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BREAKING STUDENTS' COMFORT ZONE: LEARNING FROM COMMUNITY MEMBERS, A STRATEGY WITHIN THE AEC EDUCATION

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In order to address pressing issues such as climate change, energy crises, and economic disparity, it is pertinent to include local community members within AEC education. In this paper, we explore how breaking the comfort zone of students can facilitate a broader perspective on sustainability. This new perspective can cultivate innovative and creative solutions to 21st century problems. This paper documents the experience and impacts of student participation in an education abroad program focused on sustainable buildings and infrastructure. The program took place in January 2019 in Costa Rica with the collaboration of Colorado State University (USA) and EARTH University (Costa Rica). In this program, students directly communicate with low-income community members who worked with a local developer during the construction of a new neighboring building. Qualitative interviews with students, as well as ethnographic observations of class discussions, illustrates that this partnership helped students see a new perspective on how to deal with the life cycle of construction projects. The preliminary results indicate that the collaboration between the community members and the developer was a key component of expanding students' perspectives. This research illustrates the importance of building community collaborations that are mutually beneficial in the classroom and beyond. In particular, the results suggest that educational experiences which integrate community concerns into solutions are key to expanding students' worldviews.

Keywords: Sustainability, Economic despair, Climate change, Energy Crisis, La Luisa, Future environment, Pausa Urbana, Collaborative partnerships.

1 INTRODUCTION

This study draws on data collected during an education abroad program in 2019. The program took place in January 2019 in Costa Rica with collaboration of Colorado State University (USA) and EARTH University (Costa Rica). The program focuses on sustainable buildings practices and service-learning. The course includes concepts of sustainability and climate adaptive design, development, and construction as related to human-centered design and sustainability in a tropical climate. Data collected on the education abroad program illuminated the importance of integrating local community needs as a tool for broadening students' perspectives and cultivating creative

solutions to environmental problems. The purpose of this paper is to investigate changing student perspectives as related to students' experiences as participants in 12-day study abroad program. In this paper, an overview of information related to climate change, energy crises, and economic crises is provided before moving to discuss the case study. This paper focuses primarily on student reported outcomes related to community collaboration to illustrate how this experience impacted perspectives of sustainability and social sustainability.

2 FUTURE ENVIRONMENT FOR ACHITECTURE AND CONSTRUCTION

In the 21st century, students face an uncertain future. As the impacts of climate change and global inequality increases, it is clear that new solutions and perspectives are needed. In this paper, three aspects of the future of the construction environment are examined. While the impacts of climate change continue to rise, the United States faces less severe consequences in comparison to other countries around the globe. According to the Climate Risk Index, less developed countries are generally more affected than industrialized countries. Given that the majority of students enrolled in the study abroad program were from the United States, many have yet to experience the consequences of climate change. Thus, participating in a study abroad program can provide a new setting for students to experience the impacts of crises relevant to climate change and economic insecurity. This is of particular relevance for construction management as well as architecture students and the construction industry more broadly.

The construction industry has a direct impact on climate change. Globally, 45% of world energy and 50% of water is used by buildings (Dixon 2010). Existing research documents that a staggering link between buildings and environmental problems: 23% of air pollution, 50% of greenhouse gas production, 40% of water pollution, and 40% of solid waste is produced by buildings (Dixon 2010). The Intergovernmental Panel on Climate Change reports that "if greenhouse gas emissions continue at the current rate, the atmosphere will warm up by as much as 2.7 degrees Fahrenheit (1.5 degrees Celsius) above preindustrial levels by 2040, inundating coastlines and intensifying droughts and poverty" (Davenport 2018). Accelerated by development and economic growth, global climate change is a reality that can no longer be ignored. In 2019 alone, June was the hottest month ever reported. In South America, Mexico, New Zealand, Madagascar, and other parts of South Africa had the overall hottest first half of the year (Keneally and Sandell 2019). In an era where environmental disasters continue to mount, climate change is a threat that faces us all.

It is clear that tackling climate change also requires tackling the energy crisis. At present, the building sector is one of the leading energy consumers in the world. In developing countries, 10 - 15% of energy is used on buildings (Robertson 1992). In developed countries, such as the United States, residential energy consumption accounts for more than 20% of the United States' total energy consumption (EPA 2011). Of the total energy consumed in the United States, about 40% is used to generate electricity, making electricity use an important part of each person's environmental footprint (EPA 2019). Research documents discrepancy between style of architecture, i.e. informal and formal, and subsequent energy usage (Vellinga *et al.* 2008). While 80% of worldwide buildings are informal, meaning they are built without architects of engineers, these buildings use less energy on average than formally designed architecture. Thus, there is potential to for formal buildings to be built more sustainability. Formal architecture can use traditional technologies and natural resources, as well as cultural traditions, to be built more sustainably and intentionally (Vellinga *et al.* 2008). Given that formal buildings consume more energy on average, while holding the smallest proportion of the world's population, a new method of sustainable and economically just building is critical.

As every bag of cement produced also produces 1 ½ bags of residual carbon dioxide, (May and Reid 2011), the time to build more sustainably is now. In order to move towards a more sustainably orientated architectural style, students need to be educated and informed accordingly. Study abroad programs have the unique potential to foster new and innovative students perspectives on building through showing local traditional building styles and building with the natural environment in mind. The next section of this paper focuses on how this particular study abroad program integrates natural building design with community input to better prepare students to build sustainably.

3 THE CASE STUDY

The Colorado State University (CSU) education abroad program course focuses on the main components of sustainable design and construction, energy, natural resources, and other environmental issues. The course provides an applied learning experience for students and faculty from the two universities to learn about sustainability in the built environment. As Costa Rica is world renowned for its extreme range of biodiversity, it also provides a unique setting to learn about climate-adaptive building practices. Students gain knowledge of innovative sustainable practices through renowned international examples and execute a short project utilizing these principles. In this program, students learn about sustainability in the built environment through various learning activities, which include case studies, site visits, guest lectures, reflections, staying with host families, cross-cultural interactions, and completing service-learning projects with the local community.

During the study abroad program, students visit a community called La Luisa. In this community, a construction developer needed to sell apartments in a building that faces La Luisa. While the part of the project that faces empty lots sells well, the side of the project that faces La Luisa community faced barriers. As La Luisa is an informal neighborhood, the view was not seen as ideal for property values and recruiting tenants. While the quickest solution may have been to paint the roofs of La Luisa houses, the developer took a more community based approach. The developers joined forces with Pausa Urbana, an organization whose mission is to "make the "informal" visible". This is accomplished using multidisciplinary actions as appropriation of public/private spaces, art and civil actions as a tool for communication. This approach breaks the concept of a static and objectified city towards a broader concept of living urban life. In addition, this approach rethinks the roles of the different disciplines and institutions that are involved in the city. In doing so, this approach cultivated a new method of construction. Focusing on the social impact of architecture, both La Luisa and the developer worked to find mutually beneficial strategies.

La Luisa and the developer, with the support of Pausa Urbana, formed a collaboration that involved investing time and resources to focus both on the "fifth façade" and building a reciprocal community partnership. See Figure 1.

Figure 1. La Luisa before and after (Garnier and P.U. 2017, Ensusitio 2019).

This collaboration allowed the developer to create and maintain a healthy relationship with their neighbors. This project was critical to showing students the importance of incorporating community members into sustainability projects. Cultivating relationships and collaborative partnerships is critical to building healthy and practical communities. This case study showed students that sustainability goes further than just numbers and green facades--- it deals with human well-being. See Figure 2.

Figure 2. Students at the neighborhood La Luisa (Ensusitio 2019).

4 ANALYSIS OF STUDENT REPORTED IMPACTS

Across interviews, students discussed the importance of engaging with local community members in construction projects such as La Luisa. During the program, students were able to directly communicate with low-income community members regarding their construction needs. Below, one student touches on an expanded perspective of sustainability after the La Luisa visit:

> "I've never considered the social aspect of sustainability before. Seeing how she [the developer] built the building, and it was a very good building, well-environmentally-sound building, and the community benefited from that... there was no clear benefit for the community until the developer discovered that half the building wasn't being sold because of the views onto the steel alloy tin roof. They saw how to help the local community, one of those "help me, help you" situations. They sold the rest of their building and they helped the community next to them. There is a lot of potential in the future for them to coexist from two very, very different classes."

This interview excerpts illustrates a changed perspective in sustainability, as well as the importance of developers working to build partnerships with the local community. Other students also commented on how the visit to La Luisa expanded their perspective on both sustainability and global issues. Throughout the program, students became increasingly exposed to and aware of the importance of engaging local community members into discussions of sustainability. The following interview except illustrates this changed perspective:

> "I was talking with my uncle about it, and I feel like going into this, if I'm being completely honest with myself, I was so narrow-minded, it was unbelievable, and coming out of this experience, I feel like I've learned a lot. - social sustainability wasn't exactly something—you think of sustainability, and it's like, ah, trees, plants, grass, but there's a whole side of it that's mentally and—it's a different type of—I'm losing my words here—it's just a very different experience, I guess, looking at it from not necessarily having plants and grass and trees to actually benefiting the community and benefiting yourself, your mentality, mind, body, the whole thing"

In another interview, one student also commented on how the visit to La Luisa changed his career trajectory to be more community oriented:

> "My biggest takeaway, honestly, and it had nothing really to do with the construction actually, it reminded me of a lot of what's going on out there in the world that people don't

> usually think about, just being out there. Definitely seeing some of the things that happened down there on a personal level just kind of made me reconsider what I'm doing and maybe reallocating my skills and resources towards doing something down there that has nothing to do with construction or sustainability. The biggest takeaway was definitely the social aspect of sustainability, helping the communities around the area and taking into account that if you're building an apartment complex or a housing development, these people are going to have to coexist, and if they don't, your tenants are not going to be very happy."

Thus, the visit to La Luisa not only expanded his career ideas, but also showcased the importance of coexistence amongst social classes and economic barriers.

Due to extensive classroom discussions, site visits, and lectures, students commented in interviews that they succeeded in applying their knowledge to develop creative and innovative solutions to solve community identified problems such as those introduced by La Luisa. One of the professors in the course referenced the importance of La Luisa as a case study in social sustainability in his interview. Speaking about La Luisa, the professor said the following:

> "La Luisa, that was amazing. I'm glad it happened early very early in the process. It wasn't by design. It just happened that way, so I'm glad it happened that way because again you probably realize we continuously refer to social sustainability. We continuously refer to that so that was huge, how embracing the community was, how two different communities you know interact. Later on, we had this discussion as a part of the classroom where groups came up with the idea of how to make that even better. "

This interview excerpt illustrates the outcome of integrating learning experiences with local community needs and real-world applications of learning into the program. As the program encouraged students to think about sustainability in a new context, the visit to La Luisa was an important component of expanding and developing students' prior understanding of sustainability.

Although the visit to La Luisa did not directly deal with facts of climate change or energy crisis, it deals with those factors indirectly. Despite the apartment building integrating principles of sustainability in the design and construction process, the developers neglected the social aspect of sustainability. This created problems with the profitability of the apartments. In working with the community, the developers and the local people were able to identify a mutually beneficial solution. This partnership shows the importance of bringing social sustainability to the forefront of sustainability efforts. Students reflected on the importance of social sustainability in their interviews, illustrating the importance of gathering local community input and creating solutions that tackle complex problems. This experience was not based on bringing students to a poor neighborhood to see how climate change has brought erosion or how economic despair and energy crisis has brought deficiency. Rather, this experience illustrated the importance of creating reciprocal benefits for community members and developers. When students are able to see these partnerships in action, it becomes evident that collaboration is a necessary component of building a more sustainable future.

5 CONCLUSION

In this case study, there are three communities: the developers, the La Luisa inhabitants, and the students. From the developer's point of view, this project changed their perspective on developing infrastructure in a low income neighborhood. Rather than seeing this as a problem, the developers saw this an opportunity. In turn, this brought increased media attention and positive relationships with the local community. The students' visit to the project was important for the developer as it confirmed that their work was impactful and utilized principles of social sustainability. The students focused on the relationship with La Luisa rather than the design or engineering of the

building. In addition to the new roofs, the La Luisa community received more visibility which can make future additional funding possible. Most importantly, the community felt valued as a necessary asset to the developer and as a case study in best practices to be replicated by future professionals. La Luisa is thus a case study of resistance and resilience.

Based on the data collected, the program and the partnership with La Luisa fostered a new perspective of sustainability for students. Students became aware that sustainability is not only numbers and technology--- it includes broader dimensions such as community connections and gathering diverse stakeholder input. In addition, students were able to see firsthand the impacts of climate change on diverse communities.

6 RECOMMENDATIONS

The outcomes of this research illustrate that students developed a more nuanced understanding of sustainability. This being said, future programs can incorporate experiences that deal more directly with the ongoing energy crisis and climate change across a variety of socio-economic contexts. Further research on this case study utilizes qualitative and social network data to assess the impact of experiential learning strategies and activities. While all of the student reported outcomes of this project were positive, further research could include more information from students and probe students to provide more criticisms. As this was a short-term project and experience, further studies can expand the duration of similar exercises as well as the role of the students in the design process. In doing so, students could bring implement design ideas in order to move beyond visualization into application. As the results of this study are preliminary, further research is needed to trace the impact of breaking students' comfort zones.

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