improved mainly due to having more visual engagement,

We implemented almost all the functionality we wanted in the form for user-uploaded field trips. We had fields for the title of the field trip and up to 5 subsections, and content sections for each of those that could be composed of text and/or images. Each section also had a header image or video that would be shown at the top of the page. This fulfilled all the goals we wanted for the form, except that it did not allow videos to be inserted into the text in the middle of the page and that it did not provide a built-in way for the user to embed Google Maps in the page other than using it to take an image of the location of the field trip themselves and uploading that. Field trips that are uploaded with the form are sent to Professor Krueger via email to be added to the website using the template in Appendix A, which consists of instructions for how to add the field trip, from the contents of the email, to the website using the infrastructure and formatting we designed while making the prototypes.

While we stand by the design we chose to implement earlier on, there are some elements of said design that we were unable to utilize in our prototypes. For one, while it is possible to add video files in a customized field trip using the form mentioned above, the examples we created do not contain educational videos. This was due to the fact that the information such videos would need to contain in order to fit the context of the field trips was very specific, and finding that type of video for either of the prototype field trips proved to be impossible. We felt that it would be the job of someone who is hoping to add his or her own field trip to create that type of video, and it was not within the scope of the project for us to do that for the prototypes. Similarly, while we found new images to put on the pages of the prototypes, these images do not contain any new information regarding the field trip that they were in (that was not already in the text of the book), so the level of “visual education” they provide is nonexistent. As with videos, we felt that creating special diagrams that contain valuable information for the field trip was more the job of anyone who might be trying to create their own website, and not us.

## **CHAPTER 5: CONCLUSION AND RECOMMENDATIONS**

Overall, we successfully accomplished our objective of adding content for cities discussed in the Adventures in Sustainable Urbanism book to the website. Initially, the website had no field trip content of any kind, and we set out to add this content to the site in an engaging manner that would complement the book. Eventually, the goal of the project was specified more precisely: that we should create two prototype “Field Trips,” for the cities of Calgary and Luxembourg, based on the content in the book, and create a template to create more field trips with and a form by which users could upload their own field trips. We organized our process by researching what makes a site engaging, designing a concept for our site with specific features, and finally implementing as many of those features as we could. Then, once we had enough of those implemented to produce the prototypes, we enumerated the steps we followed to create the prototypes in the template that provides instructions to produce more in the future, and created a form that allows users to upload their own field trips that would be added to the site using the aforementioned template.

### **Google Maps Integration**

One of our most important features we sought to implement was Google Maps integration. Our design called for a header for each point in each field trip, showing the relevant location in 3d to increase user immersion and give the user a sense of location. Our implementation of this feature was a great success, producing a header for every page with a zoomable, pannable image of the most relevant location to that point. However, the design for the main field trip page was slightly less successful; as Wordpress.com’s hosting service does not allow us to write custom JavaScript, we could not make the markers of the cities on the world map clickable, forcing us to resort to less intuitive text links below the map. Also, integrating Google Maps into user-uploaded forms was only partially successful: although it was possible for users to upload a Google Maps image and have it work, they would have to produce and upload the image themselves, rather than being able to simply say that they want a Google Maps image here and have it be automatically embedded by the template. Overall, the implementation of Google Maps in the site was mostly successful, but with some minor inconveniences in the finished product that detract slightly from the smoothness of the interface.

### **User-Uploaded Field Trip Form**

Another feature required in the professor’s goals for the project was the ability for users to upload their own field trips to the site. We did this by creating a form allowing users to upload titles, header images or videos, and body text and images for a home page and up to five subsections for their field trips. This closely matches the data that is put into the template to create new field trips, so in that respect the form is a success. However, the form is slightly more limited than our custom field trips are in that videos cannot be interspersed with the text



content, and Google Maps integration is slightly less convenient than we had hoped as the user has to do so by creating and uploading the image themselves. This also makes any Google Maps integration in user-uploaded field trips noninteractive (the “camera” in the image will not be possible to move or zoom). Overall, we consider our implementation of the field trip upload form a success despite these minor inconveniences, as it is still possible to get almost all the functionality of custom-made field trips using the template directly.

## **Layout of the Text**

While figuring out how to design the site and the pages related to field trips, one of the most important things to consider was how to organize the layout of the text on any given page. We realized that the amount of text for an entire field trip was too much to have on one page, as it would require too much scrolling and cause readers to lose interest. We decided to break up the text into different sections depending on how the text was divided in the actual field trip. Feeling that there was still too much monotonous text on any given page, we decided to use images to break up the text, providing more variety for the readers to look at and stopping the text from looking like a single-unending block. This way, readers may be more likely to stay focused on the field trip and read the entire thing. In the end, the division of text into different pages and sections helped improve the flow and ease of reading the text.

## **Layout of the Images**

Another design feature that we approached was the inclusion and organization of images in the text. To break up the text and so it would be more engaging to read, we included relevant images to each page of a specific field trip. Next, we centered all of the images and expanded or contracted their ratios and sizes so they would best fit the page. All of these adjustments factor into accomplishing a higher level of readability and engagement while reading about these field trips, our feature criteria were completely met for this goal.

## **Limitations**

Due to the limitations of the WordPress software, we were unable to add interactivity to the map that exists on the field trips page. Furthermore, we couldn’t find examples on the internet of the types of videos that would make sense being on a field trip page, so there are no videos in our prototypes, though the ability to add videos to your own custom-made field trips exists. Similarly, diagrams with statistical information relevant to the field trips was unable to be found, so educational images are also absent from the prototypes, though again, there is nothing stopping someone from making their own diagrams/educational images, and adding them to their own custom-made field trips.

## **Final Conclusion**

We believe that we have laid the foundation for a promising future for the Adventures in Sustainable Urbanism website. We have developed two functional webpage prototypes for field trip content related to the Adventures in Sustainable Urbanism book, and a manual so others can develop the rest of the field trips in the future. Furthermore, the site can expand beyond the contents of the book: any user who wants can upload a field trip of their own and it will be added, allowing the site to collect more field trips over time and have more than the static book. We have hopes that the website will eventually grow far beyond the field trips created for the book and become a global collection of stories of sustainable urbanism, and we have created the infrastructure for this to be possible.

## **Recommendations**

First of all, we found that several of the features in the design were impossible due to restrictions imposed by Wordpress.com, the service that the website is hosted on. Most notably, it does not support custom JavaScript, which makes many interactive features, like clickable markers on the world map of field trips, impossible, so in order for any of those to be possible the website would have to be moved and hosted in some other way. (Perhaps using a similar tool that can be gotten from Wordpress.org, which resembles the website building tools on Wordpress.com but is more flexible as it requires the website to be hosted by its creator and therefore does not have many of the security-related restrictions present on Wordpress.com.) In addition, the user-uploaded field trip form does not currently have a more convenient way to integrate Google Maps than uploading a static image taken from Google Maps, so a special case allowing the user to embed Google Maps in the field trip directly rather than uploading a static image from there would be helpful. This might also be much easier if the website was hosted somewhere else so that JavaScript could be used.

## REFERENCES

- Parker, C. M., Bellucci, E., Torlina, L., Zutshi, A., & Fraunholz, B. (2015). How website design options affect content prominence: A literature-derived framework applied to SME websites. *Journal of Internet Commerce*, 14(2), 139-176. doi:10.1080/15332861.2014.1000079
- Sisson, S. D., Hill-Briggs, F., & Levine, D. (2010). How to improve medical education website design. *BMC Medical Education*, 10(1), 30-30. doi:10.1186/1472-6920-10-30
- Schultz, R. B., Kerski, J. J., & Patterson, T. C. (2008). The use of virtual globes as a spatial teaching tool with suggestions for metadata standards. *Journal of Geography*, 107(1), 27-34. doi:10.1080/00221340802049844
- Wieczorek, A. M., Klyszejko, Z., Sarzynska, J., Szostek, A., Chmiel, K., Soluch, T., & Brzezicka, A. (2014). Mode of text presentation and its influence on reading efficiency: scrolling versus pagination/Sposob prezentacie textu a jeho vplyv na efektivitu citania--rolovanie vs. strankovanie. *Studia Psychologica: Journal for Basic Research in Psychological Sciences*, 56(4), 309+. Retrieved from [http://libraries.state.ma.us/login?gwurl=http://go.galegroup.com/ps/i.do?p=AONE&sw=w&u=mlyn\\_c\\_worpoly&v=2.1&it=r&id=GALE%7CA403918921&asid=3b43a57494955e9e4e4e6146daecfd13](http://libraries.state.ma.us/login?gwurl=http://go.galegroup.com/ps/i.do?p=AONE&sw=w&u=mlyn_c_worpoly&v=2.1&it=r&id=GALE%7CA403918921&asid=3b43a57494955e9e4e4e6146daecfd13)
- Patterson, T. C. (2007). Google earth as a (not just) geography education tool. *Journal of Geography*, 106(4), 145-152. doi:10.1080/00221340701678032
- Niedomysl, T., Elldér, E., Larsson, A., Thelin, M., Jansund, B., Kulturgeografiska institutionen, . . . Uppsala universitet. (2013). Learning benefits of using 2D versus 3D maps: Evidence from a randomized controlled experiment. *Journal of Geography*, 112(3), 87-96. doi:10.1080/00221341.2012.709876
- Huang, K. H. (2011). A GIS-interface web site: Exploratory learning for geography curriculum. *Journal of Geography*, 110(4), 158. doi:10.1080/00221341.2011.542474
- Poplin, A. (2015). How user-friendly are online interactive maps? survey based on experiments with heterogeneous users. *Cartography and Geographic Information Science*, 42(4), 358-376. doi:10.1080/15230406.2014.991427
- Wiley, D., & Hanlis, E. (. (2002). Connecting learning objects to instructional design theory: A definition, a metaphor, and a taxonomy. in wiley, DA (ed). the instructional use of online learning objects. association for educational communications and technology [http://reusability.org/read/ ]. *Canadian Journal of Learning and Technology*, 28(3), 144.
- Felder & Soloman: Learning Styles and Strategies. (n.d.). Retrieved November 14, 2016, from <http://www4.ncsu.edu/unity/lockers/users/f/felder/public/ILSdir/styles.htm>
- Zapalska, A., & Brozik, D. (2006). Learning styles and online education. *Campus-Wide Information Systems*, 23(5), 325-335. doi:10.1108/10650740610714080
- Mestre, L. S. (2010). Matching Up Learning Styles with Learning Objects: What's Effective? *Journal of Library Administration*, 50(7-8), 808-829. doi:10.1080/01930826.2010.488975

Cook, D. A., & Dupras, D. M. (2004). A practical guide to developing effective web-based learning. *Journal of General Internal Medicine*, 19(6), 698-707. doi:10.1111/j.1525-1497.2004.30029.x

Khan, B. H. (1997). *Web-based instruction*. Retrieved from [https://books.google.com/books?id=natcmn0J\\_gC](https://books.google.com/books?id=natcmn0J_gC)

Rosen, D. E. (2004, July). Website design: Viewing the web as a cognitive landscape. *Journal of Business Research*, 57(7), 787-794. doi:10.1016/S0148-2963(02)00353-3 Retrieved December 5, 2016, from <http://www.sciencedirect.com/science/article/pii/S0148296302003533>

## APPENDIX A: INSTRUCTIONS ON USING THE FIELD TRIP TEMPLATE

The email sent by the make your own field trip form will provide a field trip title, a main page header image, and some main page content (text and/or images). It will also provide a similar section title, section header, and section content for up to 5 subsections. This will be emailed to the owner of the JotForm account that owns the form embedded in the site. To convert this into a field trip on the site, follow these steps:

Create the home page for the field trip on the site. This can be done by clicking the Add button next to Pages to make a new page. Then, change the title of the page to the name of the field trip. To get the header image you first need to download it from the email. Then, click on the plus icon in the top left of the content area and select Media. Then click "Add New" (in the upper left of the popup) and upload the header image that was downloaded earlier. Then click Insert (in the lower right) and the image will be inserted. Add two new lines after the image, and then copy and paste in the content from the email. Then, make a Back to Field Trips link at the bottom of the page, below the content. This is done by putting the cursor where you want the link to go and clicking the link button (which looks like a chain) and then putting in "Back to Field Trips" as the link text and selecting the Field Trips page as the target (by selecting it in the Link to Existing Content pane). Then, use the Page Attributes section (one of the menus on the left side of the screen) to set the parent of this page to the Field Trips page as well. Once the home page is done, Publish it (the button is above the menus on the left).

On the Field Trips page, create a link to the new field trip. This is done by again going to the bottom of the page and clicking the link button. Put in the name of the new field trip as the link text and find the field trip home page that you just made to use as the link target. This adds the link to the new field trip. To add a marker to the world map showing the location of the field trip, go to the HTML view of the page and find the <img ...> tag at the top (which is where the map comes from). In that img tag, right before the "?key=Alza..." at the end, type in "%7c" and then the latitude and longitude of the city, separated by commas, like the formatting for the other markers that come immediately before it. Then Update the Field Trips page (same place as the Publish button).

For each subsection, you need to make a page for the subsection in a similar way to the home page. Create a new page in the same way and change its title to [City Name] Part [Subsection Number]: [Section Name from email]. Set its header image by uploading the header image gotten from the email in the same way as for the home page, and set the content in the same way as well. Then, create a link at the end with text "Back to Field Trip" from the new subsection page back to the home page for that field trip, in the same way as the link from there to the field trips page, and set the home page of the field trip as the subsection page's parent (using Page Attributes again). Then, if this subsection isn't the first in this field trip, create a link after the "Back to Field Trip" one with text "Previous" leading to the prior subsection. Then Publish the subsection page. If there was a prior subsection, go back to that page and add a "Next" link at the end going to the new page you just created, and Update that page. Repeat this for each subsection that the user created.