Lessons from Livestreaming Fieldtrips: Evaluating an Alternative Fieldtrip Approach in Teaching Landscape Architectural Studios

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Abstract: Improvements in multimedia technology create opportunities to remotely observe places in virtual mode. Our paper focuses on the creation and use of virtual fieldtrips in design studios with the aim of providing an in-field perspective for students, so that they can observe and characterize a 7300-hectare (18000-acre) study area. Specifically, in 2020 and 2021, we assembled and twice employed a livestreaming platform that offers the possibility of conducting site visits virtually. To evaluate the extent to which the virtual fieldtrips helped students characterize the study area, we performed a qualitative analysis using students' feedbacks from an online survey. Results showed that virtual site visits have value as an alternative fieldtrip mode, particularly in saving travel time, and can be improved with higher bandwidth mobile network connections and real-time verbal communication between remote participants and in-field livestreaming hosts. Most importantly, virtual fieldtrips, compared to more traditional media types, e. g., photos and videos, provide a richer context and a dynamic experience, which enhances each student's perception of the study area in both biophysical and socio-cultural dimensions.

Keywords: Virtual fieldtrip, landscape architectural design studio, livestreaming, Central Florida

1 Introduction

Fieldtrips or on-site visits are a method of field observation, an instructional means of providing a first-person perspective of landscape architecture practice in real-time (RANDALL et al. 2007). In terms of pedagogy, the emphasis is on training student designers and planners to become familiar with a place, and to improve their ability to characterize a study area in order to create better designs for the place. Many disciplines use fieldtrips to make instructional connections between different classroom, laboratory, and outdoor environments, such as anthropology, biology, ecology, etc. (SPICER & STRATFORD 2001). In landscape architecture, fieldtrips have been motivated by the culture of professional conceptual thinking. When fieldtrips are motived by stimulating ideas of future alternatives, it is important to create a space for design thinking, learning key themes, topics, and issues, as well as clarifying central design motivations (RANDALL et al. 2007). Therefore, visiting a study area requires a flexible and dynamic approach to support the role of observers/designers within design processes.

The authors, however, faced a dilemma as they organized a fieldtrip for a graduate level landscape architectural studio during the COVID-19 pandemic. Just as fieldtrips are essential in understanding the biophysical and socio-cultural systems of the study area, the health and safety of students are also of paramount importance. Unprecedented events like this cause instructors to experiment with novel approaches to teaching. Powered by live-streaming technology, a virtual fieldtrip allows remote observation of the study area through a first-person perspective. More importantly, it offers a real-time dynamic viewpoint to promote design thinking. Previous studies have devoted efforts to assessing perception, exploring approaches, and

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developing techniques (ARROWSMITH et al. 2005, STODDARD 2009, WALLS 2021), and demonstrated the value of developing a virtual platform to augment traditional teaching. However, livestreaming as an alternative fieldtrip approach has not been well explored, nor has how to define, create and evaluate a platform that satisfactorily integrates the real-time scene and remote communication. This paper summarizes lessons from our attempt to lower the barriers of conducting in-person fieldtrip under extreme circumstances like COVID-19. Specifically, we assembled a live-streaming platform that hosts a virtual tour to explore a 7300-hectare study area in Apopka, Florida (Figure 1). As indicated in the figure, the Studio's design program for the year 2050 required accommodating a projected population growth of 16,000 people (~6100 dwelling units). This became a critical mission of each student's design.

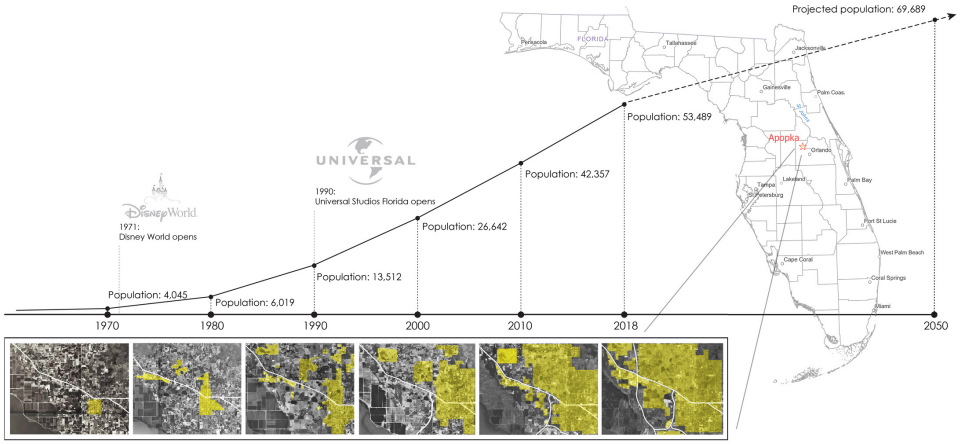

Fig. 1: The location of the Apopka Study Area (red star on inset map of Florida) and a series of maps showing the development timeline (areas in yellow)

The livestreaming platform was introduced to a graduate studio first, and then to an undergraduate studio with two more persons in the field and some technical improvements. To evaluate the usefulness of this platform in teaching landscape planning and design, we surveyed students from both studios. We sought answers regarding the efficacy and educational benefits of a virtual site visit to the curriculum focused on urban growth and landscape change. In the sections that follow, Section 2 provides a detailed description of the livestreaming platform. Section 3 discusses the logistical considerations of a virtual fieldtrip, offering insights based on our experiences of organizing virtual fieldtrips. The fourth section interprets the results of the survey. The concluding section summarizes what we have learned from organizing virtual fieldtrips and discusses potential improvements for future studios.

2 A Live-streaming Platform

We assembled a livestreaming platform (Figure 2), to allow students a more intimate remote experience of the study area. The platform used multiple hardware and software components. On the hardware side, four devices were involved: 1) a GoPro camera, a sports action camera with built-in image stabilization feature; 2) a hotspot emitter generating Wi-Fi signals to

maintain strong and stable internet connection; 3) a smartphone connecting and controlling the GoPro camera; and 4) a tablet setting up a livestreaming service and communicating with viewers.

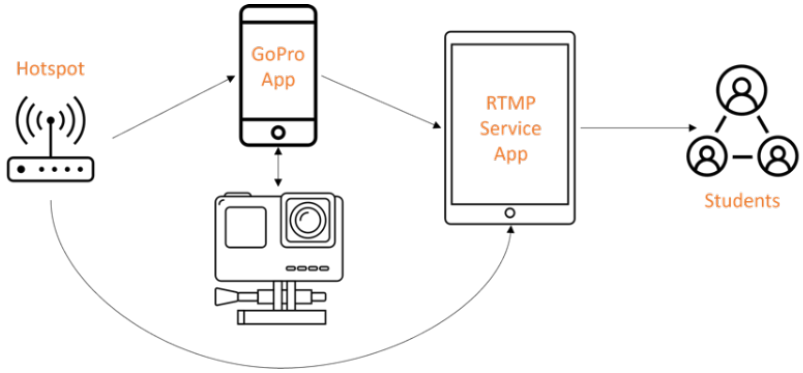

Fig. 2: Live streaming hardware and software

In terms of software, there are many easy-to-use live streaming software platforms, such as YouTube Live, LinkedIn Live, and Twitch. Before broadcasting a live stream, a Real-Time Messaging Protocol (RTMP) server needs to be configured using the selected platform. Facebook Live, in this case, was used. The GoPro Application connects the camera with the smartphone which broadcasts video stream to the RTMP server. Finally, the hotspot service must be purchased from a carrier to have internet access in the field.

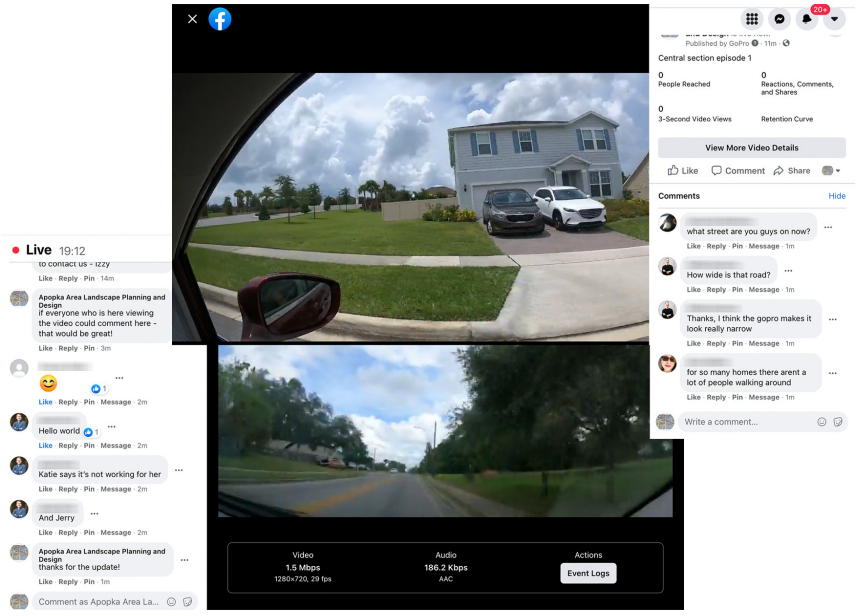

Fig. 3: Livestreaming interface for a viewer (upper right) and the host (lower left) parison of the livestreaming interface between the host and a viewer. The set of equipment and service described here cost, in total, about eight hundred ($800) U.S. dollars.

Figure 3 shows a com parison of the livestreaming interface between the host and a viewer. The set of equipment and service described here cost, in total, about eight hundred ($800) U.S. dollars.

3 Logistical Considerations

The studio described in this paper focuses on design and planning in a portion of the greater metropolitan area of Orlando, Florida particularly around the small town of Apopka. The entire study area is approximately 7300 hectares. Comprehending a study area this extensive in a limited time is challenging, but educationally useful for students. Three teams were formed, each of which virtually visited one-third of the study area through livestreaming in approximately a two-hour period.

3.1 The Field Team

Advance planning and adequate preparation are critical to a successful virtual fieldtrip. To begin, a decision must be made regarding the size of the in-field team, i. e., the task force who will travel to the field to shoot videos and broadcast to students in real-time. Employing the platform described in section 2, there are four independent field team tasks: driving, video shooting, hosting, and communicating in real time with students via the livestreaming service.

Fig. 4: A demonstration of each Field Team member's task during livestreaming a virtual fieldtrip. From right to left, person 1 was shooting the video that is steamed to the RTMP server via the mobile hotspot, person 2 was responsible for taking photos, person 3 was the driver, and person 4 who was carrying the tablet (not shown in the picture) was monitoring and responding to viewers' questions and comments. All four members share the responsibility of hosting the fieldtrip by speaking to the viewers and sharing their impressions.

Figure 4 illustrates these tasks while the Field Team was entering into a community garden in the east section of the study area. All four tasks, perhaps with the exception of the last two, should be carried out by one person, although safety needs (e. g., driving requirements) can alter such a plan. In our case, the field team was comprised of two to four members, who can be comfortably accommodated by a regular sedan.

3.2 Time Constraints

Moreover, time constraints must be recognized at the planning stage of the virtual fieldtrip and treated as one of the top priorities. As to the specific case described in this paper, Field Team needs to drive 2.5 hours each way between the Apopka study area and the main University campus in Gainesville, FL. With two hours of livestreaming for each of three sections of the study area, Field Team has to devote at least 11 hours to the virtual fieldtrip in one day. Therefore, it is important to strike a balance between individual student team's livestreaming time and the time demand from the in-the-field "hosts".

3.3 Equipment Concerns

Arguably, the most important matter is to maintain all the equipment functioning during the entire virtual fieldtrip. It is worth noting that, replacement batteries and mobile chargers are essential in keeping all equipment functioning throughout the entire virtual fieldtrip. In addition, a reliable hotspot service is critical, especially in less populated areas with poorer cell phone service. As such, it makes sense to choose a service provider that offers the best wireless signal in the locality of interest.

3.4 Route Planning

Students were asked to strategize their visits in advance and plan a route they wanted the in-the-field 'hosts' to follow prior to the virtual fieldtrip. Early route planning causes students to research and gain more knowledge about the study area, and to anticipate how much time is actually required to observe a specified territory at the intensity required. During a study area visit, different phenomena in the landscape require different levels of attention to perceive and understand. For example, simply passing by a street can provide a sense of how busy the traffic is, whereas one needs to stand in front of a building to discern the residential density in a neighborhood or the architectural character of the buildings in it. Therefore, it is useful to distinguish between different visiting modes and to ask students to specify the mode for individual locations in their route. Based on past fieldtrip experiences, we classify a site visit in one of three modes: driving, walking, and standing. In this sequence, each mode associates with increasingly detailed observations and, in turn, produces different forms of digital media records of the observations. Specifically, driving only produces the live video; walking allows the host to take still photographs; standing at a fixed point allows the host to take a 360-degree panorama, which provided the most detailed record produced by the fieldtrip.

4 Virtual Fieldtrip Evaluation

Following the implementation of the virtual fieldtrip in two consecutive semesters, we designed an online survey to gain insights regarding the efficacy of this novel approach of site

visit from a student's standpoint. The full questionnaire used for the survey can be found at https://github.com/chjch/LAA6656/blob/master/survey.md. It consisted of 16 questions and was anonymous. We received 12 complete responses representing two thirds of the total number of participants in two semesters. Of the 12 respondents, there are 6 respondents from each studio. Each one of them visited one of three sections (east, central, west) of the study area through the virtual fieldtrip. To adequately assess different experiences among three groups, the number of respondents should be evenly distributed across the three sections. However, only 25% of the respondents were from the west section, which may be explained by its poor mobile network coverage leading to a disappointing user experience. In addition, result showed (Figure 5) that virtual fieldtrip is new to most of the students (83%).

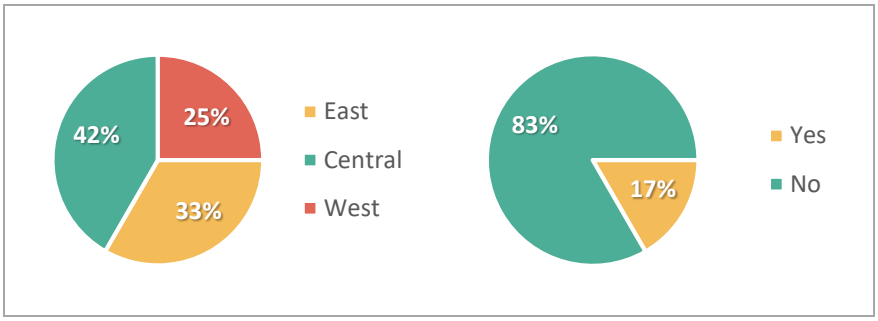

Fig. 5: Share of respondents by sections (left). Prior virtual fieldtrip experience (right).

4.1 Livestream Experience

The entire live stream for each sub-section (~ 2400 hectares or 6000 acres) of the Study Area was about 2 hours long, we observed that all respondents watched at least over 30 minutes. More than 80% of them watched over an hour, and 58% watched more than 90 minutes. All respondents faced some difficulty while watching the live stream. The most common issue was connectivity, either on the host's side or on the viewer's side. One of the respondents stated: "*I think the issues faced by the Western section could be related to patches of poor reception linked to the more rural quality of that zone.*" This connection issue could result in serious delay in communication with Field Team or complete loss of live video. None of the respondents encountered an interruption exceeding 15 minutes.

As mentioned in Section 3.1, a key task of the Field Team is to communicate and share their own impressions with remote students. The communication is mutually beneficial. Not only can the Field Team answer students' questions, but feedback from students can assure Field Team members that all equipment and connections are operating as expected. To understand student priorities in communicating with Field Team, we asked respondents to (multi-)select among three purposes (Figure 6). 75% of the respondents selected all three options as their purposes of communicating with Field Team. One respondent stated: "*I felt it was really valuable hearing the hosts opinions because it added an extra layer of information that was helpful to develop a characterization*".

The communication occurred through a Chat window provided by the livestreaming software. Our Field Team found this form of communication limited and inefficient due to the lag time in data transmission. But surprisingly, over 90% of the respondents gave it a score

higher than 4 on a scale from 1 (very dissatisfied) to 5 (very satisfied). Five respondents stated that allowing real-time conversations (phone call or video conference) can improve the effectiveness of their communication with Field Team. We also asked participants to rate their overall experience (from 1 to 5) with the livestreaming platform considering user interface, video quality, and accessibility. 10 respondents gave the platform a score above 4 (satisfied to very satisfied), and 2 respondents rating it a 3 (fair).

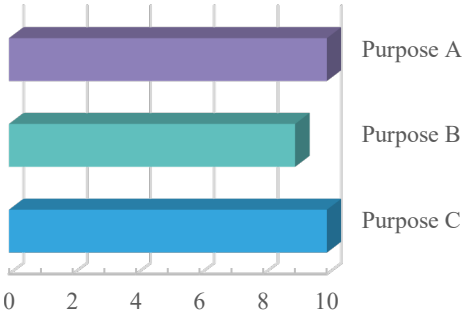

Fig. 6:
Response to the question: why do you communicate with Field Team?
Purpose A: Give direction (e. g., navigation, take photos, or walk around).
Purpose B: Inquiry (e. g., ask questions, seek opinions).
Purpose C: Chat (e. g., exchange messages, share thoughts/impressions).

4.2 Overall Rating of the Virtual Fieldtrip

With 5 being the highest possible value, the virtual field trip was given an average score of **4.4**. Moreover, on average, students deemed that the virtual fieldtrip accounts for **69%** towards their overall understanding of and ability to characterize the study area. But there is no strong correlation between the two answers. Even if a student rates the virtual fieldtrip with a high score, it may contribute less (or more) to their characterization of the study area. We also compared responses between the two studios. It turned out that there are no statistically significantly differences in average values of both answers between the two studios (Figure 7). The boxplots indicated that evaluation of the virtual fieldtrip tends to vary more in the undergraduate students' answers (Fall 2021) than the graduate students' (Spring 2021).

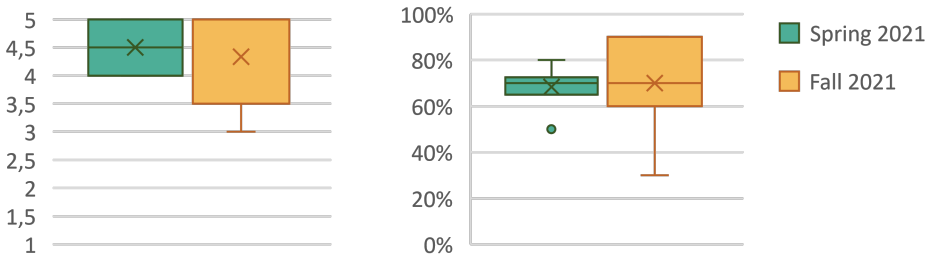

Fig. 7: Overall rating for Virtual fieldtrip on a scale from 1 to 5 (left). The fraction of virtual fieldtrip contributes to a student's characterization of the study area (right).

Students were asked to choose between a physical and a virtual fieldtrip if both options are available. Unsurprisingly, 75% of the respondents believe that they would learn more about

the site if they were physically there due to: 1) more time to spend in the field, 2) full sensory impression, and 3) in-person experiences. On the other hand, 3 respondents preferred a virtual fieldtrip since it does provide viewers the privilege of less travel time and an advantage on viewing large-scale study area in a shorter period of time.

5 Conclusion and Outlook

This paper presents a novel way of conducting fieldtrips in the context of a graduate and an undergraduate landscape design studio. We introduced and employed a livestreaming platform shown previously to be capable of carrying out virtual fieldtrips. We described software and hardware involved in this platform, and logistical considerations to be planned before the trip. A survey was conducted to gain insights on how students evaluate this form of field visit. On a scale from 1 to 5, where 1 is very dissatisfied and 5 very satisfied, students rated their overall virtual fieldtrip experience a 4.4 on average. Comparing to more traditional media, such as images, videos, aerial photos, they appreciated the advantages brought by virtual fieldtrips, such as 1) additional contextual information provided 2) the convenience (no travel time) and flexibility, 3) the camera steadiness, and 4) the opportunity to exchange thoughts and opinions with the Field Team.

Considering the challenge to education posed by disruptions such as a global pandemic, we offer this paper to colleagues interested in using this instructional method in their teaching. In our experience, visiting a study area virtually does not replace an in-person field reconnaissance, as it is shown in the survey that 75% of the respondents prefer to a physical fieldtrip. However, we believe virtual fieldtrip via livestreaming worked reasonably well in balancing study area observation with student health and safety, and that it can be a meaningful complement to in-person visits, especially when design teams are distributed in multiple locations, and when travel time is a serious obstacle.

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