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Bookscapes: A Study in the Interconnectivity of Landscape and Narrative Visualization and Communication in Landscape Architecture

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Abstract

The fields of landscape architecture and literacy have the potential to be linked through a simulated environment. Through this connection, opportunity for education arises. This thesis creates and describes a program called Bookscapes, which presents a narrative inside a simulated landscape for the purpose of communicating landscape architecture/urban planning principles.

Bookscapes is a stand-alone computer program designed using theories in education and guidelines for virtual and restorative environments (including Huang's elements, Kaplan's Attention Restoration Theory for restorative environments, constructivist theory of situational learning) and the revolving design process in landscape architecture's communication to clients through 3D modeling.

This thesis first discusses the literature and foundational framework behind the creation of Bookscapes, and why creating a program that will engage users in a narrative is important and relevant today. This section also talks about how the field of landscape architecture uses 3D modeling techniques to design, setting the stage for combining both disciplines of Narrative and Landscape Architecture into one unified program.

Next in this paper is a description of the physical and philosophical creation of Bookscapes in the methodology which includes 9 steps including: book selection, a site visit, architectural and historical research, sketch studies, 3D modeling techniques, preliminary renders and edits, mood and texture studies, programming, and finally the completion of the process resulting in a program titled Bookscapes.

A proposed study is discussed in the appendix to test if Bookscapes has the potential to increase immersion and interest to create a higher level of recall in students

who use Bookscapes to learn about landscape architecture principles. This appendix

discusses proposed testing instruments, testing environment, and sample size. All the

information in Bookscapes is also available in a paper packet. The paper packet can be

used to asses user interest, learning, and immersion as it compares to the computer

program version. The proposed instruments to measure these factors are a self-recorded

pre and post-test which can be found in the appendix.

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INTRODUCTION

The fields of landscape architecture and literacy do not at first glance appear to have much interaction. However, further analysis reveals the dependence the two have on each other. Literature reflects the landscapes of the human mind, a platform for telling stories. Landscape architecture is the creation of an environment for humans to live their stories, a design of spaces. These spaces are created for the purpose of becoming platforms for narratives to be lived. Writers travel the world to find settings that will set the stage and communicate the written lives of characters. Books take readers away on journeys on this earth and every imagined earth. In a way, every author is a tour guide through a multitude of landscapes. This thesis will examine the gap between landscape and narrative through visualization, bringing the environments of an author to the home of the reader. In this unique opportunity comes the possibility of education through immersion; an education of landscape architectural principles through the visualization of literacy.

Landscape architecture is the creation of narrative possibilities. Designers create spaces based on anticipated narratives. Each human life is a story lived within the context of landscape architecture. Examples of real-world connectivity between landscape and narrative are explored daily by archeologists uncovering historic sites. Archeologists piece together the narratives of a people long gone partially through examining their now discarded public spaces and the orientation of their homes. Small landscape clues suggest living stories of real people. Anthropology compounds on the work of archeologists by studying and comparing cultures, reconstructing narratives through landscapes.

This thesis explores how people learn about landscape architecture principles through reading in a virtual environment. The goal of this thesis is to create and describe a virtual learning environment (VLE) designed for the purpose of communicating landscape architecture/urban planning principles while simultaneously increasing user engagement and immersion during the reading process.

The output of this Plan B thesis is a virtual learning environment titled Bookscapes. This program is designed to increase user interest and immersion which leads to greater informational recall. In the following sections, I first describe the background and context for this design. I then present the design of Bookscapes including both the design process and the final product. Next, I discuss the lessons learned and limitations of Bookscapes followed by the conclusion.

BACKGROUND/CONTEXT

Landscape Architecture and 3D Modeling

Landscape architecture firms are increasingly using more advanced and interdisciplinary visualization techniques. With a wider availability of visualization programs such as SketchUp, Lumion, Rhino 3D, Revit, and 3DS Max driving the adoption of advanced visualization, firms are finding advanced digital visualizations to be increasingly vital to their competitive position.

This thesis will highlight how landscape architecture firms might currently best present their information to clients by demonstrating an narrative-driven immersive virtual environment and creating a proposed study to compare contemporary 2D education practices against upcoming 3D methods. Designers using 3D methods will

allow landscape architects to show their site to both clients and the community by

virtually walking through a proposed site while reading the design principles and

philosophy behind it. How much more engaged would a client be with the designed

landscape? How much more persuaded to select and fund that design might they be? How

much will the client understand the landscape? Landscape architects envision reality as

they design, and now they can visually express that reality to clients more

comprehensively before actual construction. Visualization through 3D modeling gives

designers a new voice, but is this new voice stronger than the voice designers currently

have?

      3D modeling techniques aid landscape architects, and many other designers, by

allowing for an immediate revolving design process. The RSVP cycles (Halprin 2014)

design theory, made popular by noted landscape architect Lawrence Halprin and his wife

Anna Halprin, stands for:

      Resources (which is anything used during the design process)

      Score (how should the design be performing?)

      Valuaction (how the design is working with other moving pieces)

      Performance (observing the design after it's been physically built)

      Most designers use a similar process, where there are resources utilized, the

designer scores their design based on how the design is intended to be used, an evaluation

of the work, and then actually building the design. This type of design is called a

revolving design process, because at any point during the process something may change,

and the designer will return to step one and begin the process again. Preferably, a designer will only advance to step three before starting over. If the designer realizes a mistake in the performance step, after the design is already built it will mean the design will need to be altered if possible, abandoned, or demolished. This is costly and time consuming for a designer. When designers use 3D modeling techniques, they have the ability to see their design before it's built. This prevents many projects from being built with errors because the designer can experience and understand their design from all angles and perspectives.

Why is Literacy Important?

Children literacy rates have been declining for several decades. Both reading for fun and through schooling is on the decline. Scholastic and YouGov jointly have conducted biyearly studies in the United States to test children's interest in reading. The most recent study (2016) shows that 51 percent of children either love or like reading books for fun, as opposed to the 2012 survey where 58 percent of children loved or liked to read and even that is down from 2010 where 60 percent of children recorded loving or liking to read. More alarming, in 2014 the survey found that 37 percent liked reading a little and 12 percent of children recorded not liking to read at all. (Reading Report)

Analyzing the research from 2016 it was found that children tend to stop enjoying reading after age 8. Between the ages of 6 and 8, 62 percent of children said they love or like reading books for fun, but in the 8 to 11 age group their enjoyment drops to only 46 percent of children who enjoy reading for fun. This number rises slightly to 49 percent for 12 to 14-year old's but again drops slightly between the ages of 15 to 17 back to 46

percent. This research suggests that the age range between 12-14 are potentially crucial years for literacy development.

Supporting quotes from the 2016 study include several young adults explaining their relationship with reading. One 12-year-old boy said, "I do like reading, but it's not at the top of things I like to do." Similarly, a 15-year-old boy said, "I like playing video games, and reading books is hard." An 11-year-old girl also felt that reading had become challenging to her. She said, "In second and third grade, I read above my grade level and I felt really proud of that. But then the books got bigger and bigger, and it got more intimidating."

"Sixty percent of the children who enjoyed reading more when they were younger put this down to the fact that there are 'so many other things that I now enjoy more than reading', and 47% blamed the fact that 'I have to read so much for school that I just don't feel like reading for fun', with others citing the fact they now have to read on their own, rather than being read to." (Flood, 2015)

While children are reading less, most children and parents say they agree that 'It is very important for my future to be a good reader' and recognize the intrinsic value reading has in the lives of successful individuals. (Reading Report)

Quotes from the 2016 study by Scholastic and YouGov that support their findings include a testimonial by a 17-year-old girl in Los Angeles. She said, "Reading keeps me sharp, helps me improve my vocabulary, and prepares me for the future." A mother of an 11-yeard-old girl in Illinois said, "I think that continuing to grow a love of reading will help in your future in many ways. It is important to read to expand your vocabulary and

knowledge of language." A 7-year-old child in California stated, "I like reading because it's fun and it's important."

These findings agree with the rest of the study that shows that both children and parents wish reading was a larger part of their lives and their children's lives. The study showed that 76 percent of children between the ages of 6 to 17 agreed with the statement, "I know I should read more books for fun" and 78 percent of parents of children 6-17 agree to the statement "I wish my child would do more things that did not involve screen time" (Reading Report). Many children enjoy reading,
"I like reading because it gives me something to do, and if it's a good book, I will read it almost every day. And because I just like reading"- 11 girl, MA

Over half (57 percent) of kids 6-17 who are infrequent readers say they have trouble finding books they like while only 26 percent of frequent readers report having the same problem. (Reading Report)

Data about criminology and literacy implies that students and parents should be concerned about literacy because of the clear link between illiteracy and crime. Penal institution records show that inmates have a 16 percent chance of returning to prison if they receive literacy help, as opposed to 70 percent if they receive no help. The Department of Justice states, the "link between academic failure and delinquency, violence, and crime is welded to reading failure." Over 70 percent of inmates in America's prisons cannot read above a fourth-grade level. (Literacy Statistics)

Young readers are a critical component in the creation of a safe nation. Individuals who fail to learn to read by the fourth grade have a greater chance to being

confined to a prison cell. 2/3 of students who cannot read proficiently by the end of the fourth grade will end up in jail or on welfare. (Literacy Statistics)

Reading failure isn't just affecting children. Research done with college student's research habits show that "students are increasingly reading less and less," (Baier, 2011) particularly when pertaining to educational assigned readings. This appears to be caused by a belief that assigned readings are not necessary for a passing grade. "Approximately 89% of students believed they could receive a C or better without completing any of the assigned readings," (Baier, 2011). Research done at Bowling Green State University by Baier (2011) recommend that teachers take advantage of the popularity in technological advances to reach more students as well as emphasize the importance of reading the assigned materials.

These relevant issues suggest a need to explore ways that reading can engage more individuals as an activity that is enjoyable and educational for students of all ages. This thesis created and analyzed a program that could bridge the gap between education in design principles with a real-world narrative to create attention, positive affect, and motivation in literacy and landscape architecture through the use of virtual reality.

This research is vital in the consideration of this thesis. As digital screens become increasingly more important to the human experience, exploration into keeping literature relevant by adapting to these new forms may be critical for the formation of a safe and educated nation.

Based on the current trends, it may be helpful and valuable for educators to explore ways to adapting and integrating technology to boost reading levels. Video games, specifically virtual reality video games, are being used to teach fundamental

principles. This can be utilized to communicate in the field of landscape architecture, an extremely visual field of study.

Virtual Environments

Support for Virtual Learning comes from studies of what learning really is. Abdelhameed (2013) states that learning is a type of constant and revolving testing of theories rather than passively accepting facts. Virtual Reality Environments are a "powerful medium for learning" because "VR provides a learning environment to test the active hypothesis…humans/users who actively engage with new knowledge are more likely to retain this knowledge and recall it at a later state, and furthermore they have more awareness of this knowledge." (Abdelhameed, 2013). This research suggests that if a student is actively engaging in an activity then they will learn new knowledge and be able to recall that information later as well as be more aware of when this information when it is presented.

Currently, there is little available in virtual environments that addresses reading. Video games have a much more enticing platform and audience. However, being able to explore the world and landscapes is not an uncommon motif in the budding VR industry. Some of the games available now include "The Abbots Book" which demonstrates a written narrative through haunted catacombs. While the movement and light mechanics are successful there is very little reading except to explain the players position in the story. The setup is entirely more like a video game than a reading experience. Also available is a program called 'Nature Treks." This game features several landscapes that the user can teleport through. However, there is no walking and the game mechanics

require a gamepad to play, rather than the standard VR controls which was found to be

cumbersome and inconvenient by reviewers on the gaming platform Steam

(https://store.steampowered.com/app/434430/Abbots_Book_Demo/). The player

cannot move through space manually and there is no reading aspect. However, the style

the program was created in features hand designed landscapes that are hyper realistic, but

while they are based on different environments, no environment is a representation of an

existing place.

Other notable games include Google Earth VR, which allows the user to fly over

landscapes as landmasses rise and fall. Nausea appears to still play a large factor in the

interface but will potentially decrease as better equipment and technology are released.

Earnest Labs has conceptually proposed reading in virtual reality but has yet to release

any definite plans on creating a program that would allow this possibility. The Chimera

Reader gives the reader the illusion of sitting in a study with pages from a book before

them. This program however allows no hand mechanics and is solely operated on gaze.

This limits the user's immersion in the experience and the reading sensation thereby

making it less likely they will continue to read outside of VR, a potential after effect in

conducting communication and literature research.

Landscape Architecture and Virtual Environments

Landscape Architecture as a field is constantly exploring new ways to design and

communicate to remain relevant in a constantly evolving digital world. Traditionally,

hand rendered images were the standard visual representation used in the field of

Landscape Architecture. Now, computers are used to generate more accurate images and

videos of designs. "With video, you can get a sense of the sight, sound, and 'feel' of a place. You can see people interacting with the design, bringing it to life. Virtual reality takes video to the next level: as you move your phone or VR headset, you control your experience in the landscape. It more closely mimics the experience of exploring a place in person. In part, it recreates that sense of discovery one gets in real life" -ASLA Award of Excellence in 2017: Virtual Reality.

Contemporary 2D Educational Methods include web-based, online teaching, like those currently done through Utah State University. These online courses are growing in popularity such as the web-based program hosted on the website DiLiLAH.org. One of the benefits of this project is its worldwide outreach potential. "Since 2012, over 175,000 people from 102 countries have experienced the profession of landscape architecture by visiting DiLiLAH." -ASLA Award of Excellence in 2017: Virtual Reality.

"VR is the component of communication which takes place in a computer-generated synthetic space and embeds humans as an integral part of the system" (Regenbrecht and Donath, 1997). Virtual Environments mimic real world environments and allows the user to become a part of that environment. As was noted above, when a user can actively interact and experience an environment, they will be more aware of it and retain the information they absorbed later than if they had just seen an image of the proposed plan.

Furthermore, an increasing number of firms are implementing virtual environments as a design tool, as it allows for a vivid representation of immediate design work. Virtual environments are emerging as a powerful tool because "it is much easier and cheaper to evaluate the form a design in a virtual environment instead of building or

modifying a physical model" (Abdelhameed 2013). Another benefit of virtual

environments is the ease of collaboration among teams. "Beyond allowing the addition of

virtual entities to real world views, VR technology enhances collaboration among

members of design teams" (Wang, 2007- quoted by Portman 2015). "Effective

collaboration during the early design states in architecture is a condition for effective

overall design and construction" (Koutsabasis et al., 2012 quoted by Portman 2015).

      Virtual reality environments also allow for collaboration and revolving design.

Revolving design occurs when analysis of a design idea can immediately be

implemented. After this analysis, changes can be made and then viewed again. In this

way, stronger designs can be developed. With this tool, designs can be expressed almost

universally and immediately. "Virtual Reality is an effective design medium. Perhaps

more than any design medium, virtual reality facilitates selective reinterpretation and

immediate evaluation. Virtual reality also allows designers to oscillate easily between

design elements properties, abstract representation, and component assembly of the

structural system in a single design activity" (Abdelhameed 2013). This versatility allows

not just for communication in a single inclusive landscape architecture firm but also in

the collaboration of several firms and disciplines utilized in all aspects of the design

process- engineers, architects, interior designers. "Subsequently, we posit that the use of

VR for architecture, landscape architecture and environmental planning can aid in

making visual studies in these fields more interdisciplinary" (Portman, 2015). "A recent

Design News article claims in its title, there is no excuse for not designing virtually..."

(Atwell & Gretlein, 2013)

Opportunities

Illiteracy in children is increasing

Illiteracy in adults is increasing

Higher Prison Rates due to illiteracy

Need for Increase in Literacy

Changes in design must occur before construction

3D modeling is becoming more widespread

Designers need to keep up with advancing technology to appease clients

Communication with clients must improve

Solution and Design

Step 3: Architectural and Historical Research

Step 2: Site Visit

Step 4: Sketch Studies

Step 1: Book Selection

Bookscapes

Step 5: 3D Modeling

Step 8: Programming

Step 6: Preliminary Renders and Edits

Step 7: Mood and Texture Studies

Foundation

Huang's Elements
Situated Learning
Role Playing
Cooperative/Collaborative Learning
Problem Based Learning
Creative Learning

Constructivist Theory
Scaffolding

Kaplan's Criteria
Extent
Being Away
Fascination
Compatibility

Figure 1: Bookscapes Flowchart

THEORETICAL FRAMEWORK

This section discusses the theories and strategies that set the theoretical framework for the design of Bookscapes. These studies include research done on the success of Virtual Learning Environments, as well as the utilization of simulated environments in the field of landscape architecture. Below is a flowchart explaining the opportunities in society and landscape architecture that lead to the need for Bookscapes that have been discussed in the section above. The flowchart shows a design wheel with the steps taken to create Bookscapes, which will be discussed later in this thesis. Also shown are the main principles upon which Bookscapes stands which are discussed below.

The Bookscapes Program is a VRLE (Virtual Reality Learning Environment) and its creation was guided by many theories in education, as discussed below.

Huang's Elements

In a study by on Virtual Reality Learning Environments (VRLE), Huang said that VRLEs "…will elevate a learner's interest and motivation compared with learning in a 2D animated environment... that is, features of interaction, imagination, and immersion are the main characteristics to attract and motivate students to learn in a VR learning environment." (Huang, 2010). From these studies Huang et al (2010) researched and described 5 elements necessary for an engaging VRLE. These principles are:

- Situated learning (realistic tasks)

- Role Playing

- Cooperative/Collaborative learning

- Problem based learning

- Creative learning

The Bookscapes program designed in this thesis addresses these five criteria in the following ways:

Situated learning

"Situated learning theory holds that knowledge should be delivered in an authentic context" (Besar, 2018). Bookscapes users read about the principles of landscape architecture while moving in a virtual immersive environment relevant to the reading content, in the case of Bookscapes, the user must actively navigate a virtual recreation of Venice which leads them to information about the city itself. The user will visually see the areas they are learning about. According to the theory of situated learning, this will lead the user to improved recall because they are actively participating to discover information in an appropriate context.

"Situated learning is an instructional approach developed by Jean Lave and Etienne Wenger in the early 1990s, and follows the work of Dewey, Vygotsky, and others (Clancy, 1995) who claim that students are more inclined to learn by actively participating in the learning experience. Situated learning essentially is a matter of creating meaning from the real activities of daily living (Stein, 1998, para. 2) where learning occurs relative to the teaching environment" (Situated Learning, 2018). Relevance for this thesis lies in students being able to actively engage with an environment in order to process design principles. Situated learning backs the theory of this thesis that through Kaplan's Immersive requirement for restorative environments

students can easily learn about landscape architecture while being inside a virtual reality experience.

Role Playing and Cooperative/Collaborative Learning

Bookscapes contains a narrative so that students feel like they are working towards a goal, in this case, trying to find Marco Polo in Venice through an annotated text of Italo Calvino's Invisible Cities. Role Playing corelates with situational learning in increasing recall through active user participation.

Bookscapes did not include inter-user cooperation, but instead provided Marco Polo's travel journal to make the user feel as though they were cooperating with another person (in this case Marco Polo) to complete the narrative. As stated above, this kind of interaction will increase "interaction, imagination, and immersion" which will "attract and motivate students to learn in a VR learning environment." (Huang et al, 2010).

Problem Based Learning

Problem Based Learning is when a student is must practice critical thinking to solve a problem rather than direct communication of facts. This type of active learning can motivate students. To create a situation where students will feel compelled to continue through the narrative, students are given a problem to solve (searching to find the missing Marco Polo) which will lead them to navigate the streets of Venice in order to finish the game. Huang, et al. (2010) argues that having this sort of problem-based learning will increase the user's interest and motivation.

<u>Creative Learning</u>

Specifically, students will have to use the provided annotated text of *Invisible Cities* paired with visual information to understand what direction to take to exit the city and complete the game. The novelty of the game itself can be considered a new and creative way of learning. This novelty should propel the user forward, and to take control of their learning experience in the VRLE.

Attention Restoration Theory

Attention Restoration Theory is an educational theory which was developed by Kaplan between the years of 1989-1995. This theory worked off William James' research on attention fatigue, which stated that it is possible for individuals to tire of giving attention to necessary tasks. (Kaplan, 1995) Kaplan states that this could make sense as quick responses were more important to evolving man than directed attention. Kaplan states in his paper, "The Restorative Benefits of Nature: Toward an Integrative Framework," that "It is only in the modern world that the split between the important and the interesting has become extreme. All too often the modern human must exert effort to the important while resisting distraction from the interesting." (Kaplan, 1995)

More modern studies examined how humans process information. There are two types of attention, bottom up and top down. Bottom-up processing is stimulus driven and is used to capture our attention quickly. Bright lights and sudden noises work off this processing. Top-down processing is goal-driven. This is the attention we choose to give to work we are doing. This allows for extended periods of study. This is the reason cell phones are so potent, they use both types of attention to keep the user captivated, and

virtual reality could potentially have this same effect on maintaining attention while teaching.

To combat attention fatigue, as Kaplan calls it, and utilize their top-down, focusing attention, humans benefit from spending time in environments that are "Restorative" (Kaplan, 1995). Kaplan promoted "Natural environments" as being the most restorative but there are arguments that can be made that an urban environment in a virtual reality system would also qualify as a restorative environment.

Restorative

For an environment to be considered restorative, Kaplan, basing his work in James', identified four criteria that must be met. These criteria are: Extent, Being Away, Soft Fascination, and Compatibility. (Kaplan, 1995).

Extent

Extent is measured by how much the user feels they are immersed in the environment.

Being Away

This is measured by whether the environment provides an escape from everyday life. As Kaplan put it, the environment must be "rich enough and coherent enough so that it constitutes a whole other world… a restorative environment must be of sufficient scope to engage the mind. It must provide enough to see, experience, and think about so that it takes up a substantial portion of the available room in one's head" (Kaplan, 1995).

Fascination

Fascination is measured by the environment's ability to capture the user's

attention. There are several types of fascination that Kaplan describes. There is process

fascination, where the user is addicted to the process of gathering information (this is

portrayed, Kaplan says, in readers who read non-fiction mystery books. These readers

could get the information much quicker from other sources but instead enjoy the process

of receiving information in such a particular way that they would rather spend their time

in lengthy reading than going to find the information in any quicker method). Kaplan

describes content fascination, where the user is interested in the specific content. Then

there is also hard vs soft fascination. Hard fascination is akin to watching a race, where

the user is captivated. Soft fascination is akin to walking through a natural setting where

the user's mind can wander and reflect (Kaplan, 1995).

Compatibility

Compatibility is measured by the user's desire to be in the selected environment.

"The setting must fit what one is trying to do and what one would like to do." In this

fourth criteria there is a strong association with education of landscape design principles

in virtual environments. Seeing the landscape in person while being taught would

produce the maximum compatibility in intention to learn. Furthermore, Kaplan states that

a compatible environment is one in which the user feels "comfortable and natural."

Virtually rendered landscapes allow a person to explore an urban environment without

social pressure or bustling crowds. The user can inspect the landscape without interference from other people.

      This exposure to restorative environments helps to combat attention fatigue, which occurs when the brain has been focused too long on one specific task (Kaplan, 1995). This theory strengthens the tie between visual learning in virtual environments over contemporary 2D based practices in education, particularly in the field of Landscape Architecture, which is the study of the outside built environment being interacted with every day.

      Bookscapes has been designed to meet all four of Kaplan's criteria to be considered a restorative environment.

Constructivist Theory

      Another relevant education theory is constructivist theory or constructivism. Constructivism postulates that people learn by gathering new information and then comparing it to information that they already have. The best way to learn, according to this theory, is through hands on experience with new information. According to Papert, "Children should acquire knowledge through experience" (Papert, 1980).

      Research by Abdelhameed (2013) show that individuals "who actively engage with new knowledge are more likely to retain this knowledge and recall it at a later stage, and furthermore they have more awareness of this knowledge." Virtually generated landscapes allow the user to relate directly to the landscape when learning about it, therefore making these types of visualizations a potentially powerful teaching tool for environment-focused learning.

Scaffolding

The Bookscapes program is also designed on the principle of scaffolding. Scaffolding is a constructivist principle and is the use of providing a familiar task to a learner and subsequently adding more unfamiliar or new tasks.

The tasks in the Bookscapes program utilize scaffolding through navigating a city (familiar activity) with learning landscape architecture (new information). Other familiar activities include reading a book, being given a task, and clicking nodes to receive information. This mixture of familiar activities combined with educational information will, according to the theory of scaffolding, strengthen the user's ability to learn and later recall the intended new information.

Virtual Reality Learning Environments

Support for Virtual Learning comes from studies of what learning really is. Abdelhameed (2013) states that learning is a type of constant and revolving testing of theories rather than passively accepting facts. Virtual reality environments are a "powerful medium for learning" because "VR provides a learning environment to test the active hypothesis…humans/users who actively engage with new knowledge are more likely to retain this knowledge and recall it at a later state, and furthermore they have more awareness of this knowledge." (Abdelhameed, 2013).

This research suggests that if a student is actively engaging in an activity then they will learn new knowledge and be able to recall that information at a later time, as well as be more aware of this information when it is presented. Students who work through the

Bookscapes program on the computer are hypothesized to have greater interaction, and

therefore a better retention of knowledge and improved recall. By extension, it could be

theorized, that if even newer VR techniques are employed utilizing the Bookscapes

program, students will benefit from a higher level of interaction and information recall.

Huang (2010) mentions 5 criteria to determine the success of the VRLE they are:

1. Interaction (with the virtual environment)

2. Imagination (Narrative)

3. Immersion

4. Collaborative learning (Using the narrative to solve problems)

5. Intention to use the system

These criteria could be used to test whether or not the Bookscapes Program is

successful in its intent to promote literacy and communicate the principles of landscape

architecture and will be discussed in the appendix of this thesis.

Visualization is a vital tool in the communication of landscape architecture

designs. Virtual environments are an effective tool for this design visualization because

it:

● Allows immediate viewing and revolving design

● Allows members of a team to collaborate

● Accurately depicts design in real world scale and real-world location

The produced product of this thesis, Bookscapes, demonstrates a way in which

designers can create their designs digitally before building them in the real world by

utilizing 3D modeling methods. Designers now have the opportunity of examining their

creations before building them. This is critical in elevating the revolving design process.

Bookscapes also shows how designs can enhance design-client communication. Designs can be paired with new information to better communicate designs to clients, as illustrated in Bookscapes.

DESIGN OF BOOKSCAPES

This section discusses the methodology behind the physical and philosophical creation of Bookscapes. The process is detailed that led to the final product of this thesis, a virtual learning environment titled, Bookscapes.

Purpose

The product of this thesis is a virtual learning environment called Bookscapes. Bookscapes demonstrates how landscape architects can utilize 3D modeling techniques to enhance the design process and incorporate learning elements. Bookscapes also demonstrates how landscape architects can communicate their designs to clients through a 3D modeled and rendered environment while having information on the design present for the client to read while autonomously moving through the virtual design.

Bookscapes is also designed with the intention of increasing immersion, interest, and engagement with the reading process. A narrative drives exploration through landscapes, while the landscapes simultaneously educates the user.

The setting for Bookscapes is in Venice, Italy during the 1400s. The user of the program is tasked with entering Venice and finding the explorer, Marco Polo, who is lost. The user is tasked with this responsibility by Kublai Khan and given a manuscript describing Marco Polo's travels. The user must utilize this narrative to traverse Venice,

which was created through 3D modeling techniques and simulated through a desktop application. As the user moves through Venice, they encounter glowing nodes which provide real information on urban planning and landscape architecture principles.

Bookscapes is designed to increase user interest, engagement, immersion with the reading process in order to promote literacy and better communicate landscape architecture principles.

The program is implemented through a PC executable file. Also created for this thesis is a 2D traditional paper packet version of the program. A proposed study and testing instruments (described in in the appendix) are recommended for future tests to be conducted on the validity of the Bookscapes program against the traditional paper packet.

Methodology

The Creation of Bookscapes was implemented through nine steps, as portrayed in the image wheel above. Each step is discussed below.

Figure 2: Step-by-Step Process of the Creation of Bookscapes

<u>Step One: Book Selection</u>

The book selected to drive the narrative for the Bookscapes program needed to meet a several important criteria. It needed to be a book that could appeal to a wide audience with a writing style that a young adult could understand. The selected book also needed to take place in an environment that most American readers would consider far away, in order to meet Kaplan's criteria of "Extent." The book also needed a compelling narrative, however this could be supplemented by annotation if needed, and so it wasn't a critical criterion in selecting the book. The final criteria to be considered for the Bookscapes program was illustrative descriptions of an urban cityscape. This could be considered the strongest criteria, as this thesis researches the interconnectivity of landscape and narrative.

The book selected for the design of the program is Italo Calvino's *Invisible Cities.* Calvino's work met the above criteria in the following ways: the book is at a moderate reading level, the book is comprised of several descriptions of theoretical cities that the explorer Marco Polo visited in his travels, the book is meant to take place in Venice, Italy- a city sufficiently distant from Utah.

The book provides a description of a real-world environment that will allow the users to learn about the principles of landscape architecture while reading. *Invisible Cities*, takes place in mythical cities, all of which are contained philosophically in the Protagonist Marco Polo's home city of Venice, Italy.

The book was annotated for this study to create a stronger narrative to provide users a goal within the narrative to encourage exploration through the city of Venice. The annotated text is provided in Appendix 1. The goal provided to the user in the annotative narrative of the Bookscapes program is to find Marco Polo by using his own descriptions of Venice. This narrative serves the purpose of describing the urban planning of Venice,

forcing the user to pay attention to their environment, and providing a goal of propelling

the user through the city to find Polo by continuing to read and finish the game.

Bookscapes begins by putting the user in a small study where the reader is able to

read about the relationship between Marco Polo and Kublai Khan. In this study scene, he

user is tasked with the responsibility to enter the city of Venice and find the lost Marco

Polo. The user will find himself with Polo's own writings of his most recent travels when

he lands in Venice via a gondola.

The pathway taken in Venice begins in a water-side plaza near the Bridge of

Sighs. The user will then cross over a bridge spanning a canal and make their way down

an alley. The alley curves for a while before releasing into the northern end of the Piazza

San Marco. The user will walk around the arcaded plaza and pass Saint Mark's Basilica

going south. While in the Bookscapes program the user will discover information nodes

discussing the different landscape architecture principles utilized in the Piazza San

Marco. The destination is the docks to the south of the Piazza San Marco where the

narrative will end as the user enters another gondola which will carry them away from the

city of Venice and out of the Bookscapes program.

Throughout this narrative, and in the utilization of it, will be the opportunity for

education of the landscape/urban design principles that went into the creation of the city

of Venice. These principles are discussed below under Philosophical Creation. As is

explained later, being in an engaging and immersive narrative will provide the

scaffolding for the use to understand the surrounding landscape architecture. In this way

landscape architecture becomes the narrative, and the narrative is driven by the

landscape. The selection of landscape architecture principles used in the Bookscapes

program can be found in Appendix 2.

Step Two: Site Visit

Figure 3: Saint Mark's Basilica located to the east of the Piazza San Marco.

I traveled to Venice in the summer of 2018 to gather data on the city, specifically the

historic landmark of the Piazza San Marco. While there, I took pictures of façade textures,

architectural details, and identified a route to use in the Bookscapes program. Site visits are

important in the field of landscape architecture. A philosophy in landscape architecture is the

study of the *genius loci* of a place, which means the spirit of the place. This includes elements

such as character, scale, lighting, and aesthetic. Bookscapes will be beneficial to the field of

landscape architecture in its potential to enable individuals to experience that spirit through

immersive visualizations.

Step Three: Architectural and Historical Research
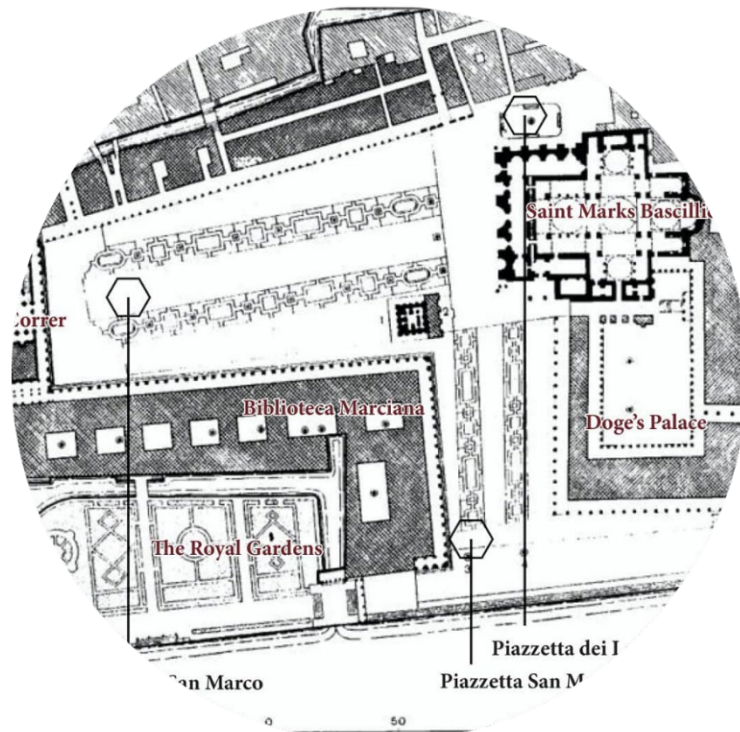
Figure 4: Architectural Layout of the Piazza San Marco

I conducted research through resource books from USU Merrill-Caizer Library,
internet searches, and aerial imagery in Google Earth Pro to find the dimensions of
buildings to recreate the city as accurately as possible. While many architectural elements
were simplified in the creation of Bookscapes due to time and resource constraints, the
dimensions and locations of the buildings are highly accurate.

I researched Venetian establishment, creation, and urban planning principles
utilized in the city to determine what would be most important to communicate to
students. Venice is a unique city built from several small islands in the early 400s B.C.
Several families, fearing invasion from attacking Huns, sought refuge in a brackish

lagoon in the northern waters off modern day Italy. These families slowly banded

together and created the republic of Venice, using extreme actions to survive. Physically,

they built bridges to span the islands, used gondolas and small boats to navigate the

pieced together city. They built wells around the city filled with a system of pipes and

sand to filter brackish water and collect rain so the citizens would have fresh water to

drink. They learned how to fish and build boats from the trees on shore and became a

strong port city during the crusades due to their navy. The Venetians discovered a good

way to manufacture glass during the 1400s and got rich from exporting glass. Their

architecture shows a strong Byzantine influence due to having Constantinople as their

ally during the crusades.

This history led to the city being designed in a way unique to Venice. Therefore,

being able to take a tour, and physically see Venice specifically is the best way to

understand the city. Most people won't travel to Venice in their lifetime, Bookscapes

exists to provide users with a comparable narrative driven experience. Bookscapes re-

creates Venice through 3D modeling techniques so that its history, and urban planning

principles would be communicated clearly through a narrative driven visualization.

The urban planning principles unique to Venice that are included in Bookscapes

are communicated through glowing nodes floating near the architectural feature each

node describes. I determined 8 critical and important principles to communicate in

Bookscapes. These include the canal system and alleyways, which make up much of the

transportation in the city. Piazzas, specifically the famous Piazza San Marco, and the

smaller piazzetta adjacent. Significant architecture features are the use of arcades for

shade, travel, and commerce, the Campanile di San Marco, which is a bell tower used to

call the citizens together in the Piazza San Marco, the Venetian well system, which insured the survival of the city by creating fresh water sources on a brackish lagoon. Many of the original wells are still working today. And glass as a major export, which aids in many architectural features in Venice, and around the world, and its role as an export led to Venice becoming a rich and popular port city. These principles can be grouped as such:

Venetian Transportation Systems

- The Canal System
- Alleyways

Types of Plazas/Gathering Areas

- The Piazza San Marco
- Piazzetta

Architectural Features

- Arcades
- Campanile di San Marco
- The Venetian Well System
- Glass

Step Four: Sketch Studies

To gain a better idea of the detailed architectural features and their surroundings in the selected path in Venice, Italy I did a series of sketches, both on site in Venice, and later by referencing the photographs I had taken as well as online material. Some of these sketches are seen in the annotated narrative provided to the user during Bookscapes.

The below image is a sketch of the Basilica San Marco as seen from the Piazza San Marco in Venice, Italy, and is used as an introduction to Bookscapes, first seen by the user in the opening scene of the program inside the Journal of Marco Polo.

Figure 5: Sketch of Saint Mark's Basilica

The next image is seen in Bookscapes as a wayfinding device. The user is floating underneath the Bridge of Sighs as they enter Venice, Italy. This image is in front of them

on the first page of Marco Polo's Journal. Seeing this sketch of the Bridge of Sighs as they float under the simulated Bridge of Sighs allows the user to understand they are in the correct position in the story.

Figure 6: Sketch of the Bridge of Sighs from the Viewport of a Gondola

The below sketch of a gondola departing Venice paired with a description in the narrative of leaving Venice via the docks can be used to guide the user to the docks to depart Venice.

Figure 7: Departing Gondola from the Docks at the Piazza San Marco

Step Five: 3D Modeling
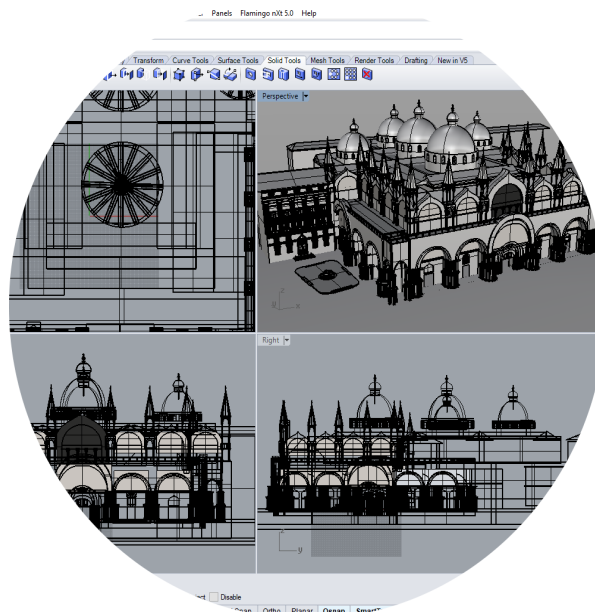
Figure 8: Screenshot of the 3D modeling process executed in Rhino 3D

An educational version of Rhino 3D was utilized to 3D model the selected path in Venice, from the dock under the Bridge of Sighs, through an Alley, into the Piazza San Marco, and finally concluding at the docks past the Piazzetta. Each block was modeled according to online records, aerial imagery, and high-resolution photographs taken on site. The modeling of the site took approximately 1 year to complete.

While Rhino 3D was selected to 3D model for this thesis, many other programs have significant 3D modeling capabilities. If this study is to be recreated, any 3D modeling program that can export into programming software would be appropriate. Examples of software include: Sketchup, AutoCAD, and Revit, among other emerging software.

Step Six: Preliminary Renders and Edits

Figure 9: Preliminary Render of Saint Mark's Basilica

3D modeling environments before they are built is of great benefit to Landscape Architects. Even though I was working from dimensions, I found mistakes I made while designing, as portrayed in the image above in the dimensions of Saint Mark's Basilica above. To correct for any issues in scaling, preliminary renders are vital to examine the model. Renders remove the possibly distracting curves, grids, and surfaces used during the build process and show a near finished product. Creating preliminary renders into the design process strengths the revolving design by allowing the designer to return to the model and make any edits necessary before sending the product to construction phase.

Step Seven: Mood and Texture Studies

Figure 10: Two Renders showing Mood and Texture Studies

During this phase of creation, I put the 3D model of Bookscapes into a program called Lumion to conduct texture and mood studies to determine ideal conditions for the user to experience in in the final product. Unfortunately, detailed textures where unable

to be used in the final product, as will be discussed in the limitations section at the end of

this thesis. Ultimately, the textures were too processor heavy to run in the program.

However, a study of appropriate textures to be determined by the landscape architect to

show to their clients is vital in the design process to increase communication to the client

of the proposed finished product.

     An appropriate mood is important to the design of Bookscapes in meeting

Kaplan's Criteria of Being Away. The user must feel immersed in a foreign environment

far from their current position. A foggy night was selected for the mood of Bookscapes.

Step Eight: Programing
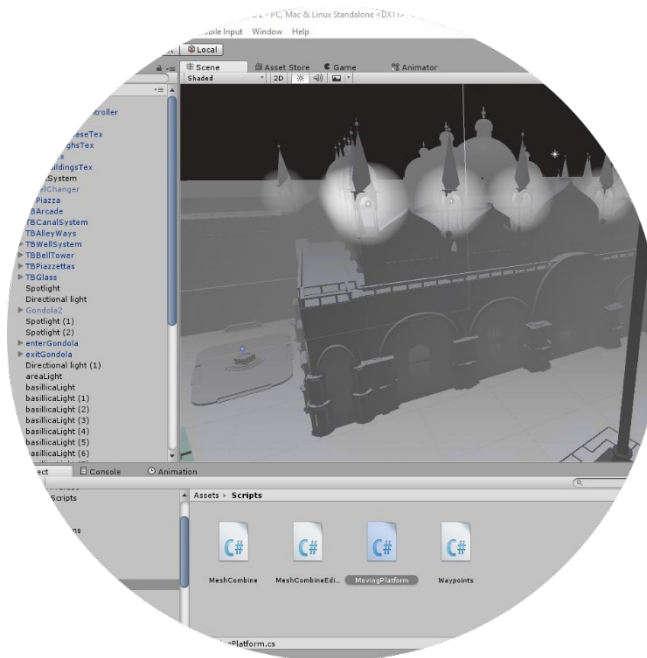
Figure 11: Screenshot of the Programming Phase of Design,
Executed in Unity

     During the programming step, the 3D model was exported from Rhino into a

programing engine, called Unity. In this program I created scripts, the foggy-evening

environment, lighting, information nodes, movement mechanics, a first-person player,

simple textures, and a readable book for the user to reference while walking around the

program, among other attributes. The finished product is an executable stand-alone

Virtual Learning Environment.

Programming the model into a VLE is perhaps the most critical step in

Bookscapes. This step brought together all the design philosophy and physical creation

into a finished, useable product with information and narrative for a user to use while

experiencing a restorative environment.

Step Nine: Bookscapes Completion

Figure 12: Screenshot from the Bookscapes Final Product

After programming Bookscapes, all the information was exported into a stand-alone executable program. This program will run on any high processing Windows Desktop or Laptop without installing extra applications. Movement Mechanics reflect those of the average video game. WDA and S keys move the player, the space bar allows the user to jump, and pressing the esc key allows the mouse to appear in order to click on nodes and to turn the pages of the narrative. The O and C keys open and close the narrative respectively.

Final Product

Below is a selection of images from the finished product of this thesis, Bookscapes.

Figure 13: Opening study revealing Marco Polo's journal and a glowing information node

Figure 14: When the node is pressed the user is invited to choose to enter the full Bookscapes program

Figure 15: The user is then transported to a gondola on a canal under the Bridge of Sighs in Venice, Italy

Figure 16: The user is given a book containing "A Record of the Invisible Cities" By Marco Polo which they will use to navigate the program
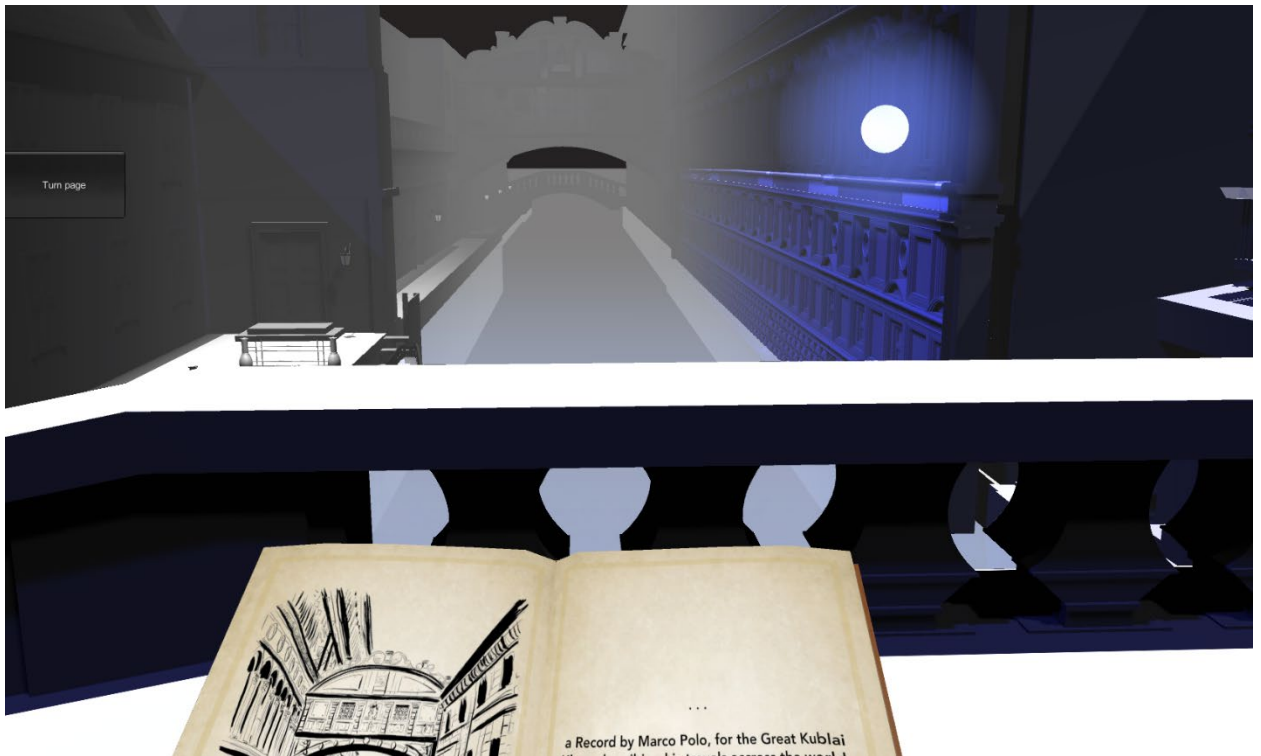
Figure 17: The first page of the book on a bridge above the Bridge of Sighs Canal with a glowing information node

Figure 18: Information on the canal pops up when the node is pressed

Figure 19: Information on alleys overlooking an alley

and before you is a bridge stretching over a slender canal. Go forward and cross the bridge.

. . .

Esmerelda

In Esmerelda, city of water, a network of canals and a network of streets span and intersect each other. To go from one place to another you have always the choice between land and boat: and since the shortest distance between two points in Esmeralda is not a straight line but a zigzag that ramifies in tortuous optional routes, the ways that open to each passerby are never two, but many, and

elevated or on ground level, each inhabitant can enjoy every day the pleasure of a new itinerary to reach the same places. The most fixed and calm lives in Esmeralda are spent without any repetition. Secret and adventurous lives, here as elsewhere, are subject to greater restrictions. Esmeralda's cats, thieves, illicit lovers move along higher, discontinuous ways, dropping from a rooftop to a balcony, following utterings with acrobats' steps. Below, the rats run in the darkness of the sewers, one behind the other's tail, along with conspirators and smugglers: they peep out of manholes and drainpipes, they slip through double bottoms and ditches, from one hiding place to another

Figure 20: A passage of the book describing water while the user is overlooking a node and a Venetian Well

The Venetian Well System

Venice sits on a Brackish Lagoon. for the residents to survive they developed a well system to provide fresh water. Wells like this one were placed all around Venice. These wells pull rainwater through a pipe system and then strain it through layers of sand up to the surface, ready to drink. This impressive urban planning feature contributes directly to early Venetian survival on a secluded lagoon.

Figure 21: Information on the Venetian Well System

Figure 22: View of the Piazza San Marco, a well with a node, and Saint Mark's Basilica.
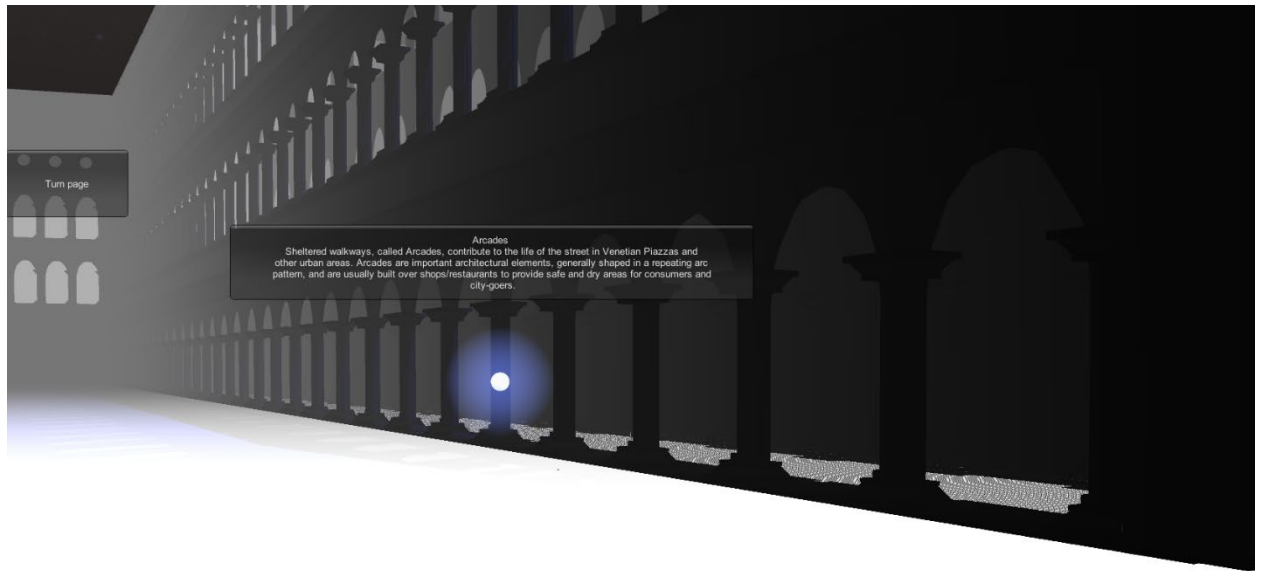
Figure 23: Information node explaining arcades
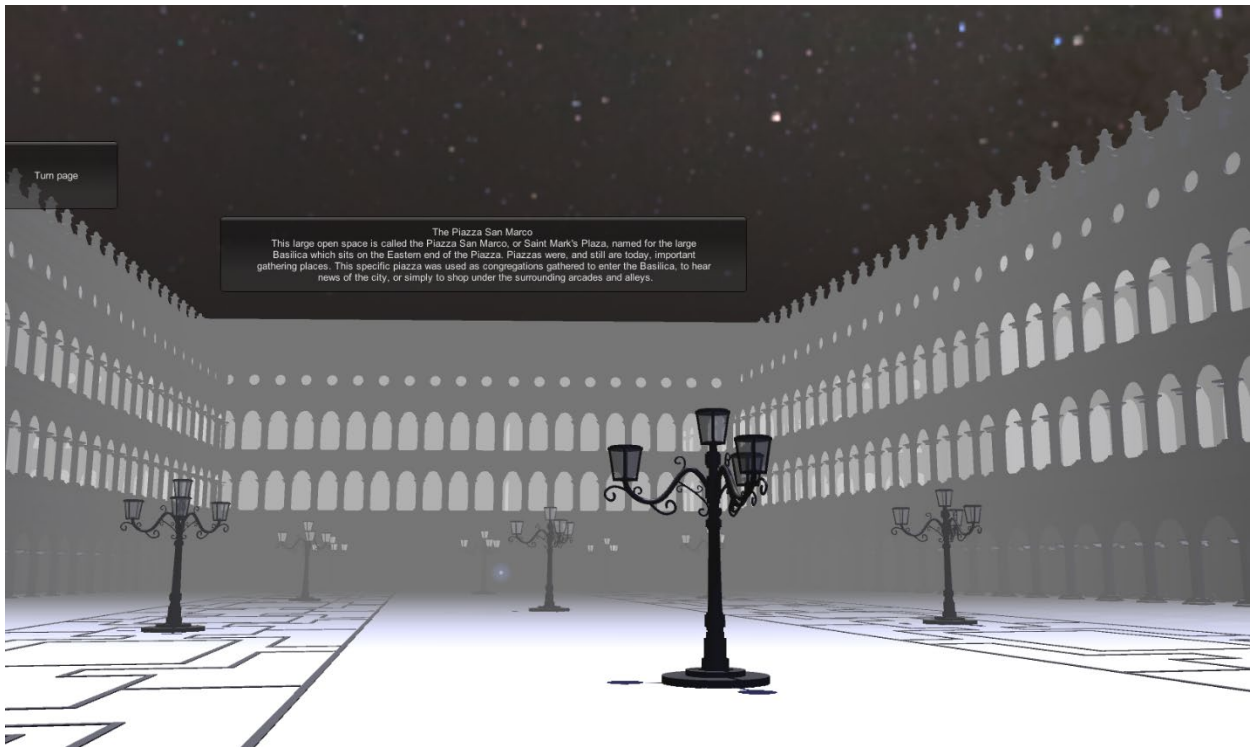
Figure 24: Information node explaining the Piazza San Marco while the user stands inside the Piazza San Marco

Figure 25: Node explaining the Campanile di San Marco

Figure 26: View of a glowing information node under Saint Mark's Basilica

Figure 27: View of the Doge's Palace

Figure 28: Node explaining the Piazzetta

Figure 29: Node explaining glass as an export in Venice, Italy
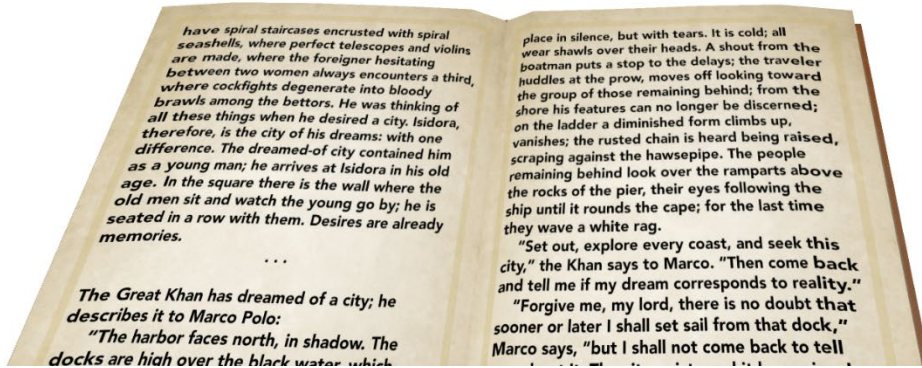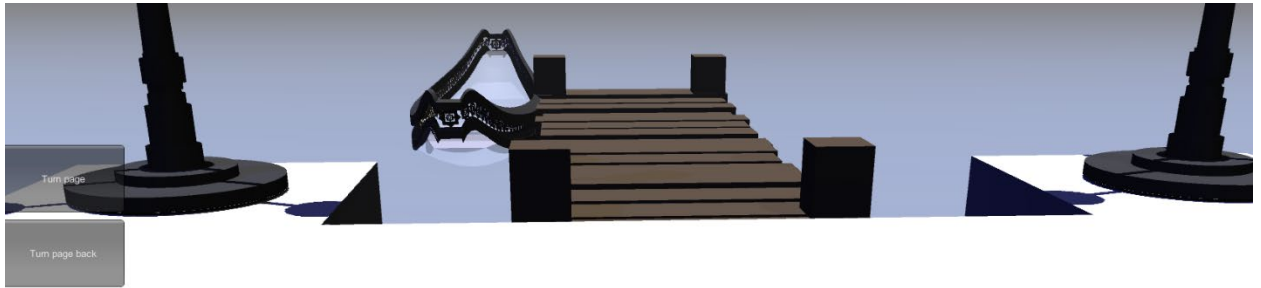
Figure 30: Harbor at the end of the virtual environment
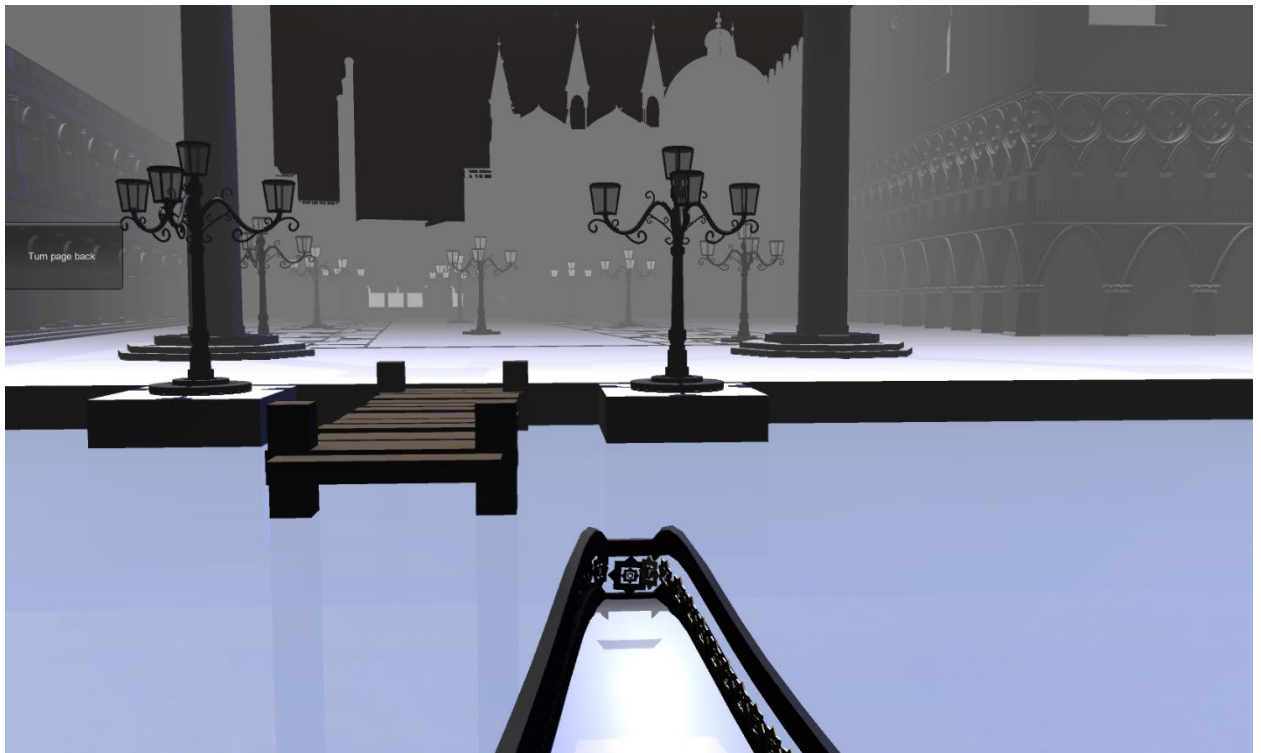
Figure 31: Final view of the city as the user leaves Bookscapes

Vignette: User Interaction with Bookscapes

Bookscapes has been designed for use by college-aged students in a university setting. However, it is a demonstration for how landscape architects could communicate their designs to their clients. As future research is done in this field, Bookscapes should expand in to a library, with narratives and landscapes suitable for a wider audience and age group.

Cora is in an Introduction to Landscape Architecture Class. She has a test next week on the urban planning principles of Venice, Italy. To prepare for the exam, Cora has been given a program she downloaded to her desktop computer at home.

Cora sits down, planning to spend no more than an hour studying because she has several other classes that are also demanding her attention. She is stressed about her workload and is having difficulty concentrating.

Cora clicks on the icon to start up Bookscapes, the program given to her by her Intro to Landscape Architecture class. Cora is presented with a scene where she is standing in a firelit study. There is a book in front of her on a podium with a glowing orb above it. Cora walks towards the book and orb and reads the open page of the book, which tells her that Marco Polo has gone missing, and that Kublai Khan will send an emissary to search from him in Venice, Italy. Cora clicks on the glowing orb above the book and text pops up telling her that if she would like to enter Venice and find Marco Polo, she can press the tab key on her keyboard.

Cora is fascinated by the goal placed before and choses to press the tab key to see what will happen next.

The screen immediately fades to black after Cora hits the tab key. Soon the screen lightens, and Cora finds herself floating in a Gondola underneath an interesting looking bridge. Cora looks down and sees that she is holding a book titled "A Record of the Invisible Cities" by Marco Polo. Cora has been given a list of instructions on how to use the program and discovers that she can open the book by pressing the O key. Cora begins reading poetry about the city she is entering.

When the gondola comes to a stop Cora jumps off the gondola by pressing the space key. The book stays open in front of her to continue reading if she chooses. In front of her, above some stairs, she sees another glowing orb. Cora races excitedly up the stairs and clicks on the glowing orb. Text appears explaining the canal system she just used to enter the city and how the canal was used to shape the city. Cora closes the text by clicking on the text box and begins searching for more glowing nodes. She sees another down a dark alley. Cora reads a few more pages of the narrative, which is describing the emerging city around her. Cora hurries through the dark alley to click on the node and read about alleys, another type of architectural transportation system like the canal which is used heavily in Venice, Italy.

As Cora continues, she encounters a well and learns about the well systems in Venice while reading the passage, "Isaura, city of a thousand wells." Cora continues to explore Venice, clicking on nodes about arcades, piazzas and piazzettas, glass, and the giant Campanile di San Marco, which stands looming in the Piazza San Marco.

Cora is fascinated by the foggy environment around her and finds herself exploring, going under arcades and columns and looking at the detail on the Dodge's Palace. As Cora finishes the narrative she is carrying she sees a sketch of a gondola leaving the city from the docks paired with an entry about boarding a gondola and sailing away. Cora remembers seeing the docks from her time exploring the city. The glowing nodes had led her to docks earlier.

Now Cora approaches the docks and sees a gondola. Cora walks forward to board the gondola and turns around to see the Piazza San Marco fade into the fog. Cora closes the book she is holding by pressing the C key and closes the Bookscapes program. Cora will remember the principles she learned from having experienced them through a simulated environment that she chose to explore.

DISCUSSION

Opportunities for future Research- Virtual Reality Immersion

As technology advances adaptive educational methods must match this demand. The speed at which technology is advancing creates a problem for designers; if they are not quick to respond, their work will be left behind in an increasingly competitive environment. Creating technologies that are adaptable to changing environments is essential. Bookscapes is designed so that with small adjustments it will retain its relevance and continue to be a tool to educate students about landscape architecture, urban planning, and more through a compelling narrative. Currently, students are familiar with PC and console video games, but in the future, virtual reality environments, or augmented realities, may become commonplace in developed countries.

In the Appendix, a study has been proposed to test for immersion, interest, and engagement to determine the success of Bookscapes as a Virtual Learning Environment.

Limitations of Bookscapes

While Bookscapes has the potential to become a valuable educational tool blending narrative and landscape principles, it has limitations as well. For instance, the

program was created through 3D modeling techniques by a student of landscape

architecture, not a student of computer science. Because of this inexperience, the program

is processor-heavy, and runs slowly on a computer with an average processor.

Another limitation of Bookscapes is the assumption that the current environment

of Venice, Italy will meet all of Kaplan's criteria for restorative environments for every

student who uses the program. For Bookscapes to be successful to the widest range of

students it's library of books and locations needs to expand. More narratives paired with

landscapes and landscape architecture information will need to be designed to meet a

wider audience.

Lessons Learned

If I, or another student, were to create another narrative-driven simulated

environment through 3D modeling techniques there are a few things I would suggest

doing different that I learned from doing this thesis.

The most critical mistake I made in this thesis was beginning to 3D model after

only taking a single course in 3D modeling. A comprehensive understanding of all

available techniques would help tremendously in the output of a faster, and more

complex-textured program. There is a benefit to recreating this thesis with a cleaner 3D

model so that textures may be applied. A study to test between a textured simulated

environment versus a white-blocked environment could supply this field of study with

interesting and previously unknown data that could be used in future guiding principles

for landscape architects who 3D model to communicate their designs.

I individually modeled each block in Bookscapes, which created an extremely processor-heavy product that can only be run on high-end desktops. A limitation of this is that the average university student has only a laptop, so will be unable to benefit from this program unless their university provides the students with computer labs containing high-processing desktops.

I also made the mistake of beginning my thesis with only the simplest understanding of programming, believing I could pick up the knowledge as I went. This led to lengthy delays in this thesis, as well as an entire restructuring of my framework. I strongly encourage the next student to learn programming for landscape architecture or video game design prior to attempting to add to the Bookscapes Library.

CONCLUSION

Bookscapes is a powerful program with the potential to educate students about landscape architecture through narrative. Bookscapes can aid in advancing the field of landscape architecture through enhancing and elevating client's and the communities understanding of proposed projects. Bookscapes is designed to meet Kaplan's four criteria for restorative environments and Huang's five criteria for successful VRLEs. Bookscapes utilizes 3D modeling techniques that have potential to be adapted to a virtual reality environment. Bookscapes is the first of it's kind to realize the symbiotic relationship between landscapes and narrative and to exploit that connection in the creation an educational program with strong visualizations and immersion to aid in both education (of landscape architecture) and literacy.

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Appendix 1

The Annotated Text of Italo Calvino's 'Invisible Cities' used in the Bookscapes program.

The great Khan has kept the records left by Polo and poured over them. It has been several months now since the explorer left the Khan's palace in the search for information on the cities in Kublai Khan's vast empire. Polo has never been away so long, and yesterday a rough manuscript was delivered to Kublai. Words hastily written on torn paper describing several cities that are one city. The Khan has now grown worried and sends an emissary out to find him. The Khan also sends with his emissary a copy of the manuscript to use to track Marco Polo with his own words.

When you have arrived at Phyllis, you rejoice in observing all the bridges over the canals, each different from the others: cambered, covered, on pillars, on barges, suspended, with tracery balustrades. And what a variety of windows looks down on the streets: mullioned. Moorish, lancet, pointed, surmounted by lunettes or stained-glass roses; how many kinds of pavement over the ground: cobbles, slabs, gravel, blue and white tiles. At every point the city offers surprises to your view: a carpet bush jutting from the fortress' walls, the statues of three queens on corbels, an onion dome with three smaller onions threaded on the spire. "Happy the man who has Phyllis before his eyes each day and who never ceases seeing the things it contains," you cry, with regret at having to leave the city when you can barely graze it with your glance.

But it also happens that, instead, you must stay in Phyllis and spend the rest of your days there. Soon the city fades before your eyes, the rose windows are expunged, the statues on the corbels, the domes. Like all of Phyllis's inhabitants, you follow zigzag lines from one street to another, you distinguish the patches of sunlight from the patches of shade, a

door here, a stairway there, a bench where you can put down your basket, a hole where

your foot stumbles if you are not careful. All the rest of the city is invisible. Phyllis is a

space in which routes are drawn between points suspended in the void: the shortest way

to reach that certain merchant's tent, avoiding that certain creditor's window. Your

footsteps follow not what is outside the eyes, but what is within, buried, erased. If, of two

arcades, one continues to seem more joyous tit is because thirty years ago a girl when by

there, with broad, embroidered sleeves, or else it is only because that arcade catches the

light at a certain hour like that other arcade, you cannot recall where.

Millions of eyes look up at windows, bridges, capers, and they might be scanning a blank

page. Many are the cities like Phyllis, which elude the gaze of all, except the man who

catches them by surprise.

The streets are eerily quiet at this time of day and before you is a bridge stretching over a

slender canal. Go forward and cross the bridge.

. . .

In Esmerelda, city of water, a network of canals and a network of streets span and

intersect each other. To go from one place to another you have always the choice

between land and boat: and since the shortest distance between two points in Esmeralda

is not a straight line but a zigzag that ramifies in tortuous optional routes, the ways that

open to each passerby are never two, but many, and they increase further for those who

alternate a stretch by boat with one on dry land. And so Esmeralda's inhabitant are

spared the boredom of following the same streets every day. And that is not all: the

network of routes is not arranged on one level, but follows instead an up-and-down

course of steps, landings, cambered bridges, hanging streets. Combining segments of the

various routes, elevated or on ground level, each inhabitant can enjoy every day the pleasure of a new itinerary to reach the same places. The most fixed and calm lives in Esmeralda are spent without any repetition. Secret and adventurous lives, here as elsewhere, are subject to greater restrictions. Esmeralda's cats, thieves, illicit lovers move along higher, discontinuous ways, dropping from a rooftop to a balcony, following utterings with acrobats' steps. Below, the rats run in the darkness of the sewers, one behind the other's tail, along with conspirators and smugglers: they peep out of manholes and drainpipes, they slip through double bottoms and ditches, from one hiding place to another they drag crusts of cheese, contraband goods, kegs of gunpowder, crossing the city's compactness pierced by the spokes of underground passages. A map of Esmeralda should include, marked in different colored inks, all these routes, solid and liquid, evident and hidden. It is more difficult to fix on the map the routes of swallows, who cut the air over the roofs, dropping long invisible parabolas with their still wings, darting to gulp a mosquito, spiraling upward, grazing a pinnacle, dominating from every point of their airy paths all the points of the city.

Stretching in front of you, you can see the canal washes out to the river. Above the canal and blocking your view is a strange bridge. You can hear the cries and sighs of murderers on their way to the gallows and know that you are not the first to cross this bridge and you will not be the last. A quiet passerby gently bumps your shoulder as you look out to the sea.

"It is a cold night to be watching the bridge of sighs," the man says, "but I think every night is cold if you look at the bridge…….."

"It's a pretty bridge," you say, "but where does this one lead? I'm trying to find a friend

of a friend, who may have stopped here. If I read you this passage written by him, could

you point me in the right direction?"

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not repeat, because the city was so constructed that its every point would be reflected in

its mirror, and the Valdrada down in the water contains not only all the flutings and

juttings of the facades that rise above the lake, but also the rooms' interiors with ceilings

and floors, the perspective of the halls, the mirrors of the wardrobe.

Valdrada's inhabitants know that each of their actions is, at once, that action and its

mirror-image, which possesses the special dignity of images, and this awareness prevents

them from succumbing for a single moment to chance and forgetfulness. Even when

lovers twist their naked bodies, skin against skin, seeking the position that will give one

the most pleasure in the other, even when murderers plunge the knife into the black veins

of the neck and more clotted blood pours out the more they press the blade that slips

between the tendons, it is not so much their copulating or murdering that matters as the

copulating or murdering of the images, limpid and cold in the mirror.

At times the mirror increases a thing's value, at times denies it. Not everything that seems

valuable above the mirror maintains its force when mirrored. The twin cities are not

equal, because nothing that exists or happens in Valdrada is symmetrical: every face and

gesture is answered, from the mirror, by a face and gesture inverted, point by point. The

two Valdradas live for each other, their eyes interlocked; but there is no love between them.

The stranger says, "I can't tell you if you are heading in the right direction, but you are in the correct city. This Valdrada exists all around and in every city. I believe your friend has been here. Keep reading the book, it will guide you through the city. As long as what you read matches what you see, then you are in the right place."

. . .

Isaura, the city of a thousand wells, is said to rise over a deep, subterranean lake. On all sides, wherever the inhabitants dig long vertical holes in the ground, they succeed in drawing up water, as far as the city extends, and no further. Its green border repeats the dark outline of the buried lake; an invisible landscape conditions the visible one; everything that moves in the sunlight is driven by the lapping wave enclosed beneath the rock's calcareous sky.

Consequently, two forms of religion exist in Isaura.

The city's gods, according to some people, live in the depths, in the black lake that feeds the underground streams. According to others, the gods live in the buckets that rise, suspended from a cable, as they appear over the edge of the wells, in the revolving pulleys, in the windlasses of the norias, in the pump handles, in the blades of the windmills that draw the water up from the drillings, in the trestles that support the twisting probes, in the reservoirs perched on stilts over the roofs, in the slender arches of the aqueducts, in all the columns of water, the vertical pipes, the plungers, the drains, all the way up to the weathercocks that surmount the airy scaffoldings of Isaura, a city that moves entirely upward.

Walk through the dark alley to find the well.

. . .

In Chloe, a great city, the people who move through the streets are all strangers. At each encounter, they imagine a thousand things about one another; meetings which could take place between them, conversations, surprises, caresses, bites. But no one greets anyone; eyes lock for a second, then dart away, seeking other eyes, never stopping.
A girl comes along, twirling a parasol on her shoulder, and twirling slightly also her rounded hips. A woman in black comes along, showing her full age, her eyes restless beneath her veil, her lips trembling. A tattooed giant comes along; a young man with white hair; a female dwarf; two girls, twins, dressed in coral. Something runs among them, an exchange of glances like lines that connect one figure with another and draw arrows, stars, triangles, until all combinations are used up in a moment, and other characters come on to the scene: a blind man with a cheetah on a leash, a courtesan with an ostrich-plume fan, an ephebe, a Fat Woman. And thus, when some people happen to find themselves together, taking shelter from the rain under an arcade, or crowding beneath an awning of the bazaar, or stopping to listen to the band in the square, meetings, seductions, copulations, orgies are consummated among them without a word exchanged, without a finger touching anything, almost without an eye raised.
A voluptuous vibration constantly stirs Chloe, the most chaste of cities. If men and woman began to lie their ephermal dreams, every phantom would become a person with whom to begin a story of pursuits, pretenses, misunderstandings, clashes, oppressions, and the carousel of fantasies would stop.

. . .

In the center of Fedora, that gray stone metropolis, stands a metal building with a crystal glove in every room. Looking into each globe, you see a blue city, the model of a different Fedora. These are the forms the city could have taken if, for one reason or another, it had not become what we see today. In every age someone, looking at Fedora as it was, imagined a way of making it the ideal city, but while he constructed his miniature model, Fedora was already no longer the same as before, and what had been until yesterday a possible future became only a toy in a glass globe.

The building with the globes is now Fedora's museum: every inhabitant visits it, chooses the city that corresponds to his desires, contemplates it, imagining his reflection in the medusa pond that would have collected the waters of the canal (if it had not been dried up), the view from the high canopied box along the avenue reserved for elephants (now banished from the city), the fun of sliding down the spiral, twisting minaret (which never found a pedestal from which it rise).

On the map of your empire, O Great Khan, there must be room both for the big, stone Fedora and the little Fedoras in glass globes. Not because they are all equally real, but because all are only assumptions.

The one contains what is accepted as necessary when it is not yet so; the others, what is imagined as possible and, a moment later, is possible no longer.

. . .

A breeze rushes past you and you smell the salty brine of sea water. Looking beyond the intricate columns and bustle you see the blue glint of sunlight reflecting from the ocean. Boats glide delicately across the surface and you began walking towards the breeze.

When a man rides a long time through wild regions, he feels the desire for a city. Finally, he comes to Isidora, a city where the buildings have spiral staircases encrusted with spiral seashells, where perfect telescopes and violins are made, where the foreigner hesitating between two women always encounters a third, where cockfights degenerate into bloody brawls among the bettors. He was thinking of all these things when he desired a city. Isidora, therefore, is the city of his dreams: with one difference. The dreamed-of city contained him as a young man; he arrives at Isidora in his old age. In the square there is the wall where the old men sit and watch the young go by; he is seated in a row with them. Desires are already memories.

<div align="center">. . .</div>

The Great Khan has dreamed of a city; he describes it to Marco Polo:

"The harbor faces north, in shadow. The docks are high over the black water, which slams against the retaining walls; stone steps descend, made slippery by seaweed. Boats smeared with tar are tied up, waiting for the departing passengers lingering on the quay to bid their families farewell. The farewells take place in silence, but with tears. It is cold; all wear shawls over their heads. A shout from the boatman puts a stop to the delays; the traveler huddles at the prow, moves off looking toward the group of those remaining behind; from the shore his features can no longer be discerned; on the ladder a diminished form climbs up, vanishes; the rusted chain is heard being raised, scraping against the hawsepipe. The people remaining behind look over the ramparts above the rocks of the pier, their eyes following the ship until it rounds the cape; for the last time they wave a white rag.

"Set out, explore every coast, and seek this city," the Khan says to Marco. "Then come back and tell me if my dream corresponds to reality."

"Forgive me, my lord, there is no doubt that sooner or later I shall set sail from that dock," Marco says, "but I shall not come back to tell you about it. The city exists and it has a simple secret: it knows only departures, not returns."

<p style="text-align:center">. . .</p>

You know now that Marco Polo has left this city and sailed to another. You too must sail to a new city. Board the Gondola and continue your search.

Appendix 2

Information Nodes of Landscape Architecture Principles used in the Bookscapes

program

Information Nodes appear as small glowing/pulsating spheres that the user can click on

that will then bring up a slightly transparent rectangle with information on it about the

architecture/planning of the area/object. The corresponding pop-up screen contains the

information.

1 The Canal System

[located near the Bridge of Sighs]

Venice was first established around 400 B.C. as a place of refuge from

attacking Huns. The city began as a system of families on disconnected islands on the

Lagoon. As the citizens increased in association, they built bridges to more easily

communicate with each other. Bridge building increased as stronger materials became

available and the city became unified. These canal systems, designed by early Venetian

architects, are still used today as one of the main means of transportation throughout the

city. There are no cars or buses in Venice, but there are Gondolas and boats.

2 Alleyways

[located in the alleyway between the Piazza san Marco and the Bridge of Sighs]

Because Venice is a system of islands connected by bridges, it is easier to

walk than bike, and its impossible to drive. Alleyways are the urban planning answer to

the question of transportation. Alleyways are human sized transportation systems, too

small for cars, but just right for humans to walk. Alleyways promote walkability and

provide shady areas for shops and homes.

3 The Venetian Well System

[located in the piazzetta after the alleyway]

Venice sits on a Brackish Lagoon. For the residence to survive they developed a well system to provide fresh water. Wells like this one were placed all around Venice. These wells pulled rainwater through a pipe system and then strained through layers of sand up to the surface, ready to drink. This impressive urban planning feature contributes directly to early Venetian survival on a secluded lagoon.

4 The Piazza San Marco

[located in the center of the Piazza San Marco]

This large open space is called the Piazza San Marco, or Saint Mark's Plaza, named for the large Basilica which sits on the Eastern end of the Piazza. Piazzas were, and still are today, important gathering places. This specific plaza was used as congregations gathered to enter the Basilica, to hear news of the city, or simply to shop under the surrounding arcades and alleys.

5 Arcades

[located near the arcade on the right, the first arcade after the piazzetta with the well]

Sheltered walkways, called "Arcades" contribute to the life of the street in Venetian Plazas and other urban areas. Arcades are important architectural elements, generally shaped in a repeating arc pattern, and are usually built over shops/restaurants to provide safe and dry areas for consumers and city-goers.

6 Campanile di San Marco

[located on the Bell Tower in the Piazza san Marco]

This Campanile, or Bell Tower, was used to alert the citizens of Venice of important events, such as political announcements or funerals. The Campanile also rings to call worshipers to the Basilica. The Campanile is an important architectural tool created for the widescale communication of Venetian citizens.

7 Piazzettas

[located in the Piazzetta leading to the docks south of the Piazza san Marco]

Piazzettas are smaller squares next to the larger Piazzas. The Piazzetta serves as an extension and gateway to and from the Piazza.

8 Glass as an Export, Venice as a Port City

[located on one of the lampposts in the smaller Piazzetta near the docks south of the Piazza san Marco]

In the 1400s Venice had established itself as a major port city. Venice thrived off the trade of merchant ships. One of the most crucial exports Venice traded to these merchants was Glass. The art of glass making contributed to the shaping of Venice. To this day, tourists come to see the art of glassmaking in the small islands surrounding Venice, particularly beads and mirrors on the island of Murano. Glass also contributed to the architecture and style of the city.

Appendix 3

A Proposed Study for Comparison of Contemporary Educational Methods Against

Immersive Virtual Environments in Interest, Engagement, and Understanding of

Landscape Architecture

INTRODUCTION

How can visual exposure to landscape architecture using immersive virtual environments help promote literacy? Can students who use immersive virtual environments have greater interest, engagement, and understanding of Landscape Architecture than students who study with current educational 2D methods This thesis focuses on the creation of Bookscapes and the research and theories available that guided its creation. If someone wanted to determine the validity and reliability of the program, they could conduct a study that to look at engagement, immersion, and education in Bookscapes. The purpose of Bookscapes is to provide an immersive, and virtual environment that can successfully communicate the principles of landscape architecture and urban planning through the melding of landscapes and narrative. Testing Bookscapes with this study will determine if Bookscapes is a successful blending of narrative and landscape architecture in the education of urban planning principles.

This study consists of a pre-survey, an intervention, and a post-survey. These components will be discussed below along with a proposed sample size.

A HYPOTHESIZED STUDY

Sample

The proposed sample for this study would be drawn from college students at Utah State University, or a comparable University. This sample will be collected via fliers, emails, and word of mouth.

Utah State University was selected based on distance from Venice, Italy where the narrative in Bookscapes takes place. According to Kaplan, to create a restorative environment the environment must meet the criteria of *Extent,* which is measured by how much the user feels they are immersed in the environment. Utah State University is physically far from Venice, combined with a mountainous and arid climate as opposed to Venice, which is a floating island with little to no vegetation. Students from this school have few reasons to visit Venice, which allows the experience of visiting the city to be a novelty. However, if this is not the case, the pre-survey has been designed to test for this in order to eliminate response bias.

Selected college students must be older than 18 and currently enrolled in classes. Students who have had prior negative reactions to virtual environments, are legally blind, or do not read or write in English will be excluded from the study because of the difficulty they will experience in interacting with the program. An exception for non-English speaking/writing students can be made, if an interpreter is provided and the student is given a private room to not interfere with another student's immersion process with the program.

A target of 100 students is required for an ideal sample size for this study, with an average of 50 males, and 50 females. This study is open to all enrolled students. Utah State University currently has an enrollment count of nearly 18,500 students on Logan Campus. Survey recruitment will target a broad swath of students, instead of focusing on

any one department. However, the pre-survey and post-test have been designed to test for this possibility.

Students will be randomly sorted into either the control group or the experimental group. An example of a suitable randomization technique is placing every other volunteer in either the control group or experimental group as they show up to the experiment.

Pre-Survey

Prior to beginning the intervention, and regardless of being in the control group or experimental group, all participants will complete a pre-survey. The intention of the pre-survey is to gauge interest and prior knowledge of Italy, video games, reading, and landscape architecture. This is used to control for outliers in previous knowledge domains as well as gauge compatibility with the landscapes and narrative provided in Bookscapes. Testing for compatibility is important in testing for restorative landscapes (Kaplan, 1995). It is unknown if a student's prior visitation to Venice, Italy will aid in the immersion and education in the use of Bookscapes, this Pre-Survey will help unravel this question.

It has also been found that students with a slight familiarity with video games benefit the most from virtual learning environments (Virvou, 2008).This is because avid video gamers find VRLEs too limited while novice video gamers struggle to understand the mechanics utilized in navigating video games. Novice players spend more energy on learning to understand movement mechanics such as mouse clicks and player navigation than on retaining the provided information. Gamers with a limited amount of experience benefit from understanding movement mechanics while not exceeding expectation. These

levels of gamers are best suited to learn from a virtual environment. The pre-survey will control for this difference in gaming levels.

The pre-survey contains four sections. These sections are:

- Previous Experience with Literacy

- Previous Experience with Travel

- Previous Experience with Landscape Architecture

- Previous Experience with Video Games/Virtual Reality

Intervention

Control Group

The Control Group will be working through the traditional paper packet which was created for this thesis as a conventional educational instrument. This packet begins the same way as the Bookscapes Program with a sketch of the Piazza San Marco and an introduction to the narrative with a call to action for the user to help Kublai Khan by searching for Marco Polo in Venice, Italy with a provided manuscript written by Marco Polo. The packet contains the same narrative provided in the PC-based program version as well as real images of the Piazza San Marco with the same urban planning principles described next to the images.

The control group will be placed in a different room as the experimental group and will make up half of the participants. These participants will sit down at a desk in a traditional educational style and work their way through the pre-test, the paper packet, and the post test. No pressure should be placed on the students to work though the packet within a specific time. All students will be encouraged to only do as much of the packet

of they feel they would like to do. This will test interest in either the paper packet or the
virtual learning environment.

Experimental Group

The other half of the participants will be randomly placed in the experimental
group. These students will do the same pre-survey as the control group and then will
work through the virtual learning environment. Participants will not be placed under a
time restriction so as to observe the student's fascination with the study instruments.
However, if is expected that the experiment will take no more than an hour per
participant. Similar to the control group, these participants will be encouraged to only do
as much of the program as they feel they would like to do. This will test interest in either
the paper packet or the virtual learning environment. The use of incentives is encouraged
and is left to the researcher's discretion.

When the participants have finished working through the virtual learning
environment, they will take a post test.

Post-Test and Data Analysis

Once the students finish reading their respective narratives, they will complete a
post-test to gauge their interest in reading more of the book, their understanding of
landscape architecture principles, as well as immersion, affect, and compatibility. The
post-test is provided in Appendix 4.

The post-test contains seven sections. These sections are:

- Landscape Architecture and Literacy

- Immersion

- Interest/Enjoyment

- Presence

- Pressure/Tension

- Value/Usefulness

- Other/Additional Comments

These sections have been adapted from the PENS survey by Jodi Clarke-Midura (2018) and have been designed to test the success of Bookscapes in being an educational tool, as well as an immersive tool. The researchers may add or amend these sections as needed as new research comes available in this field.

All data will be analyzed against the pre-survey to determine the success of the Bookscapes Program in answering the research question. The method of data analysis is left to the discretion of the researchers.

Appendix 4
A Paper Packet Equivalent of the Computer-Based Bookscapes Program

Bookscapes

Below is a manuscript from Marco Polo of his Travels, commissioned by the great Kublai Khan

The Great Khan has kept the records left by Polo and poured over them. It has been several months now since the explorer left the Kahn's palace in the search for information on the cities in Kublai Khan's vast empire. Polo has never been away so long, and yesterday a rough manuscript was delivered to Kublai. Words hastily written on torn paper describing several cities that are one city. The Khan has now grown worried and sends an emissary out to find him. The Khan also sends with his emissary a copy of the manuscript to use to track Marco Polo with his own words.

Continue reading to enter Marco Polo's home city of Venice to search for him using notes from his journal.

…

A Record by Marco Polo, for the Great Kublai Khan, describing his travels across the world, what cities he has seen and what cities are invisible.

…

Phyllis

When you have arrived at Phyllis, you rejoice in observing all the bridges over the canals, each different from the others: cambered, covered, on pillars, on barges, suspended, with tracery balustrades. And what a variety of windows looks down on the streets: mullioned. Moorish, lancet, pointed, surmounted by lunettes or stained- glass roses; how many kinds of pavement over the ground: cobbles, slabs, gravel, blue and white tiles. At every point the city offers surprises to your view: a carpet bush jutting from the fortress' walls, the statues of three queens on corbels, an onion dome with three smaller onions threaded on the spire. "Happy the man who has

Phyllis before his eyes each day and who never ceases seeing the things it contains," you cry, with regret at having to leave the city when you can barely graze it with your glance. But it also happens that, instead, you must stay in Phyllis and spend the rest of your days there. Soon the city fades before your eyes, the rose windows are expunged, the statues on the corbels, the domes. Like all of Phyllis's inhabitants, you follow zigzag lines from one street to another, you distinguish the patches of sunlight from the patches of shade, a door here, a stairway there, a bench where you can put down your basket, a hole where your foot stumbles if you are not careful. All the rest of the city is invisible. Phyllis is a space in which routes are drawn between points suspended in the void: the shortest way to reach that certain merchant's tent, avoiding that certain creditor's window. Your footsteps follow not what is outside the eyes, but what is within, buried, erased.

If, of two arcades, one continues to seem more joyous tit is because thirty years ago a girl when by there, with broad, embroidered sleeves, or else it is only because that arcade catches the light at a certain hour like that other arcade, you cannot recall where. Millions of eyes look up at windows, bridges, capers, and they might be scanning a blank page. Many are the cities like Phyllis, which elude the gaze of all, except the man who catches them by surprise.

The streets are eerily quiet at this time of day and before you is a bridge stretching over a slender canal. Go forward and cross the bridge.

. . .

Esmerelda

In Esmerelda, city of water, a network of canals and a network of streets span and intersect each other. To go from one place to another you have always the choice between land and boat: and since the shortest distance between two points in Esmeralda is not a straight line but a zigzag that ramifies in tortuous optional routes, the ways that open to each passerby are never two, but many, and they increase further for those who alternate a stretch by boat with one on dry land. And so Esmeralda's inhabitant are spared the boredom of following the same streets every day. And that is not all: the network of routes is not arranged on one level, but follows instead an up-and-down course of steps, landings, cambered bridges, hanging streets. Combining segments of the various routes, elevated or on ground level, each inhabitant can enjoy every day the pleasure of a new itinerary to reach the same places. The most fixed and calm lives in Esmeralda are spent without any repetition. Secret and adventurous lives, here as elsewhere, are subject to greater restrictions. Esmeralda's cats, thieves, illicit lovers move along higher, discontinuous ways, dropping from a rooftop to a balcony, following utterings with

acrobats' steps. Below, the rats run in the darkness of the sewers, one behind the other's tail, along with conspirators and smugglers: they peep out of manholes and drainpipes, they slip through double bottoms and ditches, from one hiding place to another they drag crusts of cheese, contraband goods, kegs of gunpowder, crossing the city's compactness pierced by the spokes of underground passages. A map of Esmeralda should include, marked in different colored inks, all these routes, solid and liquid, evident and hidden. It is more difficult to fix on the map the routes of swallows, who cut the air over the roofs, dropping long invisible parabolas with their still wings, darting to gulp a mosquito, spiraling upward, grazing a pinnacle, dominating from every point of their airy paths all the points of the city.

Stretching in front of you, you can see the canal washes out to the river. Above the canal and blocking your view is a strange bridge. You can hear the cries and sighs of murderers on their way to the gallows and know that you are not the first to cross this bridge and you will not be the last. A quiet passerby gently bumps your shoulder as you look out to the sea.

"It is a cold night to be watching the bridge of sighs," the man says, "but I think every night is cold if you look at the bridge   "

"It's a pretty bridge," you say, "but where does this one lead? I'm trying to find a friend of a friend, who may have stopped here. If I read you this passage written by him, could you point me in the right direction?"

The ancients built Valdrada on the shores of a lake, with houses all verandas one above the other, and high streets whose railed parapets look out over the water. Thus, the traveler, arriving, sees two cities" one erect above the lake, and the other reflected, upside down. Nothing exists or happens in the one Valdrada that the other Valdrada does not repeat, because the city was so constructed that its every point would be reflected in its mirror, and the Valdrada down in the water contains not only all the flutings and juttings of the facades that rise above the lake, but also the rooms' interiors with ceilings and floors, the perspective of the halls, the mirrors of the wardrobe.

Valdrada's inhabitants know that each of their actions is, at once, that action and its mirror-image, which possesses the special dignity of images, and this awareness prevents them from succumbing for a single moment to chance and forgetfulness. Even when lovers twist their naked bodies, skin against skin, seeking the position that will give one the most pleasure in the other, even when murderers plunge the knife into the black veins of the neck and more clotted blood pours out the more they press the blade that slips between the tendons, it is not so much their copulating or murdering that matters as the copulating or murdering of the images, limpid and cold in the mirror.

At times the mirror increases a thing's value, at times denies it. Not everything that seems valuable above the mirror maintains its force when mirrored. The twin cities are not equal, because nothing that exists or happens in Valdrada is symmetrical: every face and gesture is answered, from the mirror, by a face and gesture inverted, point by point. The two Valdradas live for each other, their eyes interlocked; but there is no love between them. The stranger says, "I can't tell you if you are heading in the right direction, but you are in the correct city. This Valdrada exists all around and in every city. I believe your friend has been here. Keep reading the book, it will guide you through the city. As long as what you read matches what you see, then you are in the right place."

. . .

Isuara

Isaura, the city of a thousand wells, is said to rise over a deep, subterranean lake. On all sides, wherever the inhabitants dig long vertical holes in the ground, they succeed in drawing up water, as far as the city extends, and no further. Its green border repeats the dark outline of the buried lake; an invisible landscape conditions the visible one; everything that moves in the sunlight is driven by the lapping wave enclosed beneath the rock's calcareous sky.

Consequently, two forms of religion exist in Isaura.

The city's gods, according to some people, live in the depths, in the black lake that feeds the underground streams. According to others, the gods live in the buckets that rise, suspended from a cable, as they appear over the edge of the wells, in the revolving pulleys, in the windlasses of the norias, in the pump handles, in the blades of the windmills that draw the water up from the drillings, in the trestles that support the twisting probes, in the reservoirs perched on stilts over the roofs, in the slender arches of the aqueducts, in all the columns of water, the vertical pipes, the plungers, the drains, all the way up to the weathercocks that surmount the airy scaffoldings of Isaura, a city that moves entirely upward.

Walk through the dark alley to find the well.

. . .

Chloe

In Chloe, a great city, the people who move through the streets are all strangers. At each encounter, they imagine a thousand things about one another; meetings which could take place between them, conversations, surprises, caresses, bites. But no one greets anyone; eyes lock for a second, then dart away, seeking other eyes, never stopping.

A girl comes along, twirling a parasol on her shoulder, and twirling slightly also her rounded hips. A woman in black comes along, showing her full age, her eyes restless beneath her veil, her lips trembling. A tattooed giant comes along; a young man with white hair; a female dwarf; two girls, twins, dressed in coral. Something runs among them, an exchange of glances like lines that connect one figure with another and draw arrows, stars, triangles, until all combinations are used up in a moment, and other characters come on to the scene: a blind man with a cheetah on a leash, a courtesan with an ostrich-plume fan, an ephebe, a Fat Woman. And thus, when some people happen to find themselves together, taking shelter from the rain under an arcade, or crowding beneath an awning of the bazaar, or stopping to listen to the band in the square, meetings, seductions, copulations, orgies are consummated among them without a word exchanged, without a finger touching anything, almost without an eye raised.

A voluptuous vibration constantly stirs Chloe, the most chaste of cities. If men and woman began to lie their ephermal dreams, every phantom would become a person with whom to begin a story of pursuits, pretenses, misunderstandings, clashes, oppressions, and the carousel of fantasies would stop.

. . .

Fedora

In the center of Fedora, that gray stone metropolis, stands a metal building with a crystal glove in every room. Looking into each globe, you see a blue city, the model of a different Fedora. These are the forms the city could have taken if, for one reason or another, it had not become what we see today. In every age someone, looking at Fedora as it was, imagined a way of making it the ideal city, but while he constructed his miniature model, Fedora was already no longer the same as before, and what had been until yesterday a possible future became only a toy in a glass globe.
The building with the globes is now Fedora's museum: every inhabitant visits it, chooses the city that corresponds to his desires, contemplates it, imagining his reflection in the medusa pond that would have collected the waters of the canal (if it had not been dried up), the view from the high canopied box along the avenue reserved for elephants (now banished from the city), the fun of sliding down the spiral, twisting minaret (which never found a pedestal from which it rise).
On the map of your empire, O Great Khan, there must be room both for the big, stone Fedora and the little Fedoras in glass globes. Not because they are all equally real, but because all are only assumptions.

The one contains what is accepted as necessary when it is not yet so; the others, what is imagined as possible and, a moment later, is possible no longer,

. . .

Isidora

A breeze rushes past you and you smell the salty brine of sea water. Looking beyond the intricate columns and bustle you see the blue glint of sunlight reflecting from the ocean. Boats glide delicately across the surface and you began walking towards the breeze.

When a man rides a long time through wild regions, he feels the desire for a city. Finally, he comes to Isidora, a city where the buildings have spiral staircases encrusted with spiral seashells, where perfect telescopes and violins are made, where the foreigner hesitating between two women always encounters a third, where cockfights degenerate into bloody brawls among the bettors. He was thinking of all these things when he desired a city. Isidora, therefore, is the city of his dreams: with one difference. The dreamed-of city contained him as a young man; he arrives at Isidora in his old age. In the square there is the wall where the old men sit and watch the young go by; he is seated in a row with them. Desires are already memories.

The wall where the old men sit and watch the young go by; he is seated in a row with them. Desires are already memories.

. . .

The Great Khan has dreamed of a city; he describes it to Marco Polo:
"The harbor faces north, in shadow. The docks are high over the black water, which slams
against the retaining walls; stone steps descend, made slippery by seaweed. Boats
smeared with tar are tied up, waiting for the departing passengers lingering on the quay to
bid their families farewell. The farewells take place in silence, but with tears. It is cold; all
wear shawls over their heads. A shout from the boatman puts a stop to the delays; the
traveler huddles at the prow, moves off looking toward the group of those remaining
behind; from the shore his features can no longer be discerned; on the ladder a
diminished form climbs up, vanishes; the rusted chain is heard being raised, scraping
against the hawsepipe. The people remaining behind look over the ramparts above the
rocks of the pier, their eyes following the ship until it rounds the cape; for the last time
they wave a white rag. "Set out, explore every coast, and seek this city," the Khan says to
Marco. "Then come back and tell me if my dream corresponds to reality."
"Forgive me, my lord, there is no doubt that sooner or later I shall set sail from that dock,"
Marco says, "but I shall not come back to tell you about it. The city exists and it has a
simple secret: it knows only departures, not returns."

. . .

You know now that Marco Polo has left this city and sailed to another. You too must sail
to a new city. Board the Gondola and continue your search.

Bookscapes
Below is a list of urban design and architectural features existing in Venice, Italy

The Canal System

Venice was first established around 400 B.C. as a place of refuge from attacking Huns. The city began as a system of families on disconnected islands on the Lagoon. As the citizens increased in association they built bridges to more easily communicate with each other. Bridge building increased as stronger materials became available and the city became unified. These canal systems, designed by early Venetian architects, are still used today as one of the main means of transportation throughout the city. There are no cars or buses in Venice, but there are Gondolas and boats.

Alley ways

Because Venice is a system of islands connected by bridges, it is easier to walk than bike, and its impossible to drive. Alleyways are the urban planning answer to the question of transportation. Alleyways are human sized transportation systems, too small for cars, but just right for humans to walk. Alleyways promote walkability and provide shady areas for shops and homes.

The Venetian Well System

Venice sits on a Brackish Lagoon. For the residence to survive they developed a well system to provide fresh water. Wells like this one were placed all around Venice. These wells pulled rainwater through a pipe system and then strained through layers of sand up to the surface, ready to drink. This impressive urban planning feature contributes directly to early Venetian survival on a secluded lagoon.

The Piazza San Marco

This large open space is called the Piazza San Marco, or Saint Mark's Plaza, named for the large Basilica which sits on the Eastern end of the Piazza. Piazzas were, and still are today, important gathering places. This specific plaza was used as congregations gathered to enter the Basilica, to hear news of the city, or simply to shop under the surrounding arcades and alleys.

Arcades

Sheltered walkways, called "Arcades" contribute to the life of the street in Venetian Plazas and other urban areas. Arcades are important architectural elements, generally shaped in a repeating arc pattern, and are usually built over shops/restaurants to provide safe and dry areas for consumers and city-goers.

Campanile di San Marco

This Campanile, or Bell Tower, was used to alert the citizens of Venice of important events, such as political announcements or funerals. The Campanile also rings to call worshipers to the Basilica. The Campanile is an important architectural tool created for the widescale communication of Venetian citizens.

Piazzettas

Piazzettas are smaller squares next to the larger Piazzas. The Piazzetta serves as an extension and gateway to and from the Piazza.

Glass as an Export, Venice as a Port City

In the 1400s Venice had established itself as a major port city. Venice thrived off the trade of merchant ships. One of the most crucial exports Venice traded to these merchants was Glass. The art of glass making contributed to the shaping of Venice. To this day, tourists come to see the art of glassmaking in the small islands surrounding Venice, particularly beads and mirrors on the island of Murano. Glass also contributed to the architecture and style of the city.

Appendix 5
Pre-Survey Questionnaire designed to gather user information before participating in the proposed study

Id. Number _____
Pre-Survey Questionnaire
Circle your most accurate response for each statement.
Previous Experience with Literacy
1. Rank your skill level at reading.

Unskilled			Average		Highly Skilled
1	2	3	4	5	6
7					

2. I enjoy reading.

Strongly Disagree			Neutral		Strongly Agree
1	2	3	4	5	6
7					

3. I have trouble visualizing when I read.

Strongly Disagree			Neutral		Strongly Agree
1	2	3	4	5	6
7					

4. I read for fun at least once a week.

Strongly Disagree			Neutral		Strongly Agree
1	2	3	4	5	6
7					

5. I read for fun at least once a month.

Strongly Disagree			Neutral		Strongly Agree
1	2	3	4	5	6
7					

6. Circle your favorite genres of books you enjoy reading from the below word bank.
   [as many as apply]

Fantasy	Comic Books	Children's Books	Gardening	Historical Fiction
Mystery				
Sci Fi	Sports	Classic Literature	Self-Help	Horror
Drama				
Non-Fiction	History	Poetry	Romance	True Crime
Health				

Other genres not listed above that you also enjoy:

_____ _____ _____ _____ _____

Previous Experience with Travel

1.I enjoy traveling.

Strongly Disagree   Neutral   Strongly Agree

      1   2   3   4   5   6

      7

2. I have been to Italy.

Yes   No

[If yes, please state where you visited/lived]

_____

3.I do not enjoy being outside.

Strongly Disagree   Neutral   Strongly Agree

      1   2   3   4   5   6

      7

4. I enjoy urban [city] environments.

Strongly Disagree   Neutral   Strongly Agree

      1   2   3   4   5   6

      7

Previous Experience with Landscape Architecture

1. I have a firm understanding of the principles of Landscape Architecture.

Strongly Disagree   Neutral   Strongly Agree

      1   2   3   4   5   6

      7

2. I am interested in learning more about Landscape Architecture.

Strongly Disagree   Neutral   Strongly Agree

      1   2   3   4   5   6

      7

3. I have worked an outdoor construction or maintenance job before.

Strongly Disagree   Neutral   Strongly Agree

      1   2   3   4   5   6

      7

4. I have taken/or am currently enrolled in a Landscape Architecture Class
   Strongly Disagree   Neutral   Strongly
   Agree
        1   2   3   4   5   6
        7

Previous Experience with Video Games/Virtual Reality

1. I enjoy virtual reality.
   Strongly Disagree   Neutral   Strongly
   Agree
        1   2   3   4   5   6
        7

2. Rank your skill level at video games.
   Unskilled   Average   Highly
   Skilled
        1   2   3   4   5   6
        7

3. I have used virtual reality before today.
   Yes   No

4. I enjoy being in virtual reality. [Choose NA if you have never played before]
   Strongly Disagree   Neutral   Strongly
   Agree
   1   2   3   4   5   6
        7   NA

5. I get nauseous or get headaches in virtual reality. [Choose NA if you have never played before]
   Strongly Disagree   Neutral   Strongly
   Agree
   1   2   3   4   5   6
        7   NA

Previous Experience with Landscape Architecture
   1. Briefly describe what you believe the field of landscape architecture is.
1. State your Gender
2. State your Age:

3. State all past and current majors and minors at any university you have/ or are attending:

Appendix 6
Post test designed to test interest, immersion, and education from using
Bookscapes

Id. Number _____

Post Test
Circle your most accurate response for each statement [unless otherwise stated].
Landscape Architecture and Literacy
1. I feel that I learned about Landscape Architecture from this program.
   Strongly Disagree   Neutral   Strongly
   Agree
   1   2   3   4   5   6   7

2. I am interested in learning more about Landscape Architecture in the Future.
   Strongly Disagree   Neutral   Strongly
   Agree
   1   2   3   4   5   6   7

3. The sheltered walkway [pictured below] is called a[n] _____
   _____ and it is created through the repetition of _____ .

4. Use the below word bank to match the words to their picture.

   Word Bank
   A. Piazza
   B. Champanile
   C. Piazetta

5. What transportation system does the below picture portray?

_____
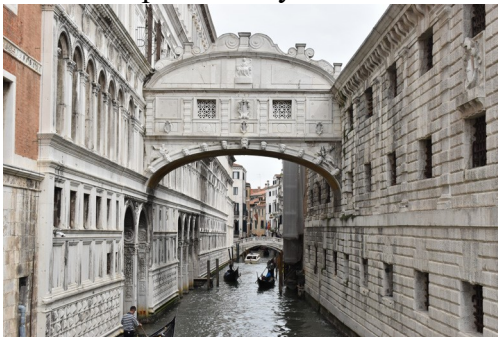
6. Which feature is shown below? Briefly describe why this feature is necessary in Venice.

_____

_____

_____

7. What human-sized transportation feature is portrayed below?

_____

8. What architectural material became a major export of Venice, beginning in the 14th century?

1. I feel like I learned from this game.

| Strongly Disagree | | Neutral | | Strongly Disagree | |
| 1 | 2 | 3 | 4 | 6 | 7 |

2. Reading a narrative helped me understand my environment.

| Strongly Disagree | | Neutral | | Strongly Disagree | |
| 1 | 2 | 3 | 4 | 6 | 7 |

3. I would choose this program to read if it were available to me.

| Strongly Disagree | | Neutral | | Strongly Disagree | |
| 1 | 2 | 3 | 4 | 6 | 7 |

4. I want to read this book on my own time, in any format [paper, digital, audio etc].

| Strongly Disagree | | Neutral | | Strongly Disagree | |
| 1 | 2 | 3 | 4 | 6 | 7 |

5. I prefer this program over a paper book for reading.

| Strongly Disagree | | Neutral | | Strongly Disagree | |
| 1 | 2 | 3 | 4 | 6 | 7 |

6. I prefer this program over traditional learning for my education.

| Strongly Disagree | | Neutral | | Strongly Disagree | |
| 1 | 2 | 3 | 4 | 6 | 7 |

7. This program helped me understand and visualize what I was reading.

| Strongly Disagree | | Neutral | | Strongly Disagree | |
| 1 | 2 | 3 | 4 | 6 | 7 |

Immersion

1. I felt immersed in the story.

| Strongly Disagree | | Neutral | | Strongly Disagree | |
| 1 | 2 | 3 | 4 | 6 | 7 |

2. I felt like I was physically in the environment portrayed in the game.
Strongly Disagree   Neutral   Strongly Disagree
         1   2   3   4   6   7

3. I felt like the objects in the game could be touched and felt.
Strongly Disagree   Neutral   Strongly Disagree
         1   2   3   4   6   7

4. I felt like I could freely move around in the game.
Strongly Disagree   Neutral   Strongly Disagree
         1   2   3   4   6   7

5. I felt engaged with the text while playing the game.
Strongly Disagree   Neutral   Strongly Disagree
         1   2   3   4   6   7

Interest/Enjoyment
1. The game was a fun activity to do.
Strongly Disagree   Neutral   Strongly Disagree
         1   2   3   4   6   7

2. I thought this game was enjoyable.
Strongly Disagree   Neutral   Strongly Disagree
         1   2   3   4   6   7

3. The enjoyed participating in this game.
Strongly Disagree   Neutral   Strongly Disagree
         1   2   3   4   6   7

4. I would describe this game as interesting.
Strongly Disagree   Neutral   Strongly Disagree
         1   2   3   4   6   7

Presence
1. When playing this game I felt like I was a part of the story.
Strongly Disagree   Neutral   Strongly Disagree
         1   2   3   4   6   7

2. When playing this game I felt like I was actually in the city.
Strongly Disagree   Neutral   Strongly Disagree
         1   2   3   4   6   7

3. The story felt real to me.
Strongly Disagree   Neutral   Strongly Disagree
     1   2   3   4   6   7

Pressure/Tension

1. I felt tense while playing this game.
Strongly Disagree   Neutral   Strongly Disagree
     1   2   3   4   6   7

2. I felt pressured while playing this game.
Strongly Disagree   Neutral   Strongly Disagree
     1   2   3   4   6   7

3. I was anxious while playing this game.
Strongly Disagree   Neutral   Strongly Disagree
     1   2   3   4   6   7

4. I was anxious while playing this game.
Strongly Disagree   Neutral   Strongly Disagree
     1   2   3   4   6   7

5. I felt nauseous while playing this game.
Strongly Disagree   Neutral   Strongly Disagree
     1   2   3   4   6   7

6. I felt physically sick while playing this game.
Strongly Disagree   Neutral   Strongly Disagree
     1   2   3   4   6   7

Value/Usefulness

1. I believe that playing this game could be valuable to me.
Strongly Disagree   Neutral   Strongly Disagree
     1   2   3   4   6   7

2. I believe that playing this game could be good for me.
Strongly Disagree   Neutral   Strongly Disagree
     1   2   3   4   6   7

3. I would be willing to play this game again because I think it has value to me.
Strongly Disagree   Neutral   Strongly Disagree
     1   2   3   4   6   7

Other

Please leave any additional comments you would like the researchers to know about your experience in this study:

Thank you for participating in this study. Please return your finished test to one of the researchers.