Inquisitions of Culture, Craft and Materiality

The home food production garden was once the backbone of American food security. However, a cultural shift away from gardening has resulted in residential properties abdicating secure garden space. Lack of food security affects the availability, quality, and affordability of fresh local produce. First Lady Michelle Obama has made food security one of her top priorities, demonstrating her commitment by re-devoting some of the White House grounds to food production. Food security has been trumpeted as being vital to the health and welfare of the people within the United States, in particular those of low-income or located within urban food deserts.

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To this end, a multi-disciplinary team of Architecture, Landscape Architecture, and Extension Service experts and educators came together to engage issues of food security through the development of the Garden Education Teaching and Training Site (GETTS). This project acts as a replicable model for home food production and is funded by a $50,000 Mississippi State University Extension seed grant to be utilized over 2 years. One of the objectives of GETTS is to develop prototypes for three scales (small, medium, large) of the family vegetable garden, of which the primary focus of this paper/presentation is the small vertical garden. A Design-Build method and pedagogy was utilized in a sophomore level Architecture Materials course where students were afforded the opportunity to collaboratively design and construct an innovative and affordable solution to vertical gardening. As students worked closely with Architecture, Landscape Architecture, and Extension Service faculty they were tasked with developing appropriate and site sensitive design solutions, selecting and procuring building materials, and fabricating and constructing (on-site) their prototypical proposals. Documentation sets, in the form of brochures and user-friendly construction assembly instructions (Ikea style), were created by the student groups for dissemination through the Extension Service and were made available online in digital format for broader exposure and use by the public. Students documented their process and produced a documentary/promotional video of the work, which was subsequently presented at The Environmental Design Research Association (EDRA) 2014 annual conference.

Through this Design-Build experience students became more aware of societal and cultural issues surrounding food security; developed tacit understandings of building materials, assemblies, and craft; were exposed to and developed a consciousness toward project budgets, time lines, and material acquisition; and acquired an

appreciation for the complexities of project management, coordination, and implementation. Finally, students reflected on their personal inquisitions of culture, craft, and materiality through the video that recorded the entire Design-Build process and by answering a survey titled, "Questioning the Vertical Garden Project".

INTRODUCTION

> *In a world of plenty, no one, not a single person, should go hungry. But almost 1 billion still don't have enough to eat. I want to see an end to hunger everywhere within my lifetime.*[1]
>
> - Ban Ki-moon, United Nations Secretary-General
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> *Imagine all the food mankind has produced over the past 8,000 years. Now consider that we need to produce that same amount again – but in just the next 40 years if we are to feed our growing and hungry world.*[2]
>
> - Paul Polman, CEO of Unilever
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> *The quest for food security can be the common thread that links the different challenges we face and helps build a sustainable future.*[3]
>
> - Jose Graziano da Silva, United Nations Food and Agriculture Organization (FAO) Director-General

Hunger and access to healthy food is a world problem – not just a third-world or foreign issue, but one that confronts us here in the United States, in our rural landscapes and urban centers. The Food and Agriculture Organization (FAO) of the United Nations estimates that around 870 million people worldwide are chronically undernourished because of the lack of access to enough food required for their daily nutritional needs.[4] According to the United States Census Bureau, nearly a quarter of the population in the state of Mississippi live below the poverty level. In areas located within the Mississippi Delta levels of those living in poverty rise to nearly fifty percent.

In addition, since the middle of the twentieth century there has been a steady decline in home food production, which has led to stronger dependence on processed and 'fast' foods. According to the Centers for Disease Control and Prevention (CDC), Mississippi is recorded as having the highest per capita rates of diabetes (11.7%)[5] and obesity (35.1%)[6] in the nation.

In the spring of 2014 the first phase of the GETTS project began with the design and construction of 10 prototypes for small, modular vertical gardening. Thirty-six architecture students were organized into teams and tasked with developing, fabricating, and documenting innovative and sustainable vertical garden structures. Over the span of a month the students work closely with Professor Jacob Gines (Architecture), Professor Elizabeth Payne Tofte (Landscape Architecture), and Brian Templeton (MSU Extension Service) through an iterative and hands-on design method and pedagogy.

At the completion of the Vertical Garden Project each team was asked to reflect on the project – its process, procedures, and objectives – and respond to a series of questions in a survey[7] administered by Professor Gines. The format of this paper is centered on a topical narrative by the author (often times responding directly to comments from students), a listing of a survey question posed to the students, followed by selected student responses. This pattern repeats for several topic areas and survey questions.

SOCIAL AND CULTURAL CONSCIOUSNESS

Dr. Marilyn Schlitz, Institute of Noetic Science (IONS) Senior Fellow and President Emeritus, posits that there are five nested levels of social consciousness.

Embedded Consciousness: People are shaped without their awareness by social, cultural, and biological factors. We see what we expect to see – and can consistently miss things we are not anticipating or that don't support our belief system.

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Self-reflexive Consciousness: People gain awareness of how their experiences are conditioned by the social world. In this process, we can begin to analyze our own biases and remove our perceptual blinders.

Engaged Consciousness: People are not only aware of the social environment but begin to mobilize our intention to contribute to the greater good. There is a movement from 'me' to 'we' as our awareness moves us to actively engage in the wellbeing of others and the world.

Collaborative Consciousness: People begin to shape the social environment through collaborative action. Within education, for example, we find an increasing focus on participatory learning, service learning, and project-based learning – each was developed to enhance the nature of collaborative social consciousness through discourse and conversation.

Resonant Consciousness: People report a sense of essential interrelatedness with others and describe a 'field' of shared experience and emergence that is felt and expressed in social groups.[8]

Figure 1: Vertical Garden prototype - Birch plywood, perforated metal, steel angle iron, and landscaping membrane. Students: Ashton Aime, Caleb Fearing, and Brad Trevino.

The range of responses from students demonstrate varying degrees of social consciousness on the topics of food security and home garden practices – not to mention vertical garden and product design. The majority of the time spent on this project was in developing engaged and collaborative consciousness among the students and exercising that consciousness through critical dialogue with professors and the larger body of students. As an unforeseen consequence outside of the listed objectives of the vertical garden project, many students commented on and committed to improving their own eating habits and seeking healthier solutions to their daily dietary needs.

Question: How has this project helped you become more aware of societal and cultural problems/issues?

"It has brought the issue of food security to the forefront. Food security is an important issue that is commonly overlooked due to the society of America."

"We have realized the importance of gardens in modern society, an age where we are separated from our surroundings. By creating something that allows for you to easily work and grow vegetation outside, people might want to go outside."

"Cities are becoming larger and green space is becoming sparse."

"We were not aware of the number of individuals who do not have access to fresh, healthy foods."

"By putting ourselves in the mind-set of a person who may not have access to a private outdoor space, save a small balcony, it has made the group more conscientious of other people's living conditions."

TACIT UNDERSTANDINGS

The fabrication 'fitness' of developing designers is often weak, perhaps fragile, and must be strengthened. Moving students out of the classroom and into a studio/lab environment allows for an 'exercise' of demonstrable skills and abilities. The relocating of the student 'craftsman' to an active and perhaps unfamiliar setting provides a condition wherein she/he can become more intimately familiar with the object of creation. With every movement and deliberate gesture information is received, processed, and stored – then actively altered as a conscious evolution of ongoing knowledge acquisition; knowledge that cannot be taught in a lecture setting. Knowledge is taught, internalized, and then practiced; resulting in the development of new skills, enhanced design language, and amplified critical thinking.

Juhani Pallasmaa could very well be speaking to a design/construct pedagogy and students/educators as expressive, experiencing beings when he states, "My assumptions of the role of the body as the locus of perception, thought and consciousness, and of the significance of the senses in articulating, storing and processing sensory responses and thoughts, have been strengthened and confirmed… The primacy of the tactile sense has become increasingly evident."[9]

Students learn to interpret tacit knowledge and turn it into deliberate and reactionary responses to ongoing and unforeseen challenges in the construction process. They are able to embrace imperfections and re-realize their original intentions. Students also develop specific process-oriented tasks that lead to an increase in personal responsibility and accountability – which many expressed as valuable to their future professional selves.

Question: What do you think are the benefits of Design-Build in design education?

"By actually building our designs, we are able to fundamentally understand how things go together. While this usually alters our design, usually they change for the

better. We are able to use the techniques we learned while building in our future designs."

"When we, as students, get to spend our time actualizing a design, it helps create a more pragmatic mind-set for the next time we design. We can then approach design with the intentions of it becoming a real object that has thickness and creates and takes space. This will help us in our careers to think about the realities of builders and contractors."

"Design-Build projects help teach the process of construction and completion. You start and finish an entire project, instead of handing it off to others to complete."

"We use Design-Build to test our knowledge of structure. Trial and error helps us learn what not to do the next time around when faced with a similar problem."

VIDEO AS REFLECTION-IN-ACTION

According to Donald Schön, a way for students to learn to think critically about their acquisition of new knowledge and skills is to have them articulate their thoughts through a process known as reflection-on-action.[10] This process typically comes at the completion of a project.[11] At the completion of the Vertical Garden Project, each team member was asked to reflect on the project's process, procedures, and objectives through an opinion survey. While this survey revealed much, it lacked a way to record the excitement and immediacy that came from observing student's actions during the Design-Build process. To capture students' learning in real time, reflection-in-action was needed.

For this project, the video became a key component in capturing reflection-in-action. The video was used by students to record the design / build process in real time and to hold team members accountable to think critically about their vertical garden solutions. The video was successful in recording things that make design fun, as well as recording unforeseen challenges in the construction process. Educators commented on the pedagogical value of reflection-in-action, claiming it achieved the goal of recording students' engagement in the learning process.

Question: How has the video component of this project allowed students to better reflect on the Design-Build process?

"The video allowed the collaborative nature of design / build to be made visible to students who were embedded in the actual process."

"Often the design process is presented to students as a step by step process that removes much of the improvisation or spontaneity from the actual project narrative. The video changed all that by showing the goofiness of the design process."

"Novice students began to understand the iterative process of design as they witnessed other teams on the video meet and resolve unforeseen challenges during the construction and installation of their vertical gardens."

"Students took the video project seriously. When the video crew was unavailable, team members took upon themselves the job of photographing interesting aspects of their Design-Build process. These became ways to reflect on actions taken by the team."

MATERIALS MATTER

> *(The) sensual and personal relationship with stuff has fascinating consequences. We love some materials despite their flaws, and loathe others even if they are more practical.*[12]
>
> - Mark Miodownik, Professor of Materials and Society, University of London

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Figure 2: Off-site fabrication of Vertical Garden prototype.

There is no doubt that material selection strongly informs, if not directly dictates, the design decision process and produced outcomes/solutions. Material selection is heavily influenced by both internal and external forces, resulting in the establishment of a set of hierarchal priorities – cost, availability, design intent, ease of construction/manipulation, aesthetics, environmental impact, performance (ie. structural, thermal), and dimensionality. The establishment of this hierarchical structure can become very complex. Student groups were assigned to one of three cost categories – low, medium, and high, which corresponded to an idealized client.

Students were also asked to be innovative with their material selection and/or the way in which that material (or combination of materials) was to be assembled or crafted.

Figure 3: Video stills of students working.

Question: How has the evolution of material choice, or material compromises, influenced your realization of this project?

"When choosing containers in which to grow the plants, we knew that they would dictate the dimensions and spacing of the horizontal members that protrude from the slanted surface of the garden. Also, the length of the shoe bags that we used for planting determined the spacing of the cross bracing on the vertical side of the garden. Therefore, the evolution of material choice directly affected the evolution of dimensional alterations made (and added) to the design's cohesiveness and responsiveness."

"It improved the design by creating efficiency of material (and an) aesthetically pleasing (outcome)."

"Wood and its structural integrity greatly influenced our design. In conjunction with the steel bolts, we could achieve a strong yet flexible bond between our moving members of our structure (and) the box holding the plants."

THE ROLE OF CRAFT

It has previously been mentioned that each of the students were encouraged to think and act as a 'craftsman' – emphasizing the importance of finish quality and design detailing. But there is another level of personal development that occurs when one is dedicated to craftsmanship. In his book, *Shop Class as Soulcraft: an inquiry into the value of work*, Matthew Crawford examined the importance of making and fixing things. Crawford discussed what is at stake for a society wherein a working/making culture (with its accompanying experiences) recedes from our common lives. "The disappearance of tools (and craftsmanship) from our common education is the first step toward a wider ignorance of the world of artifacts we inhabit."[13]

This disappearance of tools and craft was evident in the feedback received from students which reinforced known insecurities in our contemporary society of craftsmanship – not only the recognition of craftsmanship, but also the societal or economic value assigned to such an endeavor. This is highly disturbing. There needs to be heightened consciousness of craft in todays education of architecture students.

"It is only by channeling our energies into a creative task that we often discover what we are truly thinking and feeling. However, it's only when we pursue mastery of our craft that we dedicate the necessary time and energy to discover ourselves.

Fulfillment does not come from perfecting your craft, but from attempting to perfect it."[14]

Question: What role does craft play in the generation of this project?

"Craft was key to create a quality version of our vertical garden and to ensure stability."

"Craft is hard to achieve due to lack of experience shaping materials into forms that we first imagined. There is so much unknown since we are not personal users of vertical gardens. But craft helps in the end. Especially since people will be in direct contact with these inventions."

"Craft is something that we always (pay) attention to in architecture school. While we did run into some little mistakes, we tried our hardest to create a clean and efficient garden tower."

"Craft is not a big concern with our design. The materials are cheap so if someone messes up it is not a big deal to go get more materials."

BUDGETS, ACQUISITION, AND TIMELINES

Funding for this project came from a $50,000 Mississippi State University Extension Service (MSU-ES) Seed Grant, awarded to faculty for the establishment of the Garden Education Teaching and Training Site (GETTS). From this grant each student group was allotted $150 (maximum) for the purchase of materials. Material and budget requests were submitted via a shared online, cloud-based portal and were reviewed by faculty who organized requests to minimize redundancy and account for economized purchasing, shipping, and delivery.

For most students, this was the first time in their lives that they had been exposed to the 'real world' realities of calculating (and being responsible for) the actual costs of materials, sourcing available materials, managing the project timeline, and coordinating material delivery logistics. Most student groups underestimated the time needed to perform and coordinate these tasks.

Question: What have you learned about project budgets, material acquisition, and/or project timelines?

"It takes much more time than expected, and the original intentions of the project may change due to material, design, or time limitations."

"Since we had a low budget we had to be more resourceful with materials. We had to use materials in ways they are not normally used."

"These three things have to work together with flexibility to make the project come together."

"We learned that it is easy to overlook very essential, yet small, items that can make the overall cost rise more than expected. It is important to think about joinery, finishes, and tools in order to have a more accurate cost estimate."

QUESTIONING COST

It was clear from early on that, at least in the mind of the student, budget ruled. Student groups were very conscious of not overspending, which led to some normative material selections and design solutions, as well as conservative approaches to spending – not necessarily a bad thing. Even groups that were assigned to develop a prototype of 'high' cost, found it difficult to define what high cost was or to challenge the budget parameters placed upon them by the faculty.

While many student groups acquired new materials, there were others who sought to use reclaimed or salvaged materials to drive cost down and free up more money

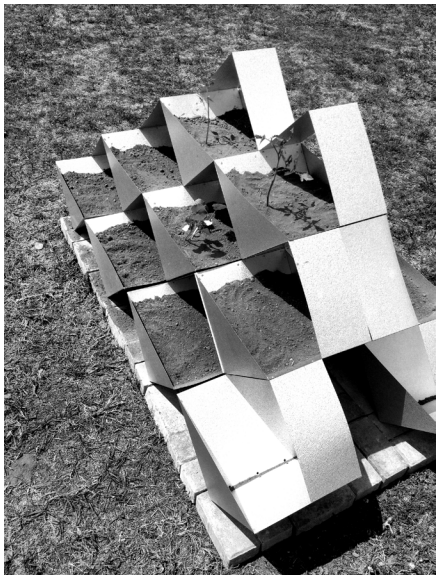

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Figure 4: Vertical Garden prototype - 24ga. Galvalume with steel rivets. Students: Aaron Ellzey, Jared Robinson, and Samuel Vick.

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Figure 5: Vertical Garden prototype - wooden hangers, landscaping membrane, wire mesh, zip-ties, and nylon thread. Students: Zach Busman, Yerix Morel, Cecelia Lemus, and John Mark Stumpe.

for a specialty material or hardware. One group salvaged a glulam beam that had previously been used by the Sustainable Bioproducts Laboratory at MSU for structural testing just before it was set to be thrown out.

Question: How is cost influencing the design?

"Our group approached this project with the mind-set of a consumer, thinking practically about what we would be willing to pay to build our own garden."

"Naturally, we as a group tended to lean more towards non-expensive items, if possible. We wanted our design to be simple enough in materials so anyone could go out and afford to build this garden."

"Cost was a big factor for our design. Initially we planned on using the donated material (plastic coated aluminum sheets), but we changed to a landscape fabric, because it was more suitable and practical. We wanted to use household items that could be lying around the house so we chose coat hangers to hang the garden from the fence."

COORDINATION AND IMPLEMENTATION

The general consensus from students was that early coordination between group members and external contributors/collaborators/venders allows for smarter and faster decision-making, provides quicker turn-around during product fabrication, and establishes a process that embraces and supports evolutionary changes to the overall design and delivery of the project.

Call it collaboration, coordination, integrated project delivery, or what you will; the reality is that "it takes a village to create… Just think of all the programming, concept sketches, models, and renderings involved in the building process – and that's just in the design office. Of course, you have to include engineers, builders, politicians, clients, and everyone else that leave their mark on the final product. With so many professionals involved in the making of architecture, is it any wonder that firms have begun to place an even greater emphasis on industry collaboration?"15

Question: Explain what you have learned concerning the complexities of project management, coordination, and implementation?

"It is very important to be as sure as possible on material choice and location of material acquisition (for) a project. These elements are things that should be decided upon early so that the proper actions (can) be taken. Having an understanding of materials and time will alter the design accordingly, and will force smarter decisions and a faster product (delivery)."

"We have learned that with early coordination and management of (obtaining) materials and supplies the design evolved."

"Implementation relies a lot on (the) coordination of group members. We have learned that it helps to delegate tasks so that different aspects of the project can be accomplished simultaneously."

CRITIQUING PERFORMANCE OVER TIME

Many of the groups struggled with the juxtaposition of aesthetics and functionality. Several of the constructions were compromised by the choice of materials and the reluctance to compromise either cost or appearance for durability. Continuous contact with both soil and water quickly degraded several of the prototypes, so that they were rendered completely dysfunctional. Several different adhesives were melted by the heat and light, while others were weakened and failed due to moisture accumulation. Better attention to drainage within the containers could have improved the situation, but not to the extent to transform the qualities of

the materials. Exposure to direct sunlight, rain, and soil likewise compromised the aesthetic aspirations of some groups. High quality lumber chosen for its appearance was rendered unappealing due to discoloration from both ultraviolet light and water. Several projects did not survive the first fortnight. It must be noted, however, that it was an exceptionally wet and hot fortnight.

A recurring problem with even the functional and durable constructs was their capacity. While beautiful and exhibiting detailed craftsmanship, the vast majority of the containers were undersized. They required almost daily watering due to their low volume and the density of the soil texture. The soil was amended and fertilized to the same extent—or in many cases a greater extent—as soil in the raised beds acting as a control, but the low volume of soil constricted the ability of the plants to produce adequate root growth to provide vital nutrient uptake. In many cases upon excavation and investigation the soil and amendments were not mixed as thoroughly as needed creating layers and pockets of dense infertility. The result was bonsai with the requisite small plants and small produce.

CONCLUSION

For the most part, the "Questioning the Vertical Garden Project" survey revealed students' understanding of project objectives and the implementation of that knowledge. The design and construction of a vertical garden was simply the mechanism by which greater lessons could be taught, and more importantly, experienced. Design, regardless of cost, requires hands-on understanding of culture, craft, and materiality.

Providing a learning environment wherein students could engage each other and experts in the field helped strengthen their social aptitude, communicative skills, and cognitive abilities. It further developed a critical, conversive, creative, and conscious mind. It could be argued that the evolution of consciousness of a student is perhaps more clearly observed and recognized when that student is engaged in work outside the classroom – in work that requires a student to not act as passive absorber of information (as in the case of lecture based education), but as an active participant in the shaping of his/her own experience and tacit knowledge. When a project is required to be hands-on the very nature of the project requires a crafted solution. It demands a solution that seeks clarity in expression, detailing, and finish.

ENDNOTES

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