The LivingRoom: 4 outdoor classroom and learning garden prototypes

The LivingRoom project is an ongoing study that is attempting to redefine what an outdoor classroom learning garden looks like and how it functions by aligning teacher needs with food, health, and nutrition education goals. The community-based project highlights the creative potential of a collaborative process integrating expertise from multiple disciplines including education, architecture, graphic design, material science and landscape architecture to generatively combine ideas into a unique and dynamic space type. With a focus on instruction and cost-effective replication, the LivingRoom provides a flexible, expandable, and maintainable approach to giving students the experience of seeing nature at work.

4 DIFFERENT PROJECTS

COVERING AREAS OF
3000, 5500, 15,000 sf

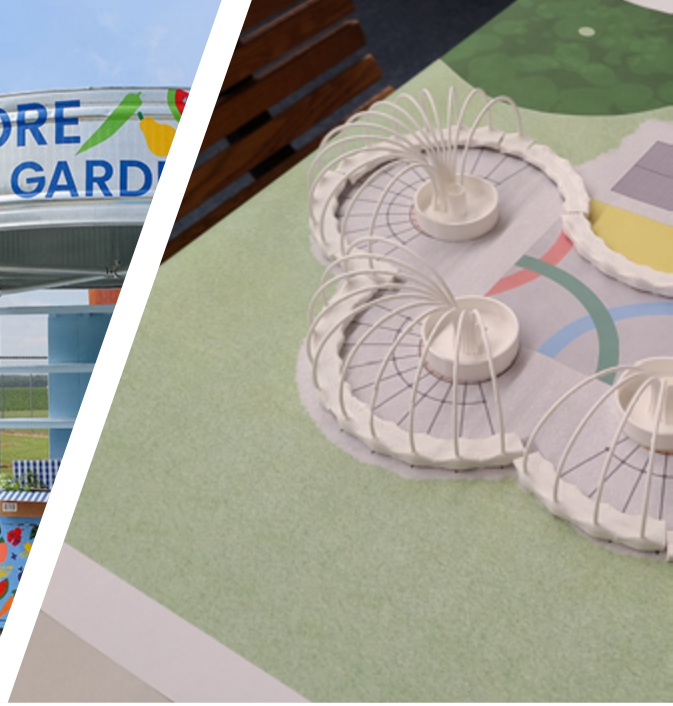
STRUCTURES COST
$18.00 to $62.00 / sf

CONSTRUCTION COST
$25,000 - $135,000.00

COMPLETION
Oct. ‘20, May + July 2021

PROGRAM STATEMENT

Designed to be a laboratory for learning, The Living Room is a sustainable space for teaching, research, and outreach in support of food security and healthy living. Designed and built with students of architecture, landscape architecture, and graphic design, the LivingRoom prototype system highlights the best of what each discipline can contribute to a collaborative design process. Intended to be easily replicated to accommodate various site conditions and/or size restrictions, the modular system is endlessly customizable. Incorporating formwork saving 3D printed concrete site furnishings, low-cost recyclable steel fence components, and water saving raised planters the design minimizes potable water consumption and maximizes growing efficiency. The structures are designed to provide a space for gathering and instruction while also serving as growing supports, green houses for cultivation and storage for teaching supplies and tools. The LivingRoom is an innovative system that is serving as a model for what early childhood educators might one day come to use across the state of Mississippi and beyond.



V3+4

THE XX & XX MS LIVINGROOM

COVERING AREAS OF
3000 sq/ft

STRUCTURES COST
$18.00 / sf

CONSTRUCTION COST
$25,000

COMPLETION
July 2021#3 July 2022 #4

PROJECT NEED

U.S. HEALTH AND NUTRITION

18.4% OBESITY AMONG SCHOOL CHILDREN

OBESITY RATES ARE 3 TIMES WHAT THEY WERE 30 YEARS AGO

23 MILLION PEOPLE LIVE IN A FOOD DESERT

HALF OF PEOPLE LIVING IN FOOD DESERTS ARE LOW INCOME

MS HEALTH AND NUTRITION

25.4% OBESITY AMONG SCHOOL CHILDREN
- HIGHEST IN US -

14.3% RATE OF CHILDHOOD DIABETES
- 3RD HIGHEST IN US -

$4,951 SPENT PER CHILD ON EDUCATION
- 5TH LOWEST IN US -

BENEFITS OF SCHOOL GARDENS

HANDS-ON EXPERIENCES PROMOTE KIDS' CONNECTION TO PLANTS AND FOOD.

GARDENS CREATE A CONSISTENT VENUE FOR TEACHING NUTRITIONAL EDUCATION.

GARDENS CAN EXPAND NUTRITIONAL EDUCATION IN AN ACADEMIC YEAR BY UP 10X.

PROLONGED EXPOSURE TO GARDENS CAN BUILD AN EMOTIONAL CONNECTION TO FOOD, ALLOWING THEM TO FEEL PROUD OF THE FOOD THEY GROW AND MORE OPEN TO TRYING NEW FOODS.

AT SCHOOLS WITH A GARDEN/ EXPERIENTIAL FOOD LEARNING PROGRAMS, KIDS EAT UP TO 3X AS MUCH FRUIT AND VEGETABLES DURING SCHOOL LUNCH.

KIDS WHO ARE PART OF REGULAR SCHOOL GARDEN PROGRAMS ARE MORE LIKELY TO HAVE HEALTHY FOOD OPTIONS AT HOME.

HARVARD, GRADUATE SCHOOL OF EDUCATION.
LET IT GROW PROGRAM

PROBLEM STATEMENT

CREATE A SCHOOL LEARNING GARDEN THAT IS:

- DESIGNED FOR ELEMENTARY EDUCATION.
- FOCUSED ON INSTRUCTION.
- DESIGNED TO PROMOTE OWNERSHIP BY A CLASS AS WELL AS INDIVIDUAL STUDENTS.
- FOR USE IN A RANGE OF INSTRUCTION IN SEVERAL DIFFERENT CLASSROOM SUBJECTS.
- FOR GROWING A VARIETY OF PLANTS WITH VARIOUS NEEDS.
- EASY TO MAINTAIN BY TEACHERS AND INEXPERIENCED GARDENERS.
- INEXPENSIVE AND MADE FROM READILY AVAILABLE MATERIALS.
- FLEXIBLE TO ALLOW FOR EXPANSION AND INCREASED PLANTING AREA WITH TIME AND INTEREST.

SCHOOL GARDEN USE RESEARCH

SCHOOL GARDEN FUNCTION

Academic Instruction	89%
Extracurricular Activities	60%
Food Production	39%

PLANTS GROWN IN GARDENS

Flowering Plants	90%
Edible Produce	77%
Herbs	53%

SUBJECTS TAUGHT IN GARDENS

Science	95%
Environmental Studies	70%
Nutrition	66%
Language Arts	60%
Math	59%
Agricultural Education	46%

NUMBER OF SUBJECTS BY AGE

K to 8th	4-5
High School	1-2

BARRIERS TO USING GARDENS

Time Constraints	88%
Lack of Instructional Material	74%
Lack of Teacher Interest/Training	70%

BARRIERS TO CREATING GARDENS

Lack of Funding	60%
Time Constraints	50%
Lack of Supplies	49%

SUMMARY

Teachers have limited time to care for gardens.
Teachers have limited resources to create gardens.
Gardens are most effectively used in elementary education.
Science, environmental studies, and nutrition are most often taught in gardens.
Gardens need to support flowering plants, edible produce, and herbs.
Academic instruction is the primary function of gardens.

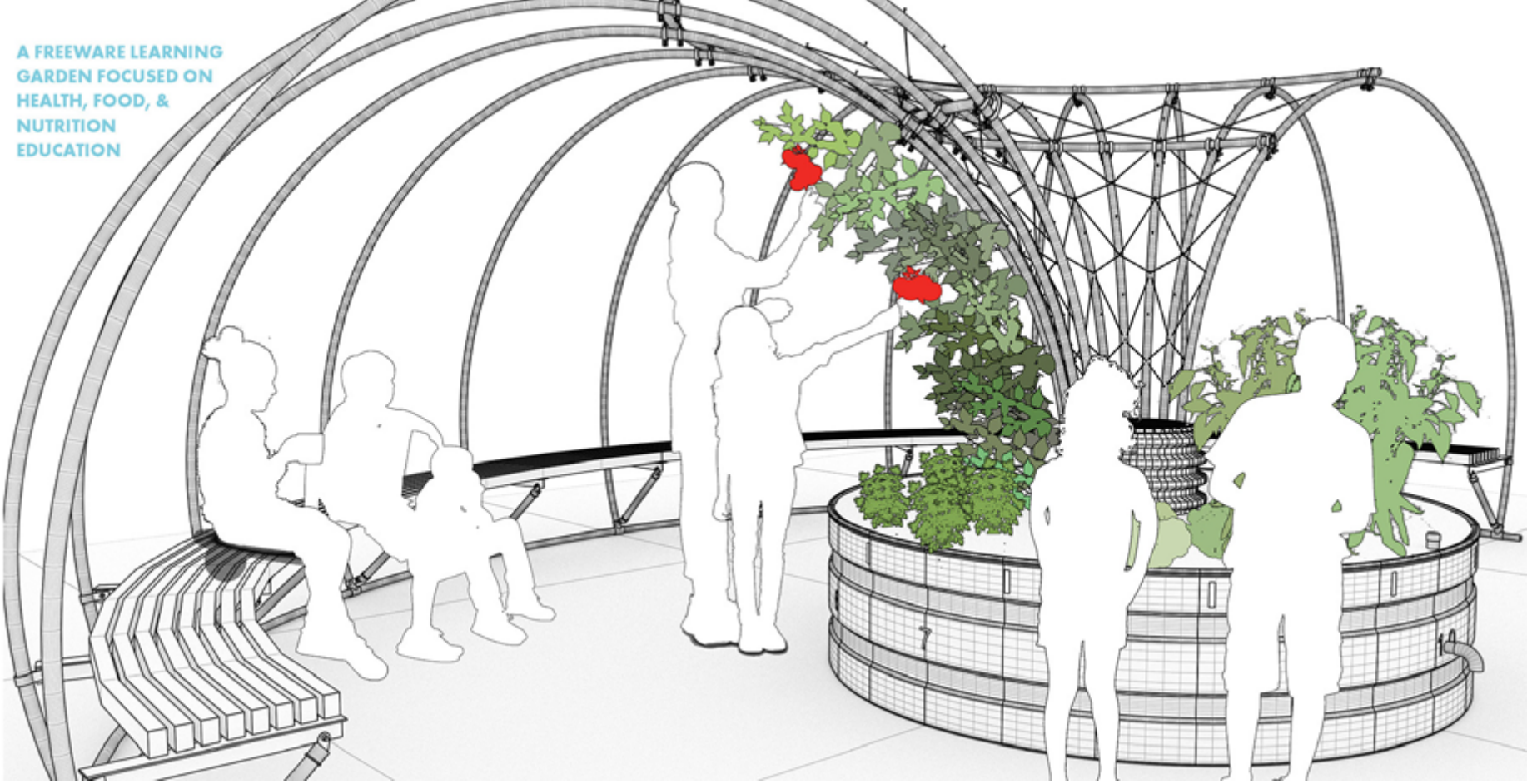
Graham, H., Beall, D. L., Lussier, M., McLaughlin, P., & Zidenberg-Cherr, S. (2005). Use of school gardens in academic instruction. Journal of Nutrition Education and behavior, 37(3), 147-151.

Overview:

This dynamic, community service design project began with exploring the potential for an outdoor classroom and learning garden at XXX Elementary School in Jackson, MS. As work commenced and the design took shape the scope evolved to become a prototype design exercise focused on health, food, and nutrition education. Through research into learning gardens' physical, pedagogical and administrative needs, the team determined that there was a major divide between the way gardens were used and how they were being built. Most applications envision a type of hope garden or miniature farm, designed for production where kids are active "farmers" cultivating the garden throughout the year. While this model has been successfully executed, it is an extremely resource intensive and therefor often financially beyond the reach of most struggling schools. Our team decided to design a learning garden which would focus on being outdoors and on the science of cultivation and nutrition rather than large-scale production, thus minimizing the need for on-going garden maintenance.

THE LIVINGROOM

A FREEWARE LEARNING GARDEN FOCUSED ON HEALTH, FOOD, & NUTRITION EDUCATION



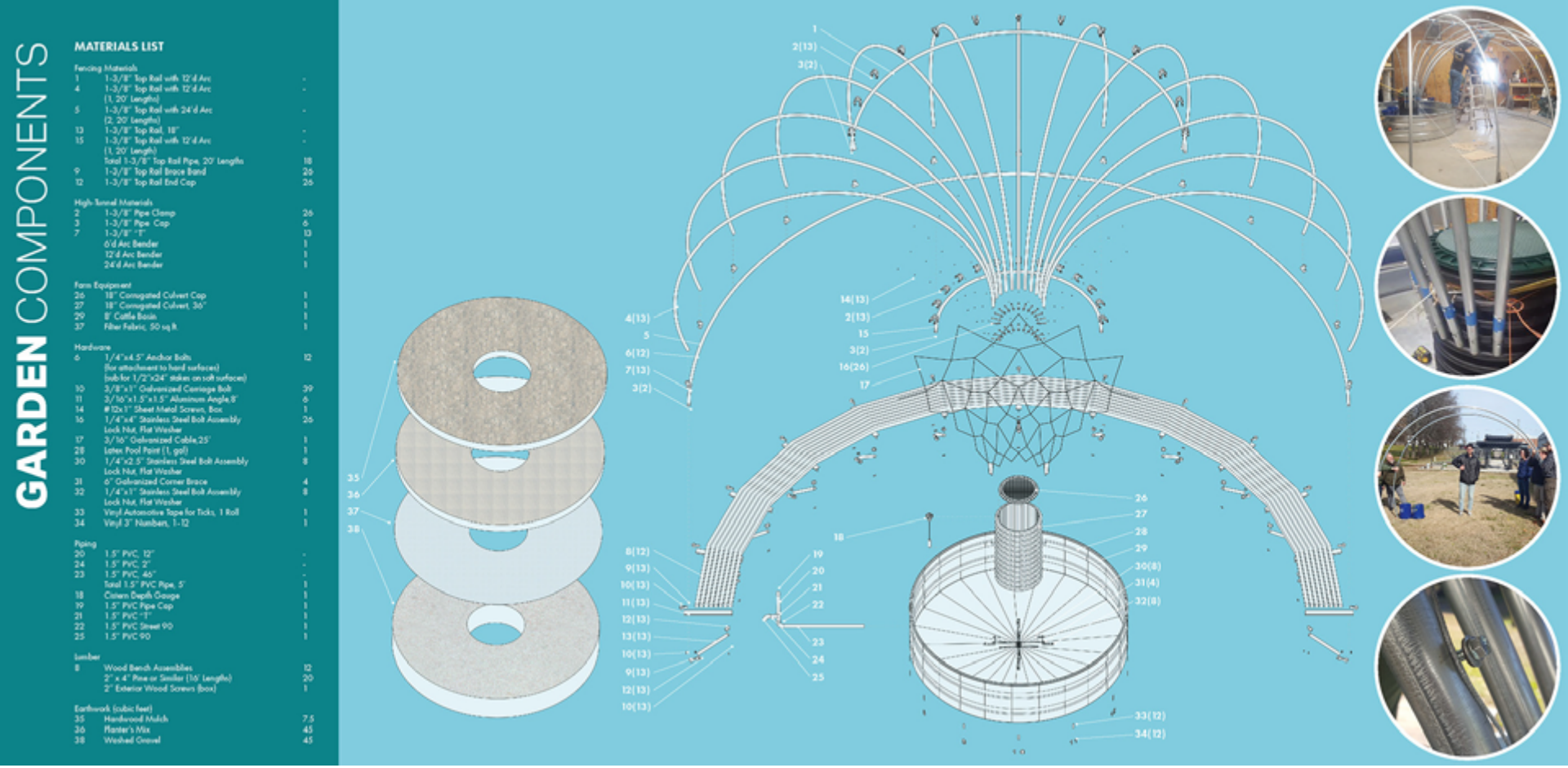
Overview continued:

The LivingRoom learning garden attempts to redefine what a learning garden looks like and how it functions by aligning teacher needs with food, health, and nutrition education goals. Materials for the base model (pictured above) are readily available for under $1,500.00 and can be implemented at any school by volunteers using the simply to follow installation guide. Focused on instruction, the garden provides a flexible, expandable, and maintainable approach to giving students the experience of seeing seeds grow into food they can eat. The system may be expanded over time as funds and needs grow. In a similarly practical way, components may be easily disassembled and relocated as schools' experiment with the classroom type and how it fits, or does not fit, into their unique pedagogical agendas.

Prototype Design & Development Process:

1. Design of a prototype learning garden that meets all the defined objectives.
2. The adaptation of the design for two proof of concept gardens.
3. Refinement and documentation of the prototype for dissemination.

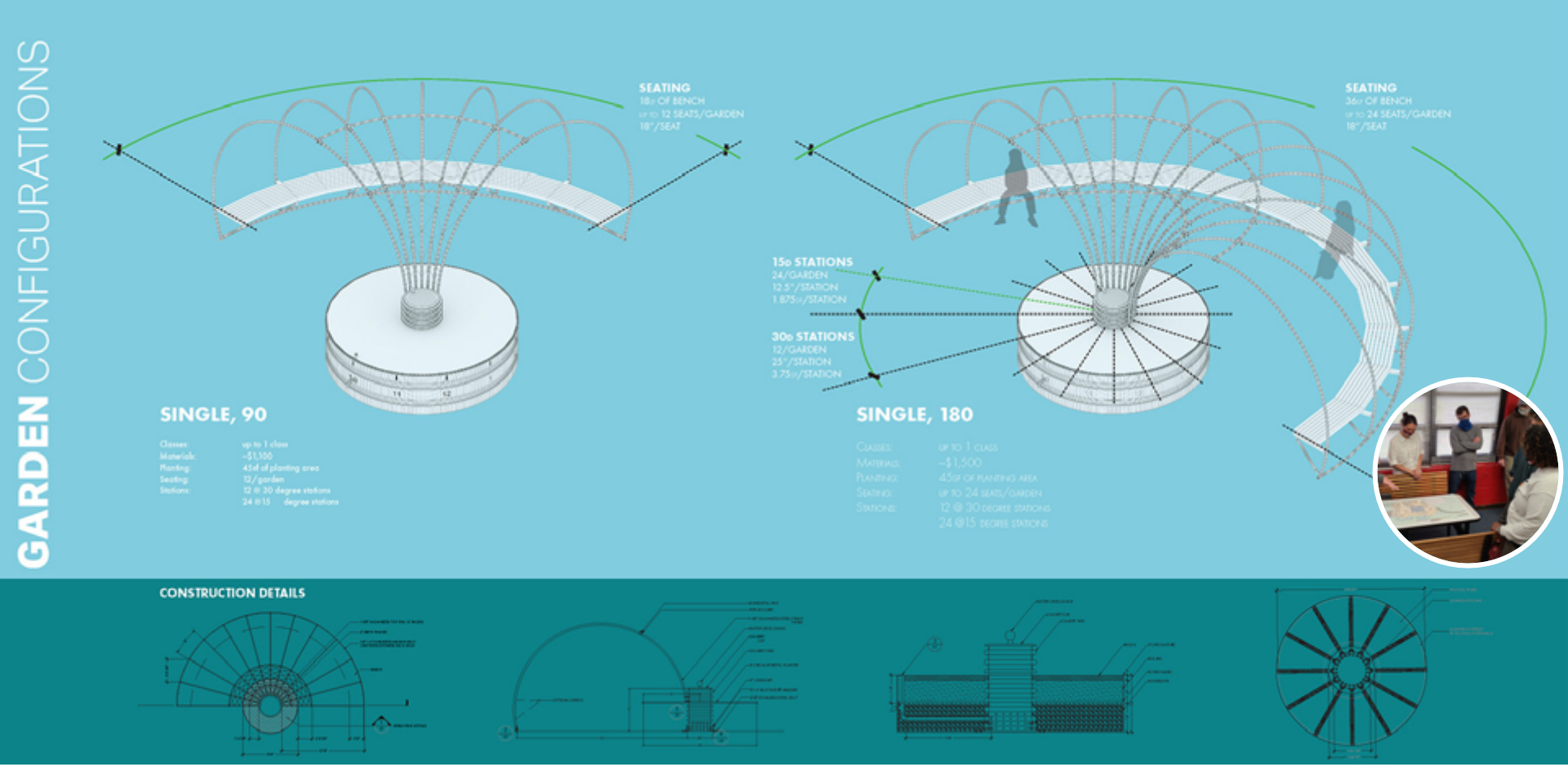
Two proof of concept site designs explore various ways the LivingRoom could be scaled, adapted, and refined. The Partnership School Living Room demonstrates a more formal composition of the components, executed at a grand scale for a large and newly constructed school. While the Galloway Elementary School LivingRoom follows an approach that is more spatially independent and self-referential in composition. Both examples highlight the creative potential of a collaborative process to include local educators with architects, landscape architects, farmers, master gardeners and involved community members.



Phase 1:

The design process began with meeting with educators and farmers to understand how much space is required to teach about food. A land parcel of approximately 500 square feet per class year level was established through these meetings.

The next step was to explore what off-the-shelf resources were available to meet the growing and classroom meeting needs. An 8’ diameter agricultural trough was selected as the bases for the planting beds because of the inherently ideal height, durability, national availability, minimal cost, visual quality and size for gardening. Looking to high-tunnel food production greenhouse design, the team developed a plan for using readily available materials to create a rotated trellis and bench system around the agricultural trough planter. A sub-surface irrigation system was added to the bottom to reduce watering needs and the likelihood of mess and associated maintenance.



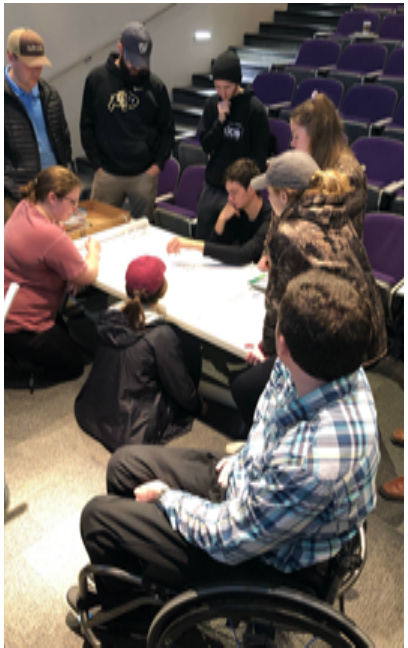
Phase 2:

The original LivingRoom development partner was Galloway Elementary School in Jackson, MS. With plans to execute the design and installation of this first example the team was unsuspectingly approached to consider the installation of a second LivingRoom during the same semester. The new Partnership School in Starkville, MS had recently been awarded a grant through Blue Cross Blue Shield authored in part by the faculty working on the LivingRoom v1 and so the team took up the design and planning for the LivingRoom v2. Within a few months the team was again approached to design a LivingRoom (v3), this time for a significantly reduced cost on a small site in Leland, MS. For all three projects, the team developed a scaled model to facilitate workshops with stakeholders to understand the spatial arrangements of multiple gardens. These gameboard models allowed project partners and end users to collaboratively explore layout and size options. Lessons learned from these exercises are now being applied to a future Living Room installation.

The XXX-XXXXX County School District Partnership School:

The 6th and 7th grade Partnership School opened in the spring of 2021 and is arranged based upon a “learning pod” system. Each learning pod is home to up to 125 kids.

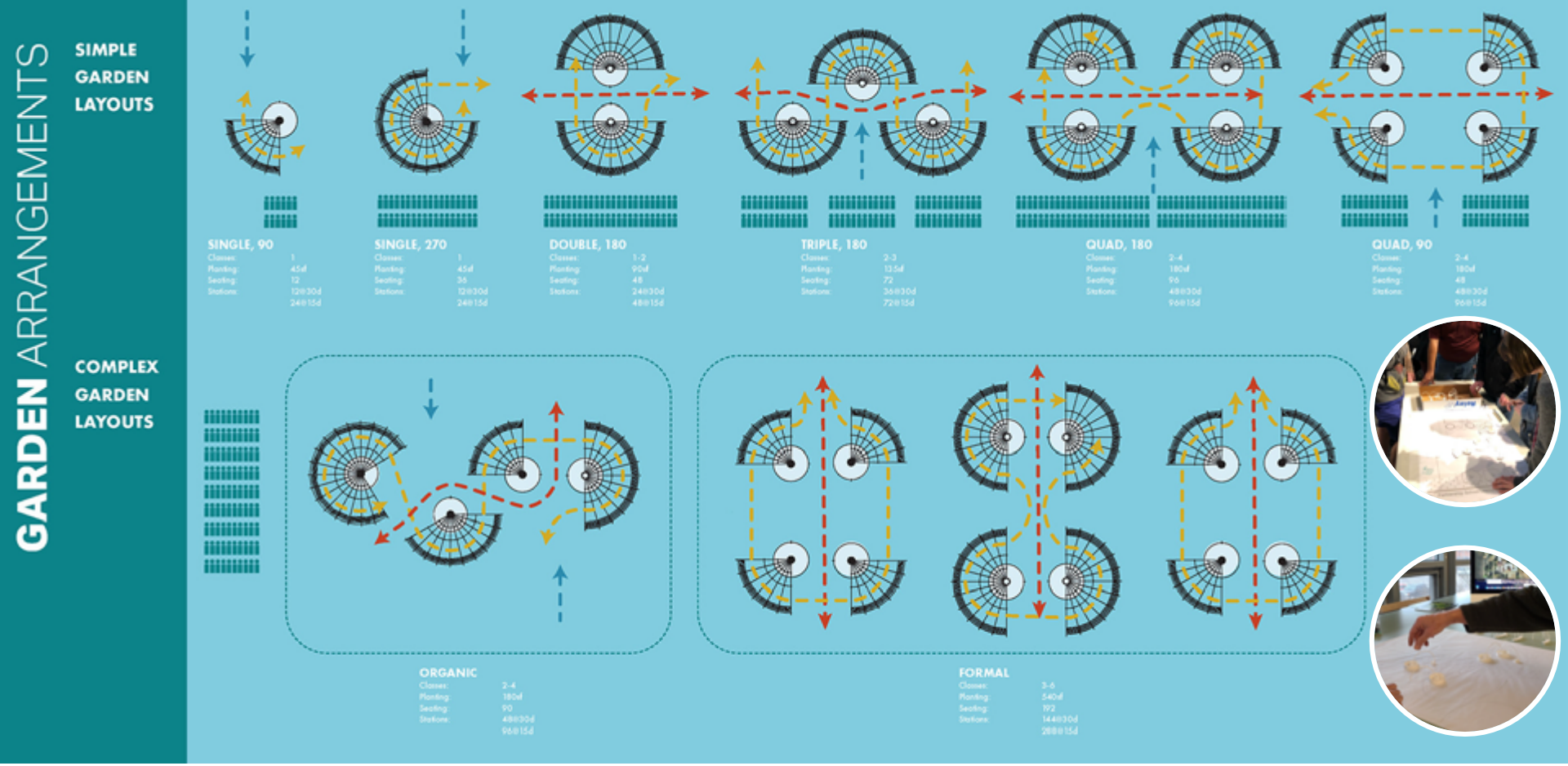
To facilitate the design of the gardens, the team held a workshop with school district teachers, administrators, and the professional design team for the school. Using scaled models on plan and elevation drawings, multiple alternatives were developed to create four separate garden pods with six garden typologies each. In this iteration the university PI’s and students worked with the professional design and construction teams to realize the project. Upon conclusion of the schematic design phase a preferred, “formal plan” was chosen by the school district and then turned over to the design team to detail, bid and construct.



Participation & Individualization:

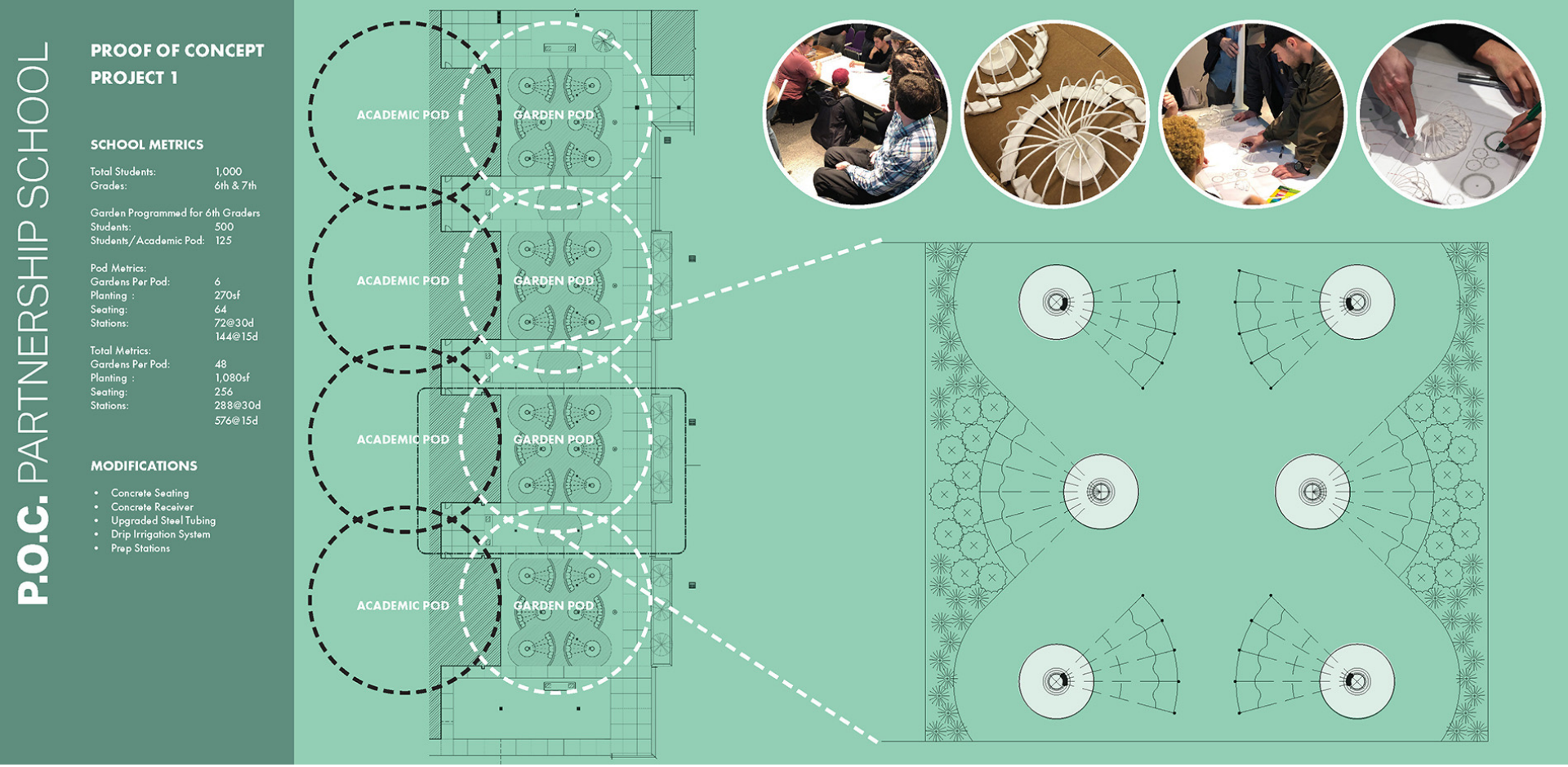
The system allows for formal and informal arrangements and spatial definition. Using a kit of 3D printed garden pieces, participants may easily locate and visualize the flow and form of the would-be spaces. With basic instructions and layout options provided, design team participants may explore issues of path and place, edge and center while getting real-time feedback about the relationship of the learning garden to the classrooms and/or building interiors they are meant to service.

By varying the hoop diameter, a sense of hierarchy and directionality is easily achieved without significant cost increases or construction complication. The result is a participatory design process that emphasizes design and experience over concerns of cost and schedule.



In the case of the XXX-XXXXX Partnership School, design students were able to collaborate with the school's professional design team to develop the layout and The LivingRooms to be professionally built and installed. Site-specific criteria were applied, and the game-board models were again used to facilitate workshops with stakeholders to explore potential spatial arrangements of multiple gardens. The needs of the various schools and their associated pedagogical programs were considered in association with the physical context to deliver an individualizable design whose costs and installation could still be easily estimated.

This version of the project will be further studied once complete to better understand the costs associated with professional fabrication and installation of the system components.



The XXX-XXXXX County School District Partnership School:

In the case of the Partnership School four classroom pods will be served by four Living Rooms. The pedagogy called for a layout which would allow for the individualization of the spaces for competitive growing. While each pod follows a centralized layout pattern the four pods also work to generate a central axis which links the spaces as an allée running parallel to the school.

The six-planter LivingRooms are designed to support small group-based activities during the day while also offering a space of repose and rest during afterhours events or while students are waiting to be picked-up.

P.O.C. GALLOWAY ELEMENTARY

PROOF OF CONCEPT
PROJECT 2

COLLABORATION

Design Students:
Programmatic Organization
Typology Refinement
Schematic Layout
Construction Documents
Assembly
Deployment
(delayed due to COVID 19)

Funding:
Fertile Ground - Jackson, MS
The Bloomberg Foundation

SCHEDULE

January 2020
School Workshop
Stakeholder Workshop
Design Concept

February 2020
Typology Refinement
Schematic Design

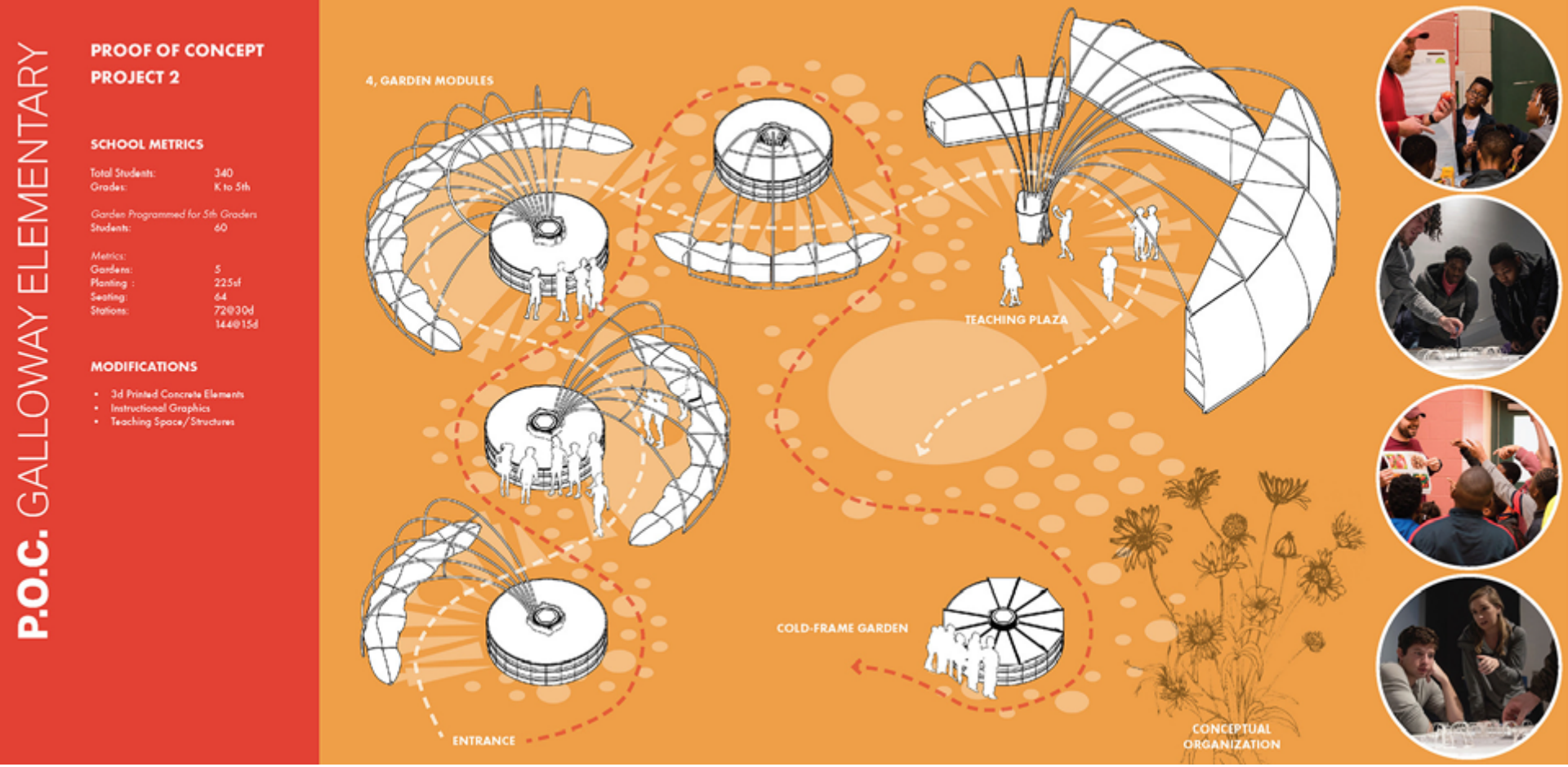
March 2020
Element Production
Surface Painting
COVID 19 Delay

APRIL TO MAY 2020
Construction Documents
Documentation

FALL 2020
Deployment (if allowed)
Grand Opening of
Livingroom Garden

Galloway Elementary School
Jackson, MS:

The K through 5th grade Galloway Elementary school is located within a USDA classified food desert, surrounded by fast-food chains in a historically underserved part of Jackson, MS. The existing school has extremely limited funding and resources, so this LivingRoom was designed to minimize ongoing expenses while offering the teachers a supplemental space to bring classroom activities outside and engage students in experiential learning. With a $35,000 budget from a related Bloomberg Public Art Challenge Grant, the team started the process by engaging the 5th graders in a creative workshop on food nutrition to generate inspiration for the design. An abandoned asphalt playground adjacent to the gym provided the perfect platform for the garden.



Customization & School-based Identity Development:

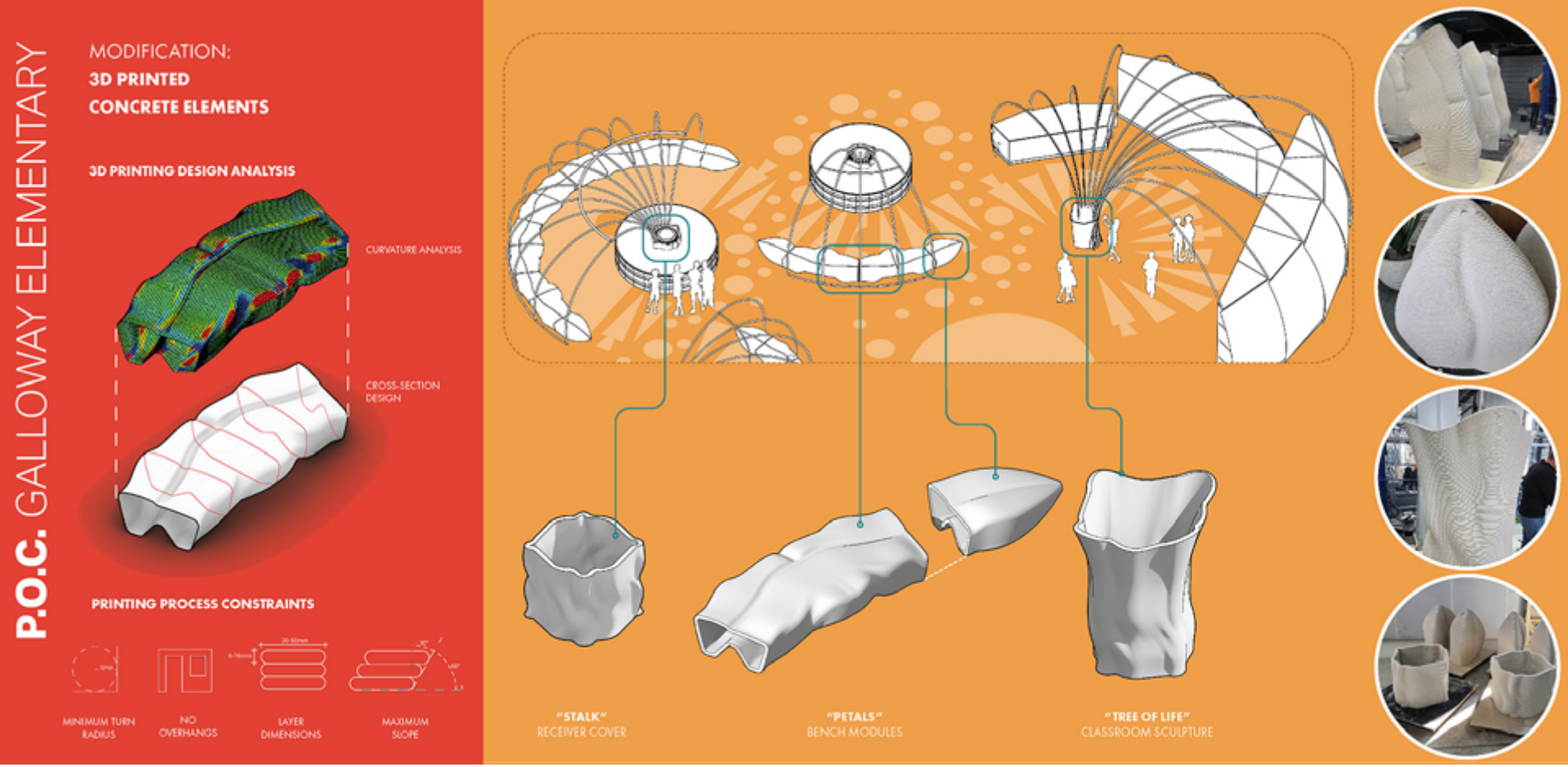
The Living Room system is meant to be customized as a way for school districts/teachers/children to be directly involved in the design process. The goal, as with many such initiatives, is for the community to take pride and ownership of the space in order for it to be well maintained and productive. In the case of the Galloway Elementary Living Room, because the age group/year levels using the space were younger the design team worked to generate a more playful and lively composition which also focused the students toward a central classroom space rather than the four-pod decentralized axial arrangement used at the Partnership School.

The concrete furnishings were developed to exaggerate a sense of movement and physical association with the plants and vermiculture teaching aids intended to be used on-site.

3D Printed Concrete:

Working with an alumnus of the school of architecture who is now the lead research and development person for an out-of-state concrete company (XXXXX), students were introduced and taught the work methods associated with the company's proprietary 3D concrete printing technology.

Exploring the potential of this method of fabrication, students worked to develop a set of forms that could be produced and transported over 1,700 miles without concern of breakage. The resulting benches, planter stems, and a large 6’ tall 1,000 lbs. vase-like structure referred to as the project’s “tree of life”, are entirely unique. The components of the bench system are modular allowing for a variety of lengths which correspond to the hoop and planter structures.



Customization of Site Furnishings:

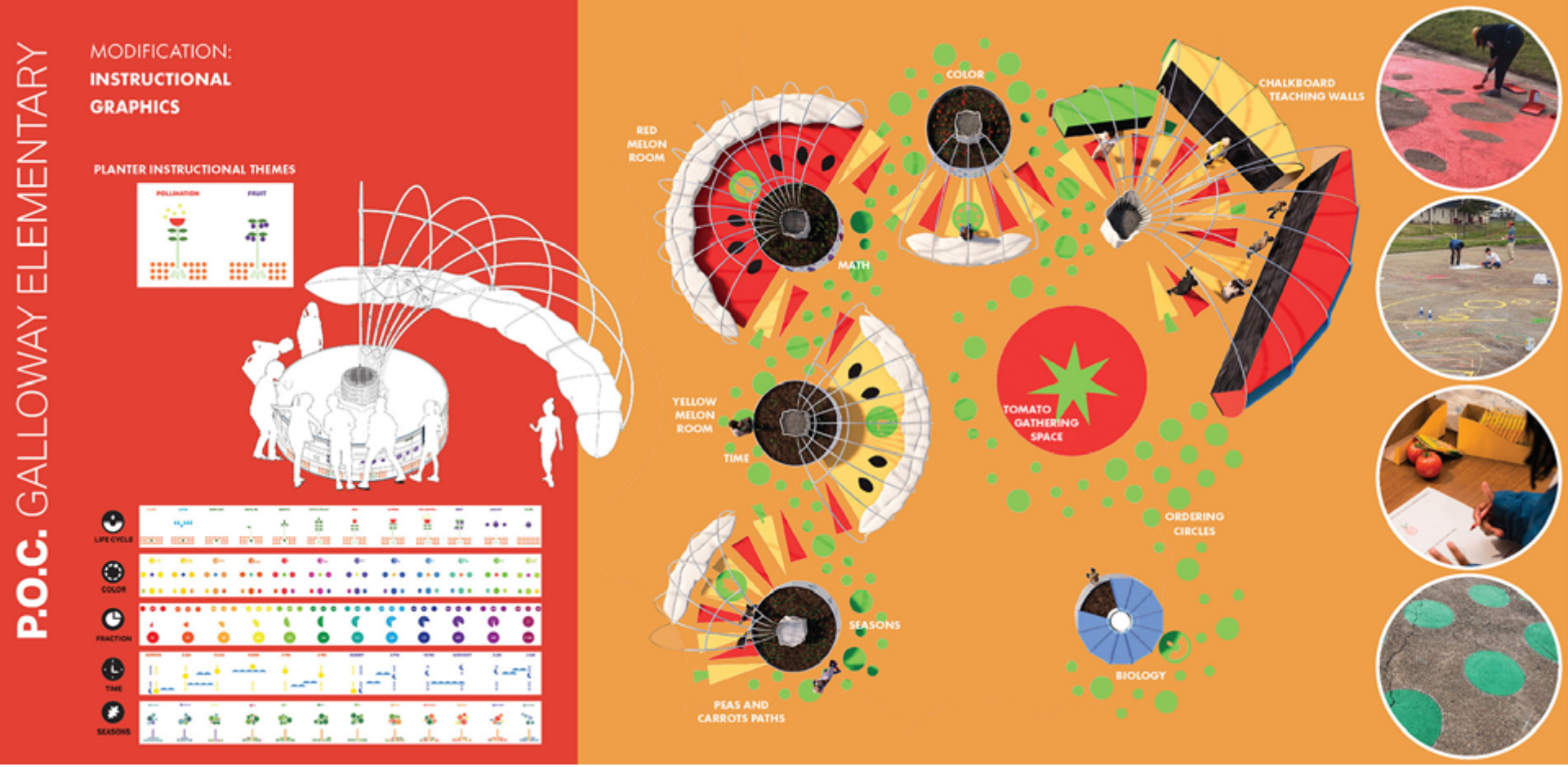
The rapid concrete printing technology, which allowed for a 5'-0" section of bench to be printed in under 1 hour, afforded the students an opportunity to tune their designs, balancing comfort, aesthetics and durability. Issues of water drainage, structural stability, weathering and ergonomics were all considered with the final design taking on the character of a plant. Learning from forms in nature, students discovered the potential of biomimicry and this will hopefully become a component of the elementary school's pedagogy.

These concrete site furnishings are the first execution of the new technology in the U.S. and use the unprecedented flexibility of the technology to make organic surfaces that turn the planters into giant flowers, where students sit on leaves and petals. The potential of this collaboration is an endlessly customizable, or school specific, theme development that allows design participants to build classroom, school or even district identity into their new LivingRoom learning garden.

Graphic Identity Development:

Instead of simple ticks and numbers to delineate teaching stations, the team developed a set of complex lesson plans built on a 12 learning-station organization pattern.

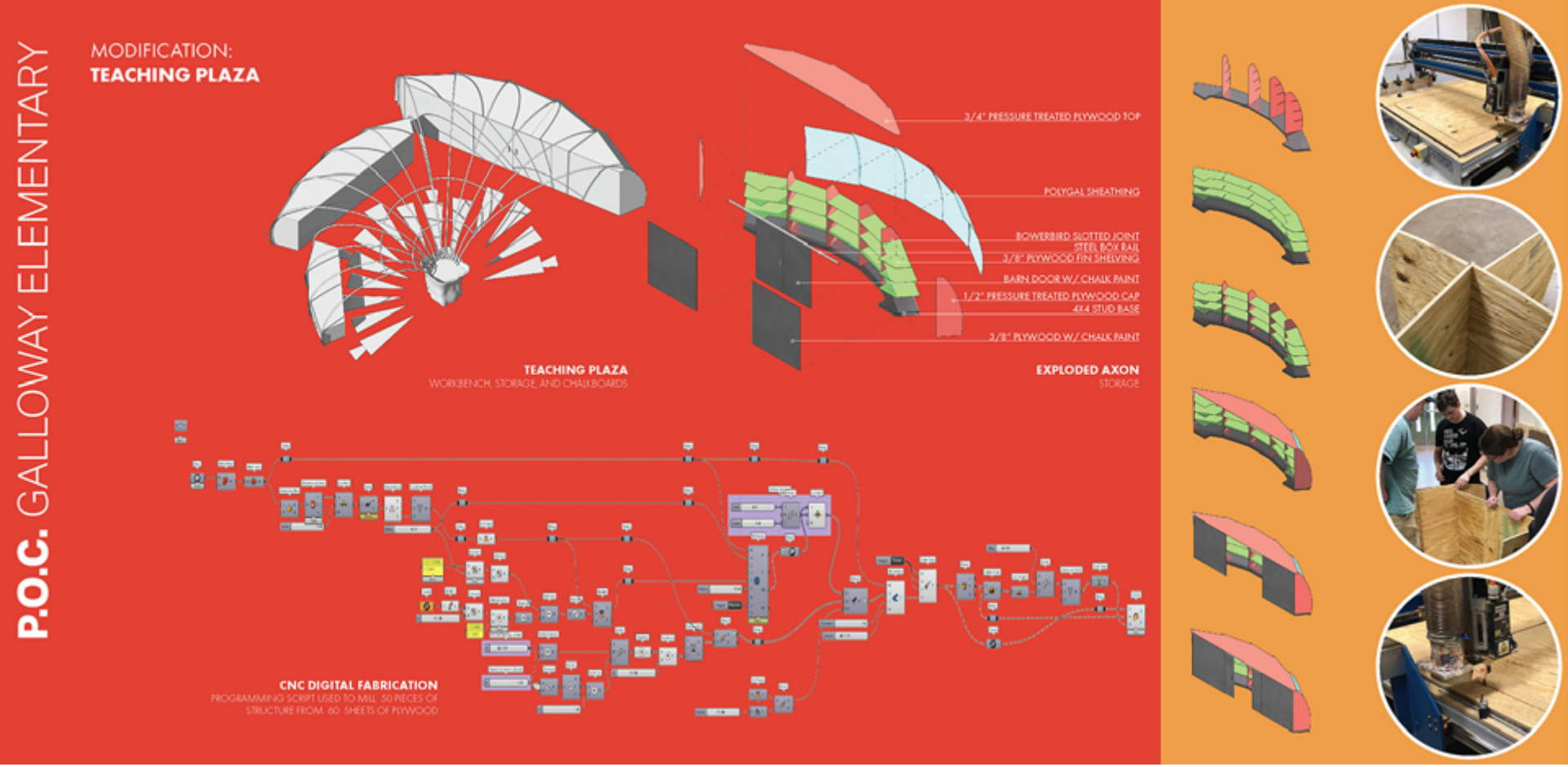
Working with an elementary school educator and members of the Graphic Design faculty and student body, the team developed five unique themes that offer lesson plans on time, color, math, biology, and seasons. These themes allow teachers to use the garden for almost every subject and ensure that the gardens will be used for not just food education, but as an integral part of the classroom.



Graphic Identity Development & Instructional Themes Continued:

In the case of Galloway Elementary School inspiration was drawn from a workshop event as well as the work of an artist who created a mural painting on the side of the school building. The team worked to build upon these visual and conceptual guides to bring linkage and an age-appropriate character to the project.

To support the educational agenda of the school a system of vinyl tick marks and numbers were planned for the sides of the planter to create 12 growing stations that could be used by one or two students. The resulting design is flexible, adaptable, and easily maintained within a limited budget of under $1,500 in materials. A plan for a cold-frame alternative was also developed which allows classes to start plants from seed and create a mini greenhouse in winter months.



Outdoor Classroom & Storage Structures:

To expand the garden, the overall design explored a large teaching space that could also create storage. A unique, plywood eggcrate assembly-based structure was developed to facilitate ease of volunteer-based unskilled labor assembly. In addition, the system allowed for a flat-pack shipping/transportation model to be used to help reduce cost and environmental impact. The system, reliant on a Bowerbird plug-in and Rhinoceros/Grasshopper software, was used in conjunction with a CNC milling machine for fabrication of basic elements. This approach allowed the structures to easily take on a curvilinear form befitting of the emerging design theme. The result is an outdoor classroom composed of three free-standing units. One serves as a workbench, the next a small tool storage space, and largest a green house and large tool storage space. The units are painted with chalkboard paint on interior faces framing the seating area.

THE JACKSON, MS LIVINGROOM

COVERING AREAS OF
5,500 sq/ft

STRUCTURES COST
$25.00 / sf

CONSTRUCTION COST
$35,000

COMPLETION
October 2020 (Iteration #1)

Getting Ready for Spring Replanting 2022