Discovering Experiential Knowledge: A Public Interest Design (PID) Studio in Yankton, SD

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Introduction

As a scholarly discourse and a practice model, Public Interest Design, or PID is a quickly growing sector of architecture in the United States (Bell, 2013; Fisher, 2008; Moore, 2017). According to Bryan Bell, a pioneering advocate, PID is characterized by the inclusion of populations traditionally underserved by architects and participation of end users in the design process (Abendroth & Bell, 2016). Bell recognized a *structural disjunction* between real-world architectural design service needs and what the current system of architectural practice can provide (Bell, 2004). He and associates of his responded by promoting PID through several professional and scholarly networks (e.g., Design Corps and Social Economic Environmental Design or SEED) and conferences (e.g., Structures for Inclusion).

Over the years, Bell's vision has been shared by many activists inside or outside of the architecture world. Leading figures have widely emerged in different intellectual fields to promote principles and practical methods of PID. According to the Public Interest Design 100 and Global Public Interest Design 100, two infographics recognizing PID leaders on a global scale (Cary, 2012, 2013), major PID leaders came from 22 states of America and 34 other countries. They played a range of roles include policymakers, funders, educators, makers, visualizers, organizers, and facilitators. Current practitioners of PID include for-profit and nonprofit architecture firms, community design centers (CDC), University-based programs or agencies, and non-profit community organizations. Adopting place-specific and process-oriented methodology, most PID projects promotes the transformation of people, place, and knowledge, understanding design beyond the pursuit of "ideal" design forms that are universally meritable and transferable to diverse places (Bell & Wakeford, 2008; Gutman, Cuff, Wriedt, & Bell, 2010).

For educators, probably the most noticeable development in PID is that a career path of community design and public-interest architecture (PID) may eventually emerge in several ways given the contemporary demographic, cultural, and environmental trends. A PID-based career path may borrow financial and organizational models from or seek partnership with existent precedents in the public service area of medicine and law (Fisher, 2008). For example, the School of Architecture at Portland State University introduced an 18-credit hour graduate certificate in PID, one of the first in the Higher Education of Architecture. The University of Kansas also created a 12-credit hour Graduate Certificate in Public Interest Design. These certificates were for future leaders in architecture, urban planning, sustainability, community development and other fields to aid currently underserved populations through sustainable, human-centered design methods.

To prepare architecture students for the ascending influence of PID, educators need to integrate theories and methods of PID in the current architecture curriculum. The first step is to identify legitimate educational goals. Among the multiple defining principles of PID, participation is at the core (Abendroth & Bell, 2018). Participation of people receiving design service in the design process can ensure inclusion, which is the moral and political foundation of PID. Participation also translates to opportunities for empowerment and education. Both are fundamentally social and cultural goals of the PID movement. In practice, participation can occur in varied design stages, from the very fuzzy early, conception stage of design to the later stages of implementation and evaluation (see Sanders & Stappers, 2008). A design studio course about PID could introduce community participation in multiple design stages.

Studio Project Background

The Department of Architecture (DoArch) at South Dakota State University (SDSU) has been upholding a PID tradition through our Public Works studio series. Based in several South Dakota neighborhoods including Mobridge, Webster, and Huron, all past projects emphasized community participation in the stage of prototyping and design development. One of the most recent projects was located in Volga, SD, a small rural village. The objective was to redevelop a pocket park on a 27' by 60' corner site into a small social gathering venue featuring outdoor seating as well as signage to visually promote the identity of Volga.

During the fall semester of 2017, I launched a new undergraduate design studio at DoArch that introduced students to the methods and process of community participation in the very early, problem definition stage of design. The project was based at Yankton, SD, which boasts of a few exquisite historic buildings in its downtown area but is also affected by issues of vacant lots and abandoned properties. In the past few years, the city administration has strived to upgrade Yankton's consumption space through a public-private partnership. This effort echoes a global transition in small-town urban development that foregrounds real estate upgrade and infrastructure improvement as incentives to herald economic growth (Gospodini, 2002; Knox, Mayer, & Knox, 2013).

In collaboration with Dakota Resources, a regional nonprofit organization specialized in community participation and community development, students and I joined two community gatherings in February and April that had participatory locals to envision the future of the downtown area in social, cultural, ecological, and physical aspects. The discussions lead to the identification of thematic questions and key concepts with which most people were concerned. Students and I made observations and recognized one thematic question as the most relevant for the conception of a studio project topic. The question is "how to make downtown Yankton a more enjoyable place to walk around at?" This question itself is too broad and cannot define a specific design problem. We analyzed it and teased out its potential connection with subjects in urban and architectural design. We decided to ask a more specific question focusing on visual environmental qualities: "how to make downtown Yankton a more *visually* enjoyable place to walk around?", the answer to which solicits a systematic assessment of downtown Yankton's visual environments regarding their affordance for satisfactory walking experiences.

Therefore, this PID-themed design studio would guide students to systematically investigate the limits and opportunities in the existent visual environments that may influence people's walking experiences. The place-specific design knowledge generated in the research study would inspire students to propose design intervention orientations and strategies.

Methods and Results

Research Precedents

There are two research precedents to inform the research study inquiring into downtown Yankton's environmental qualities. The first precedent is the study on the view on the road that were initiated by Donald Appleyard and Kevin Lynch. Appleyard and Lynch were among the first that systematically examined and assessed the dynamic views people would have when they move in the built environment (Appleyard, 1964; Lynch & Hack, 1984). The original study focused on views from the diver in a moving car. Appleyard and Lynch invented a set of sophisticated cinematic tools to study the *visual sequences*, exploring aesthetic issues such as *tempo* and *rhythm* in the sequential form. Students and I acknowledged some theoretical considerations from their cinematic methodology but decided not to inherit their abstract graphic notation system, considering that a PID research project must ensure an effective, barrier-free communication between researchers and research participants to make possible a participatory and democratic design process. An abstract graphic symbolism may unnecessarily hinder the researcher-participation communication in the field. The second precedent that inspired us is Gordon Cullen's study on townscape concerning concepts of *motion*, *position*, and *content* (1961, 1995). Cullen's observation brought our attention to the aesthetics of the *serial vision* that a walking person would have about a city's street environments. His emphasis on the relationship between "existing views" and "emerging views" helped us to devise criteria for assessing street environment's dynamic visual qualities. Cullen also inspired us to collect research data that directly measure locals' first-person walking experiences in downtown Yankton.

After a meticulous review of Cullen, Appleyard, and Lynch's research, I determined that the primary studio project should study the dynamic visual environments of downtown Yankton through the collection and analysis of walking persons' visual sequences.

Figure 1. Students and local participants conducted data collection in downtown Yankton

Data Collection

For preparation, students first completed a 3-week warm-up project that studied the dynamic visual environments of downtown Brookings, the campus town of South Dakota State University. The project familiarized students with the techniques of data collection and preliminary data analysis, addressing issues of raw data formats and data quality. Formal data collection in downtown Yankton occurred on September 14, 2017 (Figure 1). 16 students formed eight tactic teams. Four teams collected data from participating long-term Yankton residents with each team assigned with a local participant. The other four teams had at least one student who had never been to Yankton in each team. They collected data from those student participants new to the town. Every team mounted a forward-facing GoPro Hero 4 video camera on the research participant's head (local or student) and recorded wide-angle video footage as the participant walked for around 4 street blocks. Local participants were instructed to reconstruct one of their typical walks in the downtown area and verbally explained the purpose and specific detail of the walk (e.g., go to a favorite pub after parking the car or stop by a grocery shop after work). Students took field notes as they walked along with the research participants. Students completed data collection in about one hour and obtained eight recorded video footages. Each of them lasted 9-11 minutes.

Data Analysis

During the first week after data collection, students used a software program, Free Video to JPEG Converter™ to extract sequences of static views from video footages at the interval of about 5-8 seconds. This time interval is equivalent to a walking distance of 10 yards. Students extracted approximately 90-120 static street views from each video footage. These views were dependent on the research participants' body and head motions.

A preliminary look at the sequences of extracted views revealed that most of them highly resembled each other, while a small amount was different and therefore outstood. The first data analysis action was to locate the distinct views in visual sequences as both Appleyard and Cullen's research argued that distinct views corresponded to the moments when people received significantly different visual information. The amount and timing of these views, or in Cullen's words, "series of jerks and revelations," are essential for understanding the aesthetic qualities of a street environment.

The method used to identify and locate distinct views was a graphic content comparison of consecutive views. This comparison focuses on the variation in unique clusters of pixels in digital imagery that represent meaningful visual elements, for example, passersby, vehicles, street furniture, landscape features, building façade details, etc. Comparing one view to the immediate next one in the visual sequence, one can always find that some visual elements disappear, some are recurrent (configuration of pixel clusters remain stable, but their positions in the view and level of detail may differ), and some new visual elements emerge (Figure 2). All changing elements in consecutive views are predicted by a walking person's the head and body movement as well as the physical settings in the environment. Disappearing and emergent visual elements reveal how the visual environment is dynamically adapted in response to the walking person's motion in space. The percentage of disappearing and emergent elements in a view suggests if the view is significantly distinct from the preceding view. Utilizing a software program called Image Comparer™, students worked in teams of two to carry out the analysis of video footage data. They were able to find and locate 7-10 distinct views, or so-called "*key views*" out of up to 120 static views.

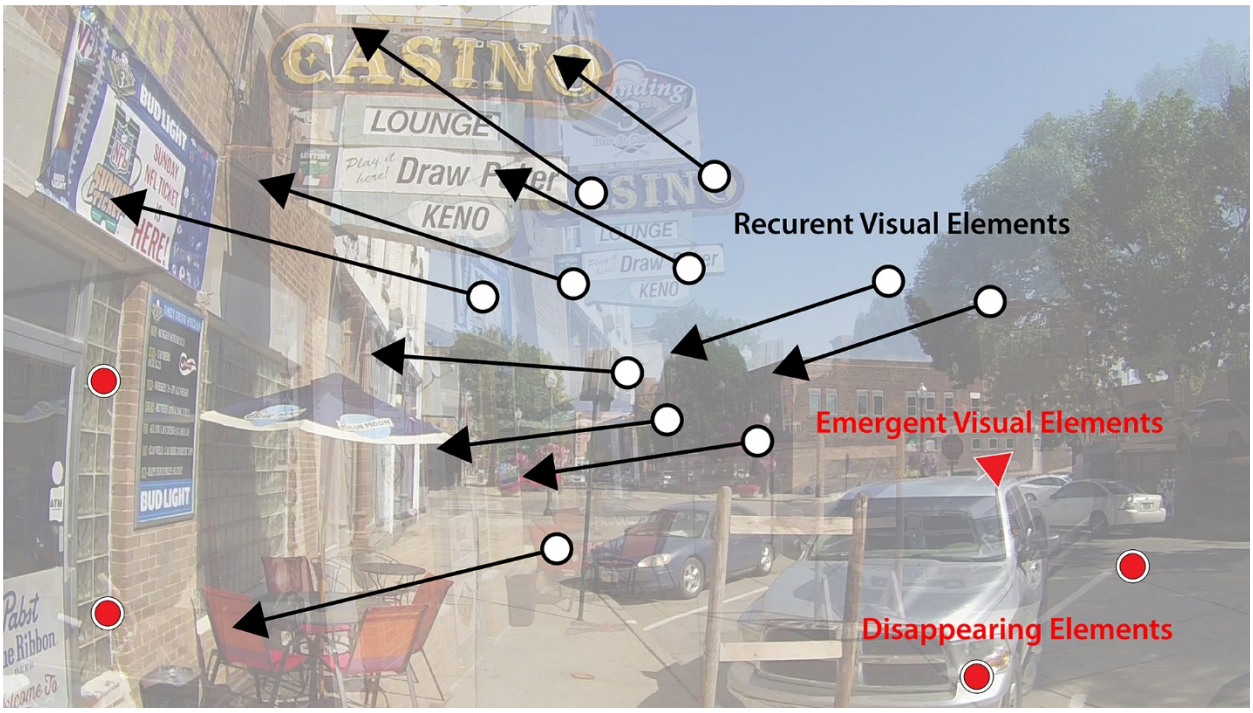

Figure 2. Study of consecutive views extracted from recorded visual sequences

Next analysis action was to examine and compare the characteristics of these key view for understanding the transition from one key view to the other. Students studied *view range*, namely the apparent visual depth and width defined in a view. A specific view range indicates at a given moment, how a walking person's visual environment is defined because of his or her instant location in the urban environment. Reading the changing patterns of view ranges allows an aesthetic evaluation of dynamic visual environments. Students also examined the degree of the *spatial enclosure* in key views by delineating the skylines in these views. For the convenience of comparison, students converted original views to a series of skyline diagrams that feature standardized mosaic layouts. Last but not the least, students also tried to extract visual subjects important to the research participants by studying the frequency of recurrent elements. As Appleyard and Lynch mentioned, humans engaged the environment in a process unlike that of a camera. Human vision is selective, constantly being modified by environmental meanings. We visually engage things in which we are interested. Head-mounted cameras cannot directly record minor eyeball movements that respond to these important visual subjects. Therefore, students tried to recognize most repeated visual subjects or so-called "*visual foci*" among recurrent visual elements, so that we can capture the specific environmental contents most relevant to research participants' walking experiences. This analysis action was inspired by Cullen's study on environmental *content* in the townscape.

Presentation and Feedback

In seven weeks, students accomplished all data analysis actions and graphically composed their findings on multiple 4'x8' presentation boards that identified both existent assets and problems of downtown Yankton regarding its affordance for visually pleasant walking experiences. These presentation boards included information of extracted views, key views, view ranges, skylines, and visual foci. Visual foci analysis was displayed by detachable and replaceable tiles mounted on presentation boards. Students adopted this approach to allow research participants check and verify analysis findings.

On October 21, 2017, students brought these presentation boards to Yankton and set up an interactive presentation in Discovery Church (Figure 3), a popular social gathering venue in the downtown area. The event attracted over 50 attendees. The dialogue between students and locals was passionate. We noticed that the locals attending experienced little difficulty to understand the graphics showcasing research outcomes. This observation implied that we could remarkably diminish the communication barrier between professionals and participating laypersons that hindered many past PID projects by engaging research data of eye-level views and using effective data visualization techniques.

Figure 3. Students and locals discussed in front of interactive presentation boards

In the final stage of this studio project, students produced conceptual massing models for urban design proposals in downtown Yankton according to their dynamic visual environment studies. Unlike conventional urban projects, these massing concepts were not initiated by functional space programs or other common design drivers such as traffic patterns or landscape systems. The massing studies were purely an exploration of how architectural forms in the urban environment could enhance people's dynamic visual environments. Students began their design thinking process with design problems framed by their research findings. For example, a typical design problem would ask students to decide "what architectural form may be created and where to locate it so that a walk from Walnut St. to 3rd St. would be more visually dramatic with new key views added to the existing visual sequence and more variation in skylines and view ranges being introduced?"

Evaluations

Upon reflection, I propose the following evaluations about the pedagogic and scholarly values of this PID-themed design studio course.

One of the most impressive lessons both my students and I learned from this experimental studio course is that learning a research and design process manifesting PID principles takes tremendous efforts in deliberation and hands-on practice. Students need extra time to digest novel concepts and to get acquainted with a workflow engineered for extensive user participation and frequent participant-

designer communication. Therefore, future PID-themed studio courses need to strengthen the core component of the course, for example, pre-design research or schematic design that incorporating community participation. An ideal schedule should accommodate a primary studio project that extends some 9-10 weeks. This time frame would allow at least three opportunities for on-site communication with the community involved in the project, including a data collection event and two research or design dialogue events. Also, I supposed that a PID-themed studio was more suitable for a different year in the Bachelor or Master's architecture curriculum. An introductory studio for students to learn fundamental PID concepts and methods can be in the 2nd year. It is also legitimate to introduce an advance PID-themed studio at the graduate-level, possibly in the 5th or 6th year. Department of Architecture at SDSU is the progress of curricular migration. These changes may be reflected in our 4+2 Bachelor of Arts in Architecture and Master of Architecture curriculum in the next few years.

The integration of computerized data analysis was still at a very preliminary level for this studio courses. Students applied a mixture of manual and digital automation methods to process massive graphics data utilized in the dynamic visual environments study. On average, every student spent at least 80 hours (equivalent to 5-weeks of out-of-class workload) on image comparison, graphics conversion and formatting, and infographic composition. A considerable portion of the work was completed manually, especially in the analysis of key views and visual foci. This manual analysis procedure was not only extremely time-consuming but also inevitably incur many instances of subjective judgment which is often whimsical and unreliable. While peer review can help triangulate data analysis and thus improve research quality, inconsistency due to subjectivity still poses a major hindrance to the overall trustworthiness of qualitative data analysis. To streamline the analysis process, one should maximize the use of digital automation. Students and instructors may need to apply some ad-hoc batch processing scripts based on common languages such as Java or Python for effective graphic analysis when interoperating multiple 2D processing programs (e.g., Photoshop and Illustrator)

PID always demands a smooth and constant participant-designer communication to ensure its major objectives of the democratic design process and social inclusion. That demand translates to a request for effective communication means in the field. As many PID scholars have argued and we have experienced in this studio course, concreteness in visual communication is essential. People with little design backgrounds always find the rhetoric of graphic abstraction alienating and unfriendly. Graphic conventions such as plans, sections, elevations, axonometric drawings often incur difficulties in understanding among community participants. Use of concrete imagery that makes presentation materials close to real-world visual experiences, on the other hand, can greatly improve people's reception of design contents and hence facilitate user participation.

Future PID-themed architecture courses may exploit Virtual Reality (VR) methods to facilitate participant-designer communication. Current VR technologies cannot attain a satisfactory balance between *immersion* (the accuracy of projected graphic materials for the simulation of immersed experiences) and *interactivity* (the freedom of viewers to choose what to see or how to engage the visual subject). Within the limit of mainstream hardware capabilities (e.g., the graphics processing ability of an iPad or a Samsung smartphone), one can only obtain a satisfactory performance of VR imageries either for immersion or interactivity. In my view, accomplishing interactivity should be prioritized. This is because most PID projects leverage community participation for designers to understand the intricate

dynamic link between users' subjective intentionality and objective physical environment. An interactive design representation can ensure instantaneous feedback on issues of person-environment relations, maximizing the advantages of PID's participatory design methodology.

Therefore, I expect extensive use of interactive 3D environments generated by game engines such as Unreal Engine™ or Unity™ that can be deployed on portable smart devices for public design presentation and discussion. Current technologies already make possible a seamless data transfer between modeling programs (e.g., Revit and Rhinoceros) and these game engines for visualization. Students of a PID-themed design studio would be increasingly proficient with the digital skills of creating and curating interactive 3D environments for engaging the public.

Conclusion

In schools of architecture around the world, the call for a stronger connection between studio projects and real-world design needs has been on a noticeable rise in the 21st century (Jarrett, 2000; Morrow, 2000). This trend is prompted by many ongoing social, economic, and cultural transitions, such as privatization and niche marketing in the building industry, stylistic materialism, mass-customization, and experience economy (see Klingmann, 2007; Knox, 1993, 2011; Zukin, 1989). The movement of PID signifies a refreshed momentum to further the exploration in this direction. This studio course characterized by the instruction of PID methods tried to extract taken-for-granted, experiential knowledge from everyday users to provide legitimate evidence for making informed design decisions. For students taking this course, they were able to develop universal design capabilities (e.g., predesign research, problem definition, conception, and prototyping) in conjunction with a sensitivity toward public opinions and perception, preparing them for their future involvement in publicly funded projects or public-private partnership (PPP) projects. The discoveries we made implies a necessity to develop and apply more sophisticated visualization and digital automation means in a course-based PID project.

For the participating community, our endeavors helped expand a place-based design knowledge capital, stimulating discussion about building typology or leading to changes in codes and regulations. In the long run, our PID-themed courses will help cultivate a cultural climate for the public and local design professionals to converse more often and understand each other better, empowering the public with cognizance of the values of architecture and creating work for local design firms by recognizing projects and practitioners.

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