

A Participatory Design Case Study in Environmental Design Education

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ABSTRACT

This article provides an overview and insights of challenges, potentials, and recommendations of teaching and applying Participatory Design (PD) in design education including the students' point of view through studying a case - a Master of Landscape Architecture studio course in Arizona State University, U.S. Students collaborated with Mo'ili'ili community members in Honolulu, Hawaii, U.S. for two semesters, to co-design the renovations of Old Stadium Park through three phases of PD process - field study & listening; community engagement workshop (50+ people); and pop-up design conversations (100+ people). This research illustrates the challenges of integrating PD in design education, which includes uncertainty and flexibility, funding, trust-building, time management, access to diverse knowledge centers, research ability, and communication hurdles. As well as implications and recommendations such as encouraging students to be flexible; embracing uncertainty; making explicit learning goals; leaving comfort zones; improving communication and organizational facilitation skills; and utilizing research ability for better trust-building with communities.

CCS CONCEPTS

• Education; • Design; • Cultural characteristics;

KEYWORDS

Community engagement, Service-learning, Participatory design, Design education, Environmental design, Real-world complex issues

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1 INTRODUCTION

PD is a common and effective approach that underlines the democratic involvement of end-users via diverse approaches [9]. PD originated in Northern Europe and is often used in improving technological system design, typically concerning computerization of the work environment. PD has been developed to be applied to many design situations [7]. Environmental design could benefit from PD without exception. In conventional environmental design practice, professional designers work for clients rather than working with stakeholders. However, the consequences of limited meaningful engagement with stakeholder communities can lead to community dissatisfaction, underrepresentation of values and trauma, and that can result in unsuccessful projects or dismissal of vulnerable community values. Designing with diverse communities is particularly critical for environmental design projects because of the complexity of multiple stakeholders' engagement and the potential for producing long-term impacts. By diverse communities, we mean the plurality of interconnected social relationships that are both spatially delimited, such as in a neighborhood, and those non-spatial relationships that share values and practices, such as a religious or environmental community. For environmental design projects, stakeholders could be residents, employees, partners, customers, direct users, developers, consultants, and decision-makers in the design process. A participatory approach in environmental design is fundamental to empower diverse members of the community and allow them to defend their values. In PD, designers incorporate critical local knowledge and the community is empowered when members understand the project, contribute to it, and defend community values from outside interests. The purpose of this study is to report the application of a participatory approach in the education of environmental designers.

Some studies in PD education have been discussed in the past decade. First, Hetch and Mass [4] reported a course case and pointed out the need for training in soft skills such as facilitation and communication. However, they did not use real users arguing for practical reasons. More recent studies have reported the use of live projects (real situations and users) [1, 11]. For example, Christianson, Grönvall, and Yndigegn [1], who reported a series of courses, argued that live projects are essential to learning PD skills such as time management, 'sensitive persuasion' in the interaction with stakeholders, and dealing with uncertainty.

Further, there is an agreement that PD is hard to learn and some didactics include providing feedback after exercises [1], better use of examples that not only show the outcomes but also the process [1], and expose students to uncertainty [1, 11]. PD research in education is growing. Design programs are providing students more project-based courses engaging community members using design thinking to improve the well-being of people. However, case studies often emphasize multidisciplinary collaborations. Limited research reported the implication of PD for design education, especially the learning experience of students [3]. Except for teaching methods, it is also essential for educators to address personal and professional qualities that can benefit students in PD projects [10]. This paper contributes and investigates the challenges and benefits for design students in the PD learning experience, including their learning behavior and recommendations to PD pedagogy. Broadly this study explores the implementation of PD processes in design education, which is needed in the field [4].

2 METHODOLOGY

This study applied exploratory qualitative methods to understand and reflect on a service-learning design studio course with a PD approach. One of the authors (Xie) was a doctoral student with the role of coordinator in the studio and two of the authors (Cheng and Coseo) were instructors of the design studios in Fall 2018 and Spring 2019 in a Master of Landscape Architecture program. In this study, the researchers observe both students and communities in the PD process and conducted 30 minutes semi-structured individual interviews with students after the course and with the Institutional Review Board approval. All interview recordings were transcribed. Interview questions include learning experience from students such as PD skills learned and effectiveness of PD in design process; challenges for practicing PD when engaging with stakeholders; personal design perspective transformation and recommendations. Researchers thematically and inductively analyzed the interview responses data derived from six students. Participants have diverse backgrounds including landscape design, architecture design, and sustainability. None of the participants has direct experience in PD projects before the course.

3 PARTICIPATORY DESIGN PROCESS

PD was integrated into the learning process during each phase of the studio. There were three encounters with the community following previous recommendations from Christiansson et al. [1]. Phase one required students to *listen to communities* that have a deep knowledge of Mo'ili'ili urban ecological and social networks. In this phase, students documented existing community environmental discourse and were able to present back to what they learned. This allows for convergent conversations around design decisions. The National Science Foundation suggests convergence as a process of creating a shared understanding, language, and approach between diverse communities to address compelling societal challenges. Phase two was activating those networks through an interactive *community engagement workshop*. Phase three was mirroring back to participants what students heard from phase one (listening) and two (workshop) in the form of *six pop-up design conversations about three design proposals*.

3.1 Phase 1) field study & listening

Who am I and where am I from? - Observation and listening for the *connection before collaboration*. Phase one required students to *listen to communities* that have deep knowledge of Mo'ili'ili urban ecological, cultural, historical and social networks (Figure 1) (Figure 2). Then, students documented existing community environmental discourse and present back what they heard to ensure alignment with communities' values and understanding of the neighborhood and the watershed (Figure 3) (Figure 4). This allows for *convergent conversations around design decisions*. Research explains diverse themes could only be elicited by communities because they are the experts of their experience and are crucial in decision making [8].

3.2 Phase 2) community engagement workshop

Why are we here with you? - Socialize knowledge and generate ideas. PD can be implemented in diverse ways including workshops [5]. Phase two was activating those networks through an interactive *community engagement workshop*. Students conducted community-input workshop activities and have active listening with limited personal opinions and expert advice (figure 5).

3.3 Phase 3) pop-up design conversations

What is missing? - Continued conversations. Phase three was mirroring back to participants what students heard and design recommendations from phase one (listening) and two (workshop) in the forms of *six pop-up design conversations about three design proposals*, which design teams went to six different sites in Mo'ili'ili community to get as much interaction and feedback from community members. (figure 6).

4 FINDINGS

Researchers thematically and inductively analyzed the interview responses data, which elaborated on findings of PD learning experience from the students' point of view. Participants have backgrounds in landscape design, architecture design, and sustainability. Most participants did not experience PD projects or courses before the course. One participant had learned about the PD concept in other classes before. And only one participant took a PD related studio course, however, in that course they just met with leaders of the city and asked some questions to inform the design project, which did not engage with community members or any other stakeholders. However, half of them have internship experience including residential areas, regional parks after the course, which gave them a better understanding of PD, and most of them hope to practice PD during their design work. Results of interview are reported in these sections: *Understanding the role of designers in the PD process; PD skills learned and effectiveness in the design process; Challenges of practicing PD in the design process; Design perspectives changes after PD practice; Recommendations to PD pedagogy*.

4.1 Understanding the role of designers in the PD process

All participants agreed upon the importance of being *good listeners and observers* in the PD process. Two of them understood their roles as *intermediary agents* between designers and stakeholders. In



Figure 1: Field study - Lyon Arboretum, Honolulu, Hawaii



Figure 2: Cultural and historical connection - active listening with the Manoa Heritage Center, Honolulu, Hawaii

other words, designers should be a facilitator and incubator of ideas to motivate and integrate information from stakeholders, as well as translating, processing and visualizing what they were thinking, then filter and model into a design. One participant considered their primary role was to learn from peers, community members, and stakeholders, and their secondary role was to provide resources and tools to the community that they can use in future development. He said it was significant to clearly explain their roles to communities:

“When we engage with community members, we tried to emphasize to the community that we were not in an authoritative role on the project, instead, we were only participants and stewards to help spread the community’s values.”

4.2 PD skills learned and effectiveness in the design process

Almost all participants emphasized *communication* and *trust-building* skills in the PD process. Two participants reported *connections before collaboration*. One said: “For that community, we are outsiders, so we should be approachable to know them and share our stories before talking about design elements.” One participant encouraged fellow designers to *be open* and *share the same-same story* when building trust for bridging differences and connecting emotion with communities. In the workshop, community members shared their same-same story of Old Stadium Park. For example, they share their most impressive experience in that park. One participant stated that he learned *idea/context translation* and how

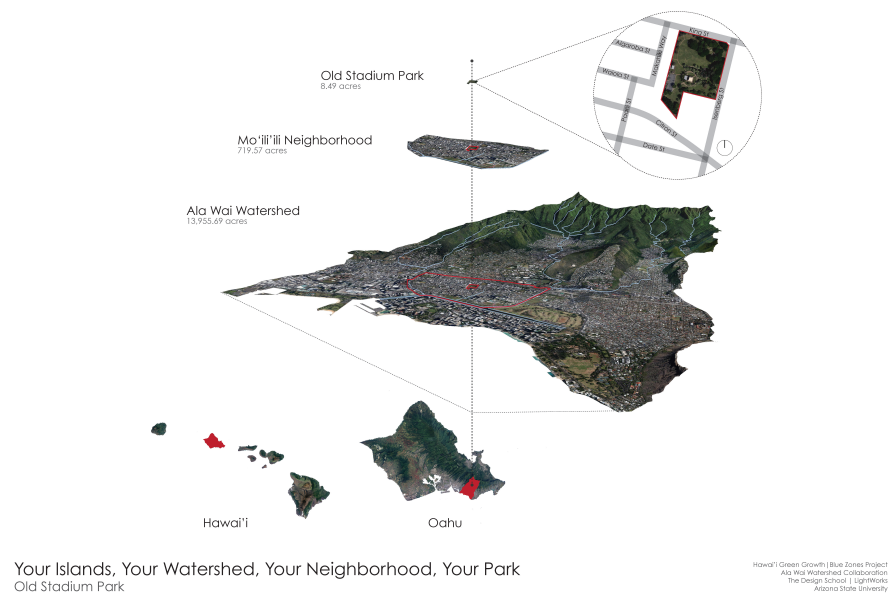


Figure 3: Mo'ili'ili neighborhood and watershed. Image: master students of Landscape Architecture studio course at Arizona State University, Fall 2018.



Figure 4: Proximity to the Old Stadium Park of Mo'ili'ili neighborhood, Hawaii. Image: master students of Landscape Architecture studio course at Arizona State University, Fall 2018.



Figure 5: Community workshop with Mo'ili'ili, Hawaii.

to motivate information/ideas, as well as *organizational coordination ability*, *contingency ability* and *mediate contradiction between communities*. Another participant considered PD could motivate communities' sense of participation and ownership of the project, which leads to their responsibility and stewardship to the project. Another participant reported the most important PD skills learned from this course were *vulnerability* and *empathy*. He said:

“Early in the process, we had to show we were vulnerable to critique and personal biases. We encourage communities to bring up anything that was missing in our design proposal. We couldn't capture every aspect of posters, so calling out our limitations could show that we were willing and eager to listen and learn. [...] As outsiders to the community we had to learn to recognize our personal biases and be able to put them aside in order to empathize with the experiences and stories that others shared with us. Using participatory design is beneficial because it helps build skills like vulnerability and empathy. Sharing stories and gaining empathy helps people connect, and the connection is key to successful design.”

4.3 Challenges of practicing PD in the design process

All participants stated the biggest challenge to practice PD is *building trust with communities* and put away their hesitation about the design team. Two participants mentioned they felt uncertainty about the project process and learning outcomes, which challenged them to practice PD better. Another two participants elaborated that there were challenges for them to navigate the skepticism and clear up confusion/hesitation from community members by saying:

“They had the resurgence of Hawaiian Renaissance, they're reclaiming their heritage. To be an outsider coming in, our biggest challenge is breaking down barriers, making connections. They were wary of outsider designers and sometimes kept their guard up.”

One participant asserted it was a challenge to *learn the indigenous culture* of Hawaii because he wanted to be more empathetic when engaging with the community. And he said that it was a lot of responsibility for a design student because he was not sure if he



Figure 6: Pop-up design conversations (4/6): Old Stadium Park (upper left), Glazer's coffee (upper right), Mo'ili'ili Library (bottom left), Waiola shaved ice store (bottom right), Honolulu, Hawaii.

could make all stakeholders happy without more previous practice in the real-world. It was hard for him to figure out the common thread or language, and priorities of stakeholders without previous practice in the real-world. Two participants mentioned they felt *uncertainty* about the project process and learning outcomes, which challenged them to practice PD better. For another participant, the biggest challenge was motivating communities to share their thoughts and stories. He said:

"Some people were glad to talk about their community and experiences, but others were more reserved and hesitant to open up to strangers. [...] This was a great test of our people skills as we had to become comfortable talking to all sorts of people and sharing our own stories in order to gain trust. To make things more challenging, many stakeholders came to our meetings with an agenda and it was sometimes difficult to make conversation about ideas and topics other than their special interest."

4.4 Design perspectives changes after PD practice

Almost all participants reported their *communication and organizational facilitation ability need to be improved* after experiencing PD. For example, sometimes they felt runaway when facilitating community workshops. Two students felt they *needed more empathy as opposed to analytical skills* in the design process. One said that different perspectives influence communication, so *designers should be more open-minded*. One participant felt her *design perspective has broadened and is more grounded in particularities*. The PD process illuminated her awareness that *design is quite contextual*, so more

factors and community values should be integrated into the design. She claimed this PD project allowed learning such high-level community engagement, which makes her *feel more confident to do PD* in her future career.

On the other hand, she stated that she needs to increase work efficiency and learn the knowledge of Geography Information System (GIS) to improve her PD ability. And One participant realized the *social responsibilities of designers*. When he attended community town hall meetings and then working with them, he was impressed by the communities' passion and care about their culture and history. And he was impressed by community members' passion and care about their culture. He was touched by the experience which a virtual design project could not give it to him. Another participant stated this experience helped him to realize that the PD approach was not utilized enough in design. He said:

"Some of the feedback we got from community members expressed how welcoming and engaging our process was and that it was unlike anything they had participated in before. More communities should have their voices heard more often when it comes to how the landscape is being developed around them."

4.5 Recommendations to PD pedagogy

Participants offered diverse recommendations from different perspectives. One suggested that when going through uncharted territory, every PD experience is new and different. Working with community partners inevitably brings more uncertainty to projects. Students should be encouraged to *embrace uncertainty and be flexible* to plans/schedules changes. One participant said: "I realize

design is fluid. It's always changing like water. I think the instructor or a therapist could help students learn values of uncertainty." Additionally, she asserted that students should *leave comfort zones* to design in an entirely different social and environmental context than they used by saying:

"I have become a more well-rounded designer after the course. I grew up in the desert, but I left my comfort zone to design a park on an island. Going outside of my context was valuable. Every designer should do that in education."

Two participants considered that it would be better to give students a specific location/site at the beginning, so they could *ask specific and detailed questions*, for more efficient and articulate communication with communities. Another three participants stated they were not extroverted or charismatic people, so it was useful to *practice more interacting and building trust with communities*. One said:

"Beyond the workshop, we also could gain their trust by listening, observing and participating in more community events to become a friendly face in the community. More experimentation could help further develop PD skills. Many ways could get people to engage with a topic, for example, play games, make advertisements, hold group discussions. The more practice designers get at connecting with communities, the easier it becomes. And finding more opportunities for students to create and practice engaging activities will help them be more comfortable and confident in the PD process."

One participant asserted *explicit learning goals should be established at the beginning*, she suggested asking self-questions such as "how will this PD project enrich my education? What are the possible learning outcomes? Which could motivate us (design students) to perform better in PD learning?" Another participant considered students should *learn how to do research on indigenous culture/history*, it will enable them to gain more empathy and avoid misunderstanding or offense. And he stated students should be *willing to work closely with and be honest with teammates*: "PD is a process of connection." One student suggested a metaphor for the PD process is a marathon instead of a sprint by saying:

"It's a long process to chase. Every design isn't a one-time thing. You come in and shake some hands. To truly do PD, it takes time and you need to make those connections and enjoy the beautiful process."

One participant spoke highly of the value of the PD learning experience and encourage more PD in design courses. She said:

"The opportunity to work on a participatory design project in studio is an extraordinary and gratifying experience. It's an opportunity that I hope more students are able to participate in, especially since these types of projects seem to be rare in the design industry."

5 DISCUSSION

5.1 Challenges

The PD process has its challenges and presents learning opportunities for faculty, students, and community partners. First, exposing students to uncertainty has been encouraged before [1], but in this course, faculty also struggled with the problem of *uncertainty and flexibility* in aligning studio learning objectives, schedules, and syllabi with dynamic project requirements. Creating an expectation

that service-learning activities require flexibility is key to managing student and external partner experience. For students without prior PD experience, they have to constantly adjust/adapt to the process itself. Students *started with mismatch expectations about PD*. For example, one student thought that only one workshop would get all the info they need but only found out more information gaps. PD poses a significant challenge for people who like to have a fixed plan and execute the plan accordingly. Students need to be flexible and able to accept last-minute changes or decisions from communities. While the PD community agrees that live projects like this case is strongly recommended [1, 11], however, *funding* limits the ability of the studio to provide a long-term service. This course was supported by a one-time grant allowed the studio to travel three times to Hawaii. Since there is no dedicated funding to support the continuing PD process, it puts in peril the hard work it takes to build trust and create meaningful partnerships.

Second, *trust* is a key challenge for a PD project. Fortunately, faculty teaching the course had previous experience and built trust with the leading community organization who served as liaison in Hawaii. These ambassadors are keys to the success of service-learning studios, who teach faculty and students the best way to navigate sensitive relationships and community issues.

Third, as expected from previous studies [1, 2], students struggled with *time management* especially when coursework does not always go smoothly as planned or changes are being decided at the last minute by communities. Furthermore, additional personal time beyond regular course hours needed in the PD process can pose challenges for students when they need to accommodate other courses and personal obligations at the same time. The time it takes to effectively run and evaluate the PD process outcomes was a major challenge in a 9-month activity. Yet, the ability to run the service-learning activities over two semesters helped the students reach a far higher level of participation than if the studio were only one semester long.

Last, *access to diverse knowledge centers* is difficult. Students had excessive access to some communities (e.g. sports enthusiasts) but limited access to other communities (e.g. Micronesian communities). They found that this uneven access to centers of neighborhood knowledge left the design discourse lopsided. This may be a particular insight for environmental design or disciplines where there is diversity in the community.

5.2 Opportunities

These challenges can also be seen as opportunities or didactics to teach PD. While students struggled with the challenges, they valued the experience and appear to be ready to incorporate PD in their design practice. Indeed, after this course, two participants had internship and work experience in residential and regional park design elsewhere, they both agreed they had a better understanding of the significance of PD in their real-world design work, and hope to practice PD more during future design work.

PD in design education has the potential of creating a more nuanced understanding of equitable design processes for students. The design process is a continuous feedback loop and evolves over time. PD allows students to see pragmatic and practical limitations for designers. This is a critical lesson for design students to learn a

set of mindset and skills - humility, empathy, and empowerment - to meaningfully address inequities between powerful interest groups and vulnerable communities who are less heard. Moreover, PD in live projects allows students to be close to the real-world experience through learning-by-doing and advance their attitudes, skills, tools, and knowledge in working with communities. Scholars mark that more research is needed, such as exploration of approaches that are most suitable to support and train stakeholders involved to effectively contribute to the participatory design process; what role can be given to stakeholders in this translation from design to practice [6]. In this study, researchers emphasized on incorporating PD ethos and toolsets to traditional design studio pedagogy. However, colonialism in Hawaii needs more discussion. For future work, researchers should develop colonial thinking and get more insights from marginalized communities, - in this case, working closely with original inhabitants of a territory reshaped by a history of colonial occupation.

6 CONCLUSION

Our study shows that the challenges of PD are opportunities for meaningful learning of skills such as embracing uncertainty, trust-building, time management, and communication. PD catalyzes foundational skills that can benefit designers in any field for bridging the communication between designers and stakeholders. Design pedagogy can be advanced through learning from self-reflections and case studies on how to navigate meaningful PD processes. Successful PD has empowerment potential to dismantle dissatisfaction, infuse community values, address legacies of community trauma, and ultimately rendering democratic design processes.

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REFERENCES

- [1] Christiansson, J. *et al.* 2018. Teaching participatory design using live projects: Critical Reflections and Lessons Learnt. *ACM*. (2018). DOI: <https://doi.org/10.1145/3210586.3210597>.
- [2] D'Andrea, V. and Teli, M. 2010. Teaching participatory design: A participatory approach. *ACM International Conference Proceeding Series* (2010).
- [3] Fleischmann, K. 2015. A Successive Approach to Multidisciplinary Teamwork in Undergraduate Design Education: From Dysfunctional to Functional Teams. *Arts and Design Studies*. 37, March (2015), 25–35. DOI: <https://doi.org/10.13140/RG.2.1.5133.8007>.
- [4] Hecht, K.M. and Maass, S. 2008. Teaching participatory design. (2008), 223. DOI: <https://doi.org/10.1145/1900441.1900486>.
- [5] Kang, M. *et al.* 2015. Design for Experiencing: Participatory Design Approach with Multidisciplinary Perspectives. *Procedia - Social and Behavioral Sciences*. 174, (2015), 830–833. DOI: <https://doi.org/10.1016/j.sbspro.2015.01.676>.
- [6] Könings, K.D. *et al.* 2014. Participatory design of learning environments: Integrating perspectives of students, teachers, and designers. *Instructional Science*. 42, 1 (2014), 1–9. DOI: <https://doi.org/10.1007/s11251-013-9305-2>.
- [7] Merritt, S. and Stolterman, E. 2012. Cultural hybridity in participatory design. *ACM International Conference Proceeding Series* (2012).
- [8] Sanders, E.B.-N. and Stappers, P.J. 2008. Co-creation and the new landscapes of design. *CoDesign*. (2008). DOI: <https://doi.org/10.1080/15710880701875068>.
- [9] Simonsen, J. and Robertson, T. 2012. *Routledge international handbook of participatory design*.
- [10] Stam, D. and Boon, B. 2018. What you gain and what it takes: A student's reflection on a participatory design project. *ACM International Conference Proceeding Series* (2018).
- [11] Winter, J. and Sharp, L. 2016. Teaching PD - Learning from a small industrial project. *ACM International Conference Proceeding Series* (2016).