# Experiments in Participatory Architecture

Adventure Classrooms and the Construction of Micronational Realities

by

Samuel E. Kronick



Submitted to the Department of Architecture in partial fulfillment of the requirements for the Degree of

Bachelor of Science
as recommended by the Department of Architecture
at the
Massachusetts Institute of Technology



June 2010



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ABSTRACT

Beginning with the conjecture that non-professionals can find empowerment through a greater understanding of the built environment, two projects of architectural intervention were developed to experiment with the notion of "participatory architecture." The first was ting•bing, a modular classroom structure designed to be built, redesigned, and rebuilt by a group of high school students. The structure was prototyped at full scale with the hands-on help of local high students and expanded into a system of virtual and model-scale building toolkits. The second experiment was a temporary autonomous micronation called The Microdot, an event series open to the public featuring the construction of easy-to-build transformative tensile tents, collaged passports as symbols of citizenship, and a pop-up alter-institution.

Thesis Supervisor: Ute Meta Bauer
Title: Associate Professor and Director of the Program in Art, Culture, and Technology

# Acknowledgments

The nature of my work leaves me indebted first and foremost to my collaborators Bill McKenna and Jack Murphy. Through our countless conversations the ideas of this thesis took on more refined form; their willingness to lend a hand turned talk into practice.

I am grateful for two mentors that have shaped my educational experience over the past four years and aided me with resources, inspiration, and wisdom: Ion Sørvin of N55 and my advisor Ute Meta Bauer.

I owe a cleaner text to the editing prowess of Seohyung Kim.

These projects would not have been possible without generous support from The Council for the Arts at MIT; Sally Susnowitz and the MIT Public Service Center; Leila Kinney and the office of the Provost for the Arts, Phil Khoury; the office of the Dean of the School of Architecture, Adele Santos; the MIT Community Service Fund; and the MIT Visual Arts Program Director's Discretionary Fund.

The students and teachers at Prospect Hill Academy gave their time and invaluable feedback to improve this experience. Special thanks to Mr. Moretti and interns Edwin C., Betsie D., Melissa F., Sergio R., Tracy S., Xayida T., and Ahmed Z.

This work is dedicated to my parents for the gift of the education that made it possible.

# Refshalevej: A Manifesto

*The ship is the heterotopia par excellence. In civilizations without boats, dreams dry up, espionage takes the place of adventure, and the police take the place of pirates.*

—Michel Foucault, *Of Other Spaces* (1967)

The sun never set that night. Midsummer at 55 degrees north was a cycle with troughs of mere twilight, crests of ecstatic ambition. I was floating on a platform in the Copenhagen harbor with my new friend Louise while I watched the sun return from west to east as it dipped just ever so slightly below the horizon. This was the front porch to Louise's home for the summer. She built the modest wooden shelter as well as the platform on which we sat. A handful of other floating structures reflected in the water between us and the shore; we were the furthest out, reachable only by a makeshift ferry pulled along a patched-together network of ropes.

On shore there were houses, too, all built by their respective inhabitants. A few weeks earlier, all that existed was a pile of scrap lumber, cast-aside industrial storage tanks, and an imprecise air of determination to build. Something was rotten in the state of Denmark, said the people who gathered on Refshalevej, a small street along the water in the capital city. A conservative government seemed bent on stomping out diversity either through outright war, or worse—an unabashed policy of "normalization." But none of that would matter much here, because the mission was to build a new place: free, autonomous, and organized around better principles. Exactly what those principles were was up in the air, similar to the situation as the bordering autonomous region of Christiania took form 35 years prior. Comparisons to Christiania would be apt to some extent, but the history of that place is so weighty that its documentation is best left for others to write.[1] I wasn't there when Christiania's barricades came down but I was there when Refshalevej's walls, windows, doors went up, when its temporary residents began inhabiting the street as a constructive protest action.

The youth and autonomen of Denmark had expressed their grievances before. After the Ungdomshuset, their de facto cultural center and meeting place, became the site of a violent eviction and government-backed demolition, a loose affiliation of Copenhagen leftists rioted in the streets for days, joined in anger and solidarity by peers across the world.[2] But this new demand for *flere fristed*—more "free spaces," loosely—was different. It didn't invoke black bloc tactics, the crafting of molotov cocktails, and general nihilistic destruction. That may once have been an effective strategy to ensure that the subculture's injuries could not be ignored, but by the time I arrived in Copenhagen the point had been made and it was time for a more productive criticism. Society wasn't going to just hand over a new free space, but it might tolerate a freshly built one- for a while, at least. So the *Opbyggerene* ("up-builders", a name used as the external-facing collective identity of the leaderless group) took over the street of Refshalevej and began to build a place for themselves and anyone who wished to join in on the fun. The settlement lasted for about four weeks of midnight twilight before the police arrived and tore it down.

Hakim Bey opens his best-known work The Temporary Autonomous Zone with the declaration that "chaos never died."[3] It was during the month on the street in Copenhagen when I first read those words, and fortune put me in a situation where they resonated like no other. Where I found myself was not an escape from the supposed order of reality, not an alternative, not

a dream, but true reality itself, constructed from undead desire and resuscitated building materials, dissatisfaction and optimism, nails and warped two-by-fours. So what if it was temporary? So what if it wasn't likely to alter the course of Western political discourse? So what if its radical incongruence with the norms of the rest of the world cast it as merely an anomaly? We were there. It was real. And though the events on the street were anarchistic but not particularly anti-order, reconciling their messy reality with what I learned of the world growing up in a quiet Midwest suburb required an acceptance of chaos as the macrocosmic organizing principle.

Refshalevej wasn't Utopia. To call it such would be a cliche, reducing its status to just another amongst myriad failed ideals. There are better names that invite more careful analysis, Hakim Bey's "Temporary Autonomous Zone" (TAZ) being one of them. Bey coyly avoids defining this phrase but offers instead that "In the end the TAZ is almost self-explanatory. If the phrase became current it would be understood without difficulty...understood in action."[4] Despite being called a "zone," the TAZ is more or less placeless. It is simultaneously a social structure, a festival, and a nomadic mind set that rejects oppressive structures of authority wherever they may be found. It seizes a site that is convenient at a given time and then moves on. Being temporary is an inherent strategy to avoid drawing too much attention and entering into a David-vs-Goliath showdown. But transience does not preclude reconstitution; an important characteristic of the TAZ is that it is moves and rebuilds, spreading virally to other sites.

Michel Foucault provides another perspective when coins the term "heterotopia" to describe places that exist apart from and simultaneously in relation to all others in a given society. They are "a kind of effectively enacted utopia," points that reflect a culture back onto itself as contemplative "counter-sites."[5] The festival is one sort of heterotopia according to Foucault, as are the cemetery and brothel, other sites of crisis or deviance.

Foucault's discusses the existence of heterotopias in a society but he does not suggest how they come to be in the first place. Bey suggests actions to engage in under the banner of chaotic autonomy as tools for the production of a TAZ. The site of Refshalevej combined the ability of a heterotopia to comment on society at large with an emphasis on action as in a TAZ. My hypothesis is that such liminal and peripheral spaces tend to be defined more by the actions which take place inside their boundaries than by their formal characteristics or even their relationships to other spaces and places. What I witnessed on Refshalevej was spatial identity defined by a communal act of building, generated with the construction of an engaged architecture of participation.

What did the transient settlement of Refshalevej do? Who built it, and for what reasons? These kinds of questions only seem to arise when looking at a place so different from what we know that we can't help but dig deeper to make sense of what we see. Yet these questions and their implications have relevance for the analysis, interpretation, and decisions we make about the world more familiar to us. Put generally:

Architecture is part of our everyday lives; we spend most of our time in buildings of one kind or another. While we might participate in other everyday activities such as cooking our own food, the processes of designing, constructing, and managing our own buildings have been claimed exclusively by the professionals. To make matters worse, many buildings are expressed as towering monuments made from seemingly permanent materials, firmly anchored to valuable land, unchangeable by the people inside. As a result, we lose a connection to and understanding of our most intimate physical environments. It doesn't have to be this way! The most noble role of designer is not to impose an architectural vision on others, but to empower people to make and explore places they can really care about. This is *participatory architecture*.

That summer I saw for the first time architecture being used in a way that truly excited me. This wasn't Vitruvian *firmitas*, *utilitas*, *venustas*, nor was it the slick contemporary expression of band-aid-deep "sustainability." Participation wasn't just a process that produced a layout and structure in the end; everyone building, living in, and visiting this colony was an engaged participant, a producer

Recycled wood and instructions to "build it chill" set the tone for this constructive action on the street.

of an activist architecture, part of a political plan, contributing to a social movement. Circulation, illumination, materials, facades, were all consequences of action, not constructs of "design." The rules were broken, the rules didn't matter, and I may have been the only one who viewed it as an architectural project at all. In the end, the mood stuck. It follows and guides me to this day.

The message of Refshalevej was strong but messy and undirected. I look back on the following works as efforts to clarify exactly what it was I witnessed on that street. They are experiments in creating a framework to understand this idea of participatory architecture, conversations with myself and others to identify sites of possibility and speculations on future modes of engagement.

# Objects, Bodies, Environments: A Literature Review

*Things have significance for concrete situations: when we say: here we have a concrete situation, but no things are of significance to this situation, this is not in compliance with our experiences.*

—N55, *ART AND REALITY* (1996)

## Building to Learn, Learning to Build

That Refshalevej found its strength in the act of building resonated strongly with my own experience. I know myself to be at my fullest while building something. I discovered this passion in high school when I used every excuse I could to cut class and spend time down in the machine shop instead of in a more traditional classroom. It was in the shop that I learned what math and physics really meant. I was free to explore the characteristics of different materials and create demonstrations of the "academic" theoretical constructs from textbooks and lectures. As I began to study architecture, I reflected on how these two locations within the same school exhibited wildly different spatial attitudes—the authoritative teacher-centered hierarchal arrangement of desks contrasted with the machine-material-tool focus in the shop. Contemplating the differences in architecture, activity type, and level of engagement between the spaces in which I had learned sparked an investigation into how architecture could empower other learners to discover the joys of building as active participants in their environment.

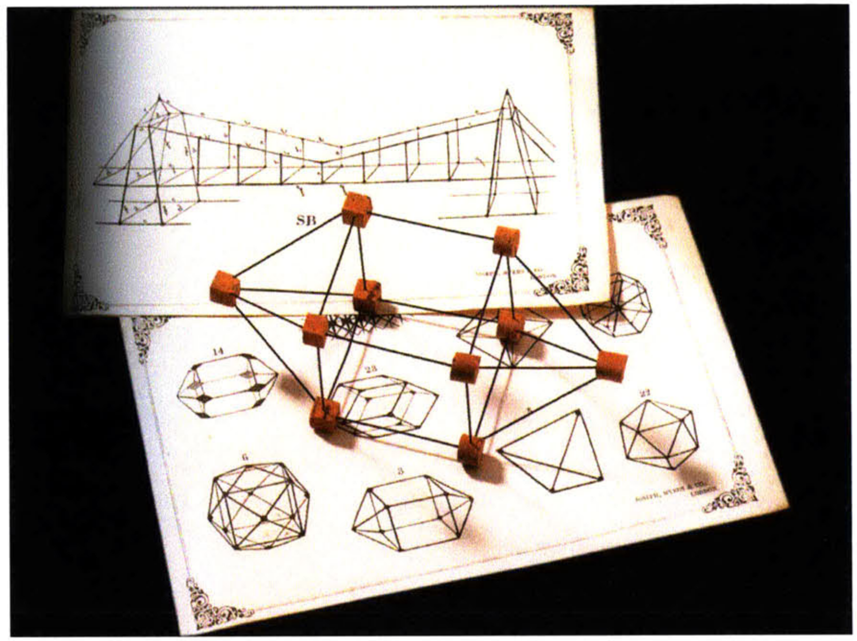
To speak of "school" is to evoke both a set of institutional practices (classes, curriculum, grades, teachers, etc) and specific architectural spaces (the school building itself). The relationship between these two connotations is complex and suggests that physical and environmental factors, alongside mental pedagogical practices, have an impact on learning. Literature on the topic leads to an argument that objects, bodies, and environments interact to create power dynamics which effect both knowledge production and participation. Rather than just looking at the experiments of psychologists who attempt to reduce the components of environment to independent variables in their study of knowledge acquisition, this review will look at the interventions of artists and designers whose work deals with education, environment, and the process of creating alternative things and spaces to empower their users.

## Starting with Objects

MIT computer scientist and educator Seymour Papert relates a story from his youth of discovering that the gears of automobile transmissions served as a highly effective metaphor for many of his academic studies. He cites this as an example of a "transitional object" that creates an affective connection between a learner and the concepts they seek to assimilate. The terminology he uses is drawn from Jean Piaget's theories of cognitive development whereby learners build knowledge structures as they move from "concrete" to "formal" thinking. Papert argues that by having a concrete structure (such as his gears) to ground one's thinking, formal structures can be more readily integrated into one's body of knowledge. Though he begins by describing a physical object, he quickly moves to discussing computers as "the Proteus of machines," or a sort of infinitely accommodating and reconfigurable virtual transitional object.[1]

To Friedrich Froebel, the inventor of the early childhood educational movement he dubbed Kindergarten, objects play a key role as well. In the schools he developed, children are given a series of twenty "gifts," objects for performing a certain activity, such as wooden blocks for building, grid paper for reproducing drawings, and peas and wire for creating geometric forms. Writer Norman Brosterman connects the activities and aesthetics of these objects to the creative works of 20th century modernist artists and architects. Brosterman establishes the influence of Froebel's kindergarten by comparing images of these designers' work to crafts produced by children learning with Froebel's method. He concludes that Froebel's objects provided an aesthetic structure for the linear brushstrokes of Mondrian, the geodesic frames of Buckminster Fuller, and the space-making logic of Frank Lloyd Wright.[2]

Artist Annette Krauss' "Hidden Curriculum" project is an exploration with two groups of high school students to document and discuss the secrets they used to navigate the rigid structures of their educational institutions, revealing the production of a hidden body of knowledge. The first two of seven stages in the project focuses on an object commonly found in the classroom: the chair. Unlike Papert's gears and Froebel's gifts, this object is not discussed for its potential to facilitate learning. By asking students to place chairs in explicitly unusual situations, Krauss has the children question the supposed innocence of objects present in a learning environment. Krauss' work discusses how objects reinforce particular norms and power structures in learning environments, such as mandating that students sit still in a chair while receiving lessons from a standing teacher. By deconstructing the meanings of such a commonplace object, she argues that nothing in a learning environment can be truly neutral.[3]



One of Friedrich Froebel's "gifts" teaches kindergardeners to build crystal structures out of hubs and struts, foreshadowing art and architectural trends to come.

## Objects and Bodies

When Papert departs from the physical gears of his youth to the virtual promise of the computer, technologist Mike Eisenberg sees an unfortunate mistake made as a result of technological hyper-optimism. Papert describes the Logo programming language and its characteristic "turtle"—a programmable screen character that can be controlled by the student to create algorithmic graphics. Eisenberg says that while some students may be able to "feel" as if their bodies are moving like the turtle's (as Papert suggests), this virtual representation cannot be, for example, touched, hugged, collected, or brought home to a student's parents. The turtles fall short as optimal transitional objects because they lack a connection to the many senses of the human body; they are not tangible.[4]

In an essay accompanying Krauss' "Hidden Curriculum" project, sports sociologist Thomas Alkemeyer builds a stronger case for the importance of considering bodies in knowledge production. Alkemeyer cites social theorist Pierre Bourdieu's concept of "habitus." A simplified definition of habitus can be stated as "embodied social knowledge;"[5] the emphasis on embodiment becomes important to Alkemeyer when he argues for more attention to the physical situation and constraints placed on learners in an educational environment. His essay provides a foundation for understanding a stage in Krauss' project where students are asked to explore the space of their school and inhabit some part of it in a manner that was normally unacceptable. As students hide behind appliances or ride their bikes through the hallways, they engage their bodies in unconventional ways to reconsider the environment which was designed to be a place of learning. Alkemeyer provides additional examples, such as the rearranging of bodies from individuals at desks in a "normal" classroom to peers in a circle during "democratic" class council meetings. He concludes that "learning is connected to physical arrangements" and that "different spatial-social orders each imply different forms of the reproduction of inequality." Thus, considering bodies is important not only for understanding knowledge production, but also for increasing opportunities of participation amongst traditionally marginalized persons.[6]

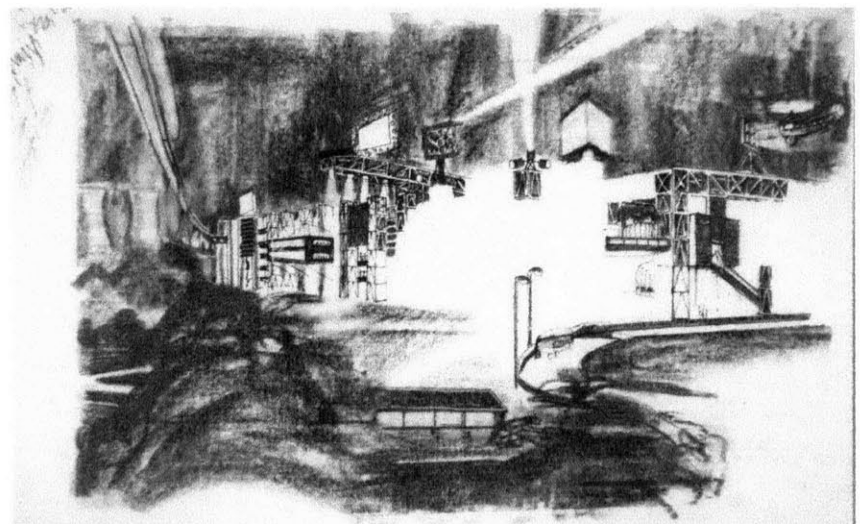
Alkemeyer moves beyond how bodies interact with objects to how they engage with spaces and environments. Eisenberg, too, sees past the mere tangibility of objects when he identifies the inability of Papert's computational worlds to be inhabitable. The quality of bodily immersion, he argues, is lacking from Papert's vision, even when Papert himself likens learning math by living in a computational "Mathland" to learning French by living in a physical France. When Eisenberg proposes tangible extensions to Papert's computational ideas, he suggests that they augment walls, floors, ceilings, and windows—the very architecture of a child's room—to truly immerse the learner in an environment of her own creation.[7]

## Rethought Learning Environments

Eisenberg only begins to suggest alterations to the learning environment that would provide for an alternative educational experience. Yet others have proposed—and in some cases implemented—their own reworked learning environments. Many of these alternative educational environments emphasize play as an important activity. The case of the Adventure Playground is a good example of how play was used, if initially unintentionally, as an educational strategy. Danish landscape architect C. Th. Sørensen developed the idea for a "junk playground" after he realized that children would rather play in the rubble of destroyed buildings after World War II than in his carefully designed playgrounds. He proposed, and others later implemented, an open play space that would consist of little more than tools and materials with which children could build and care for their own structures. These playgrounds thus became sites of young bodies engaged in the construction of their own realities.[8]

Children build their own playground out of junk in Denmark.

One of British architect Cedric Price's most famous (though never built) works was his Fun Palace—a reconfigurable framework of building components designed to be a sort of educational leisure space. Here, too, play is the primary mode of engagement. While the project was presented primarily to the public as a fun leisure space where anything goes, Critic Stanley Matthews explains that Price's collaborator Joan Littlewood viewed the flexible space first as an educational project, though different enough from traditional schools that she did not want it to even be associated with "learning." As a result, though it was initially conceived with social goals to supplement adult education, the project is perhaps better known for its radical architecture.[9]



A sketch of Cedric Price's Fun Palace leaves the center of the structure unfinished, capturing the dynamic intentions of this place of radical learning.

MIT Media Lab professor Mitch Resnick's "Computer Clubhouses" attempt to give a site to Seymour Papert's constructionist ideas. In contrast to the Fun Palace's use of flexible architecture as the tool for place making, these clubhouses create a learning environment by concentrating kids working on similar projects alongside knowledgeable professionals with access to relevant technological tools.[10]

From these examples, a couple of observations can be made about projects of this sort:

First, there is disagreement about the appropriate scale for an immersive learning environment. Eisenberg declares that the room is the perfect size for such a space to take shape. Most of his discussion concerns individual learners, and he implies that immersion might happen within an individual's own home rather than at school or other centralized sites. In contrast, Sørensen's adventure playgrounds occupy a few acres. There is a strong emphasis on the benefits of collaborative learning and socializing which perhaps necessitates the larger scale. Even larger, Price's proposed Fun Palace is a megastructure that would be inhabitable by thousands of people in three dimensions. Though Resnick's computer clubhouses only span a physical space the size of a room, they extend into a virtual space that expands without bounds as its participants actively create it.

Second, these examples come to a common conclusion regarding the importance of flexibility and open-endedness. Learning in each of the examples is suggested to occur through the process of experimentation, lacking predetermined outcomes. Writing about the educational aspects of adventure playgrounds, Richard Andersen draws a distinction between ritual play and experimental play: in ritual play, objects only serve a ceremonial purpose while in experimental play they have real significance.[11] Flexibility in the Fun Palace manifests itself as experimental play with architectural elements (walls, floors, staircases) within a predetermined structure, while flexibility in the adventure playground begins with nothing more than an empty plot of land. The flexibility of Resnick's clubhouses occurs not in the physical world but in playing with the digital "microworlds" that learners create on their computers.

Papert views the act of programming a computer as the height of flexibility. By creating through a self-directed, open-ended process and harnessing the elements of experimental play, a child becomes empowered with knowledge as he or she creates his own digital world.[12] Coincidentally, Price's Fun Palace came under the influence of persons working in the fields of cybernetics and mathematical game theory. Price and Littlewood began to look at their project as a reprogrammable "virtual architecture."[13] The clients of both Papert's educational software and Price's educational architecture become not merely passive users, but active programmers. This is a very similar shift to how Amber Frid-Jimenez defines "participation" as "the activation of consumers in the production of mainstream culture" in her thesis about online participatory art.[14]

If the central theme of these rethought learning environments can be summarized as functioning via participation, it will be useful to look at other projects that use participatory practices to create empowering environments. One such example is German artist Christoph Schaefer's Park Fiction project. In it, Schaefer and collaborators utilized a number of novel tactics to collect ideas during a "parallel planning process" for the development of land along the riverbank in Hamburg, Germany. The Park Fiction team developed a number of "infotainment" devices, such as their "action kit" which included "questionnaires, maps, dough, dictaphone, foldout harbor panorama, and instamatic camera to capture ideas." They gave out "game-boards instead of leaflets that described the access points where one could become involved in [their] process." These tool served to both educate the citizens of the affected area and determine their collective desires for how development should proceed. Ultimately, a park that incorporated their input was built.[15]

## Future Directions

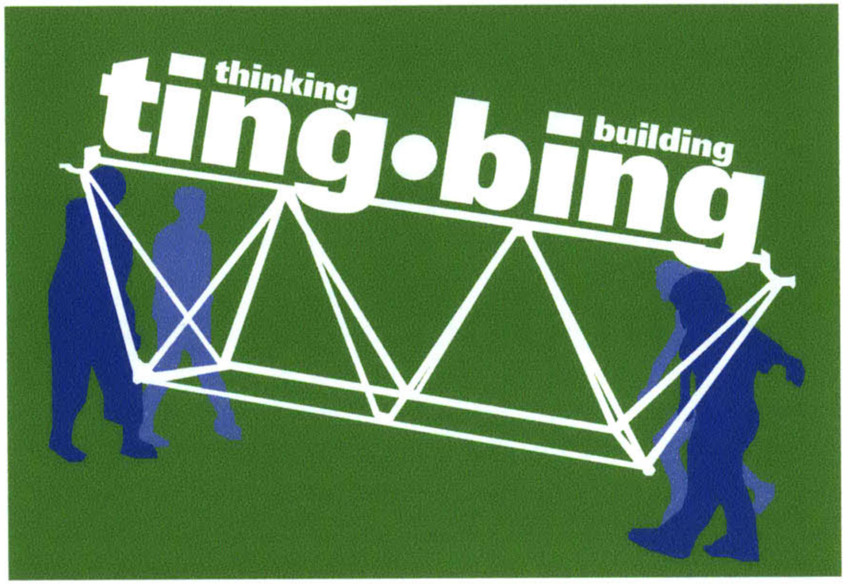
With the positive link between objects, bodies, environments, and learning now clearer, it becomes apparent that further experiments in this domain would be productive. While Papert and Resnick have extensively explored digital construction tools and while adventure playgrounds serve as an experiment in purely physical construction of environment, there is little work that realizes Eisenberg's suggestion of spanning between these worlds. Thus, it would be interesting to apply the embodied collaboration and physical aspects of adventure playgrounds to digital programming tools or vice-versa.

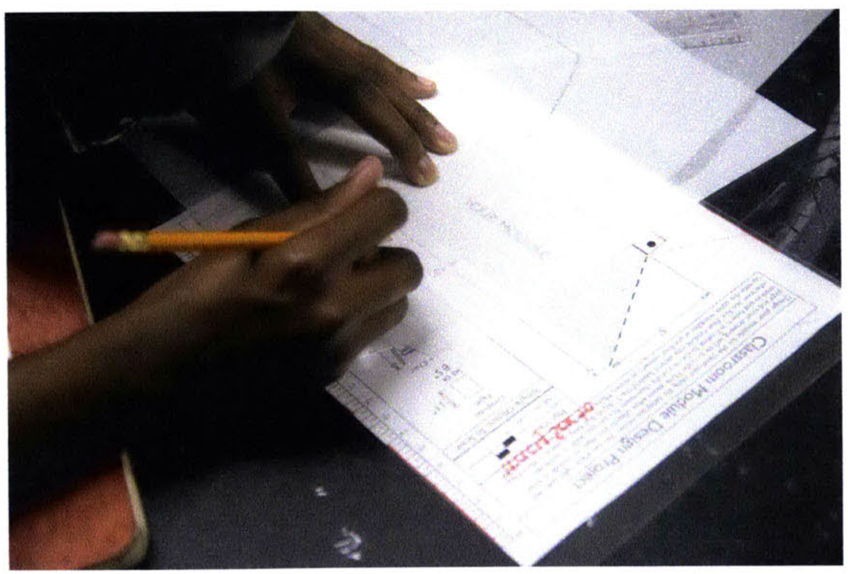
In realizing such a digital-physical hybrid through the production stage, it could be wise to incorporate strategies developed for electronic devices such as the Open Source Hardware model of the Arduino microcontroller.[16] With an open source model, anyone may freely obtain, modify, or produce a design. The production of educational building kits of architectural/environmental scale might be distributed across a number of manufacturers, perhaps including end-users themselves, in order to minimize startup costs and encourage further flexibility, and thus learning, in use. As relevant precedent, the spread of adventure playgrounds occurred in part through "information kits" that served as a specification for what this venture required and provided advice on how to get started, rather than concentrating their production in any given organization.[17] Where a popular project like the Fun Palace collapses mainly due to its massive size and huge financial requirements,[18] perhaps smaller scale interventions reproduced via a less centralized model could succeed to greater effect.

# Thinking, Building

*I think part of the trouble with learning mathematics at school is that it's not like mathematics in the real world. In the real world, there are engineers, who use mathematics to make bridges or make machines... But children, what can they make with mathematics?*

—Seymour Papert, *Constructionism vs. Instructionism* (198?)



Hands-on work with high school students to generate ideas and start thinking spatially.

## Introspection

My two favorite activities are thinking things and building things. I don't think I had distilled my interests down this succinctly when I began the project that would eventually grow to become ting•bing. My thought process was guided more by a simple curious question: what if I, a designer, could create a kit for a classroom that could be put together by a group of high school students? What would they build with the pieces I provided? Would this empower the students to redefine their relationship to their school, an architectural form normally manifest as an icon of cold permanence, unchanging brick, and rigid indifference?

## After School

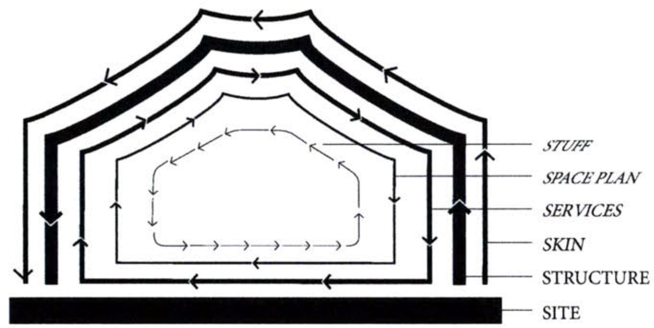
Very quickly I realized that answering these questions would require that I engage directly with my intended audience. I began by seeking out a high school to partner with by contacting the MIT Public Service Center. After contacting and meeting with a few principals and activity coordinators from different schools, I decided to work with the students and teachers at Prospect Hill Academy Public Charter High School in Cambridge. I was attracted to a program at Prospect Hill led by teacher Michael Moretti called the Engineering Program in Community Service Learning (EPICS)[1] where students learned design and fabrication skills to create work that benefitted their local communities. The students in this program carried out large real world projects over the course of the year such as installing a green roof on a local building and making gardens and recycling infrastructure for their school. The focus on active, hands-on learning seemed a perfect match for the ideas I had in mind.

This project was a collaboration from the very beginning. I recruited fellow architecture student Bill McKenna to help flesh out the early ideas and we met with students and teachers at Prospect Hill twice a week after school during the spring of 2009. These early meetings consisted of sharing some basic architectural representation skills with the high school students so that they could begin expressing their spatial desires. Such activities were of limited utility to generate specific designs, but they were essential in establishing a relationship between the MIT students involved and the students and teachers at the high school.

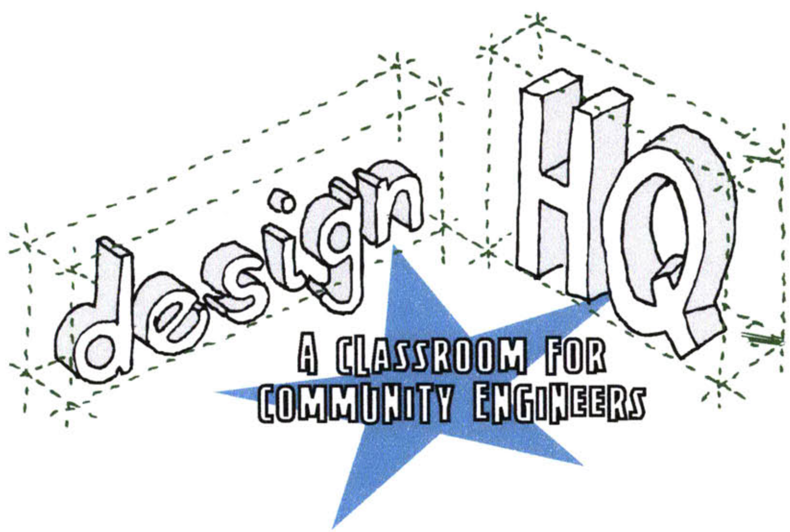
## A Classroom System

The initially vague goal of creating an empowering student-constructed learning space led us to create several specific design constraints that guided our process. In an attempt to avoid presenting an image of being authoritative form-givers while still intending to produce a concrete architectural object in the end, we conceived of our work as generating a *system* for a classroom. We found inspiration in architectural outsider and systems theory advocate Stewart Brand's observations about the changes which buildings undergo over the course of their existence. Taking the concepts of "shearing layers" from Brand's How Buildings Learn[2] and applying them to a pedagogical environment, we identified flexibility as a principal to guide how buildings might *teach*.

Each of the layers Brand identifies—site, structure, skin, services, space plan, and stuff—would become an opportunity for students to observe flux and design creative interventions that could experimentally alter their environment. The classroom should be nomadic, a temporary outdoor pavilion where site analysis would be an ever-present activity requiring consideration of the sun, weather, human circulation habits, and the relationship to the existing school building and surrounding city. As the students would erect the skeleton of the classroom itself, the structure should become a tangible lesson in statics while remaining dynamic with an extensible and reconfigurable inventory of structural members. The skin of the classroom should express the changing attitudes of its inhabitants by presenting surfaces for murals or presentation of student work. Infrastructure usually hidden in closets or above ceiling tiles should be simplified and left for students to route as needed and the source of utilities like electricity should be integrated into the building. The arrangement of spaces should be fluid, allowing students to reconfigure the layout at will and try out different relationships between activity sites. The "stuff" in most classrooms is already an unstable collection of objects, so this was not of special concern to our endeavor. In the end, some of these ideas presented themselves strongly while others were lost in the compromises and practicalities of our collaborative design process. In keeping with the spirit of the original impetus for the project, we tried to design a system that would not only be able to be




Shearing layers, based on Stewart Brand's *How Buildings Learn* became a concept to explore how buildings can *teach*.




assembled by high school students, but also possible to prototype in a few months and replicable by others in the future.

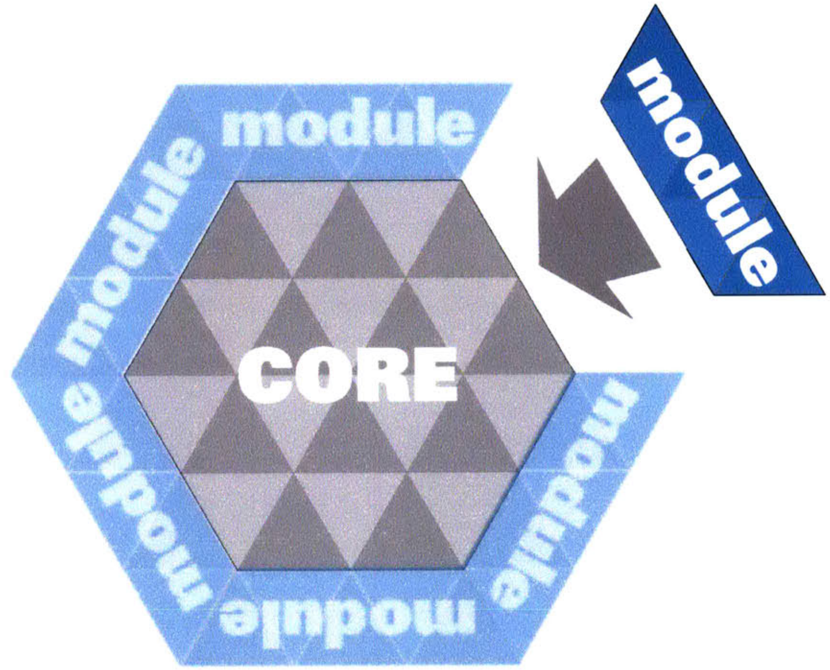
As we sought to design a somewhat generalized system and not just a single building, our immediate endeavor was to draw up the plan for one of potentially many classrooms. The first implementation of the system should be specific to our partner school, so we formulated a theme and working title inspired by the activities of the EPICS program at Prospect Hill. As these were certainly not the most privileged kids in the Boston area, it was remarkable to us that they were the ones trying to give the most back to their communities by applying what they were learning in school; we saw them as the future superheroes of an altruistic brand of design and engineering. What they could use was a home for their ideas, a place to learn necessary skills, a space to collaborate and share—a self-made headquarters to launch their plans for the betterment of the world around them. Thus we began to evolve our design under the banner of "designHQ: A Classroom for Community Engineers."

## Meet the Modules

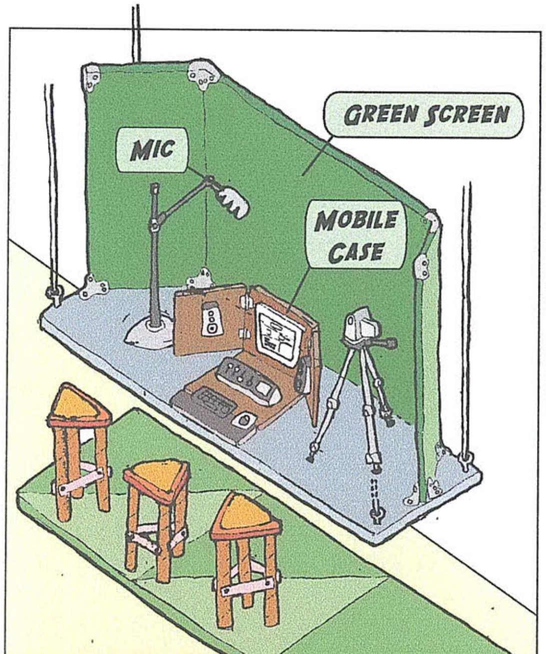
Our design constraints led us to develop a modular floor grid as the foundation of the classroom's space-making logic. To encourage classroom layouts that steered clear of the teacher-centric hierarchal arrangement found in most schools, we wanted to build on a roughly circular plan. We settled on a grid of tessellated equilateral triangles to create a hexagonal space in line with these goals.

It was our desire not to over-program the space while still providing some structure from which the students could experiment. Within the hexagonal layout, we set aside the center as an open core space that could accommodate multiple layouts of student desks or tables for group or individual work. With a width of 16 feet, the space is large enough to accommodate a modest class of 20 students, though smaller classes would be preferable so that there would be enough hands-on experiences to go around. Peripheral to this core are six trapezoidal "module" spaces on the same triangular grid. While the core remains a general-purpose space, each of the modules houses a more specific activity.

The choice to divide the periphery into a multitude of activity spaces was influenced by psychologist Howard Gardner's theory of multiple intelligences. This approach to education acknowledges that different students obtain and organize knowledge in dramatically different forms that frequently go beyond commonly tested verbal-linguistic and logical-mathematical skills. Each of the modules we initially developed is tuned to create a spatial zone for one or more of Gardner's other intelligences: visual-spatial, bodily-kinesthetic, musical-rhythmic, interpersonal, or intrapersonal.[3] The following pages contain illustrations drawn by collaborator Bill McKenna of the six modules we initially proposed.



The core-module floor plan allows for a non-hierarchal central space surrounded by zones of specific activity on the periphery.

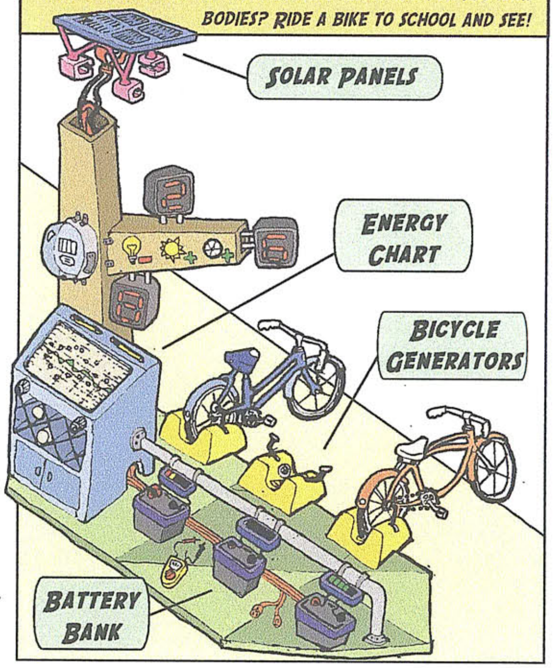


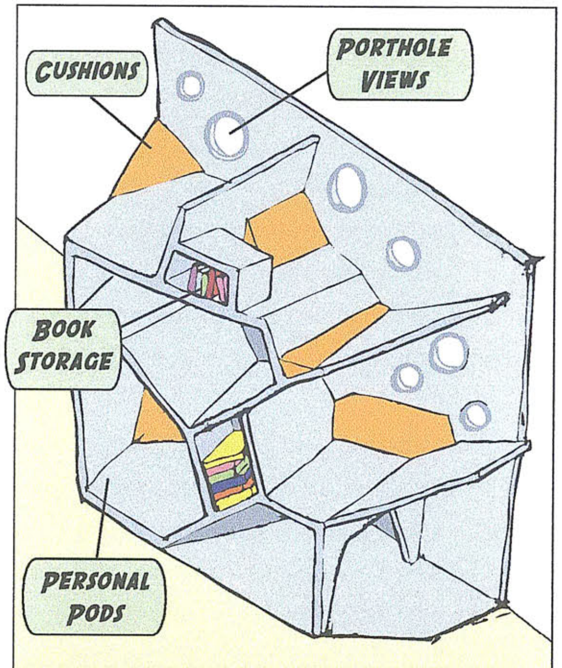

## MEDIA LAB

EVEN A LITTLE TECHNOLOGY CAN GO A LONG WAY. TOOLS TO DOCUMENT AND PRODUCE MEDIA FROM OUR ACTIVITIES & SURROUNDINGS IS A MUST. A MOBILE MEDIA KIT ALLOWS US TO ROAM AND IT TO PACK UP SAFELY AT NIGHT.

## POWER PLANT

THE ENERGY MODULE ALLOWS US TO EXPERIMENT WITH GREEN POWER! IF WE CHART HOW MUCH ELECTRICITY OUR CLASSROOM USES, CAN WE MATCH IT WITH ENERGY FROM THE SUN AND OUR BODIES? RIDE A BIKE TO SCHOOL AND SEE!




## READING ROOM

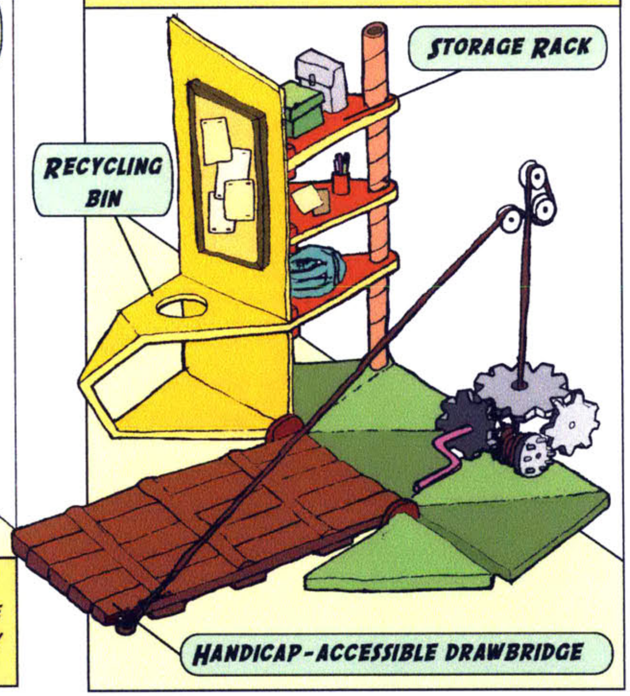
WE CAN ALL AGREE... SOMETIMES YOU JUST NEED A SPACE ALL TO YOURSELF. CURL UP WITH A BOOK OR SKETCHPAD AND ENJOY A BITE-SIZED VIEW!

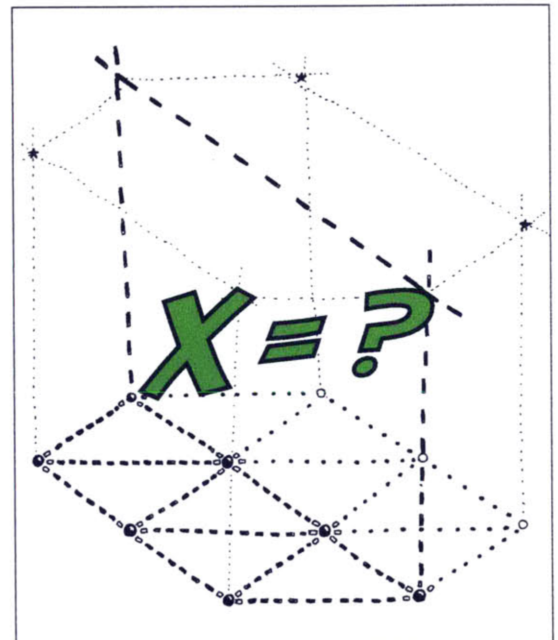

**ECOLOGY LAB**

DESIGNED WITH OUR FEARLESS LEADER, MR. MORETTI, THE **ECOLOGY STATION** GIVES US THE TOOLS WE NEED TO STUDY BUILT AND NATURAL SYSTEMS IN THE COMMUNITY AROUND US.

**ENTRANCE**

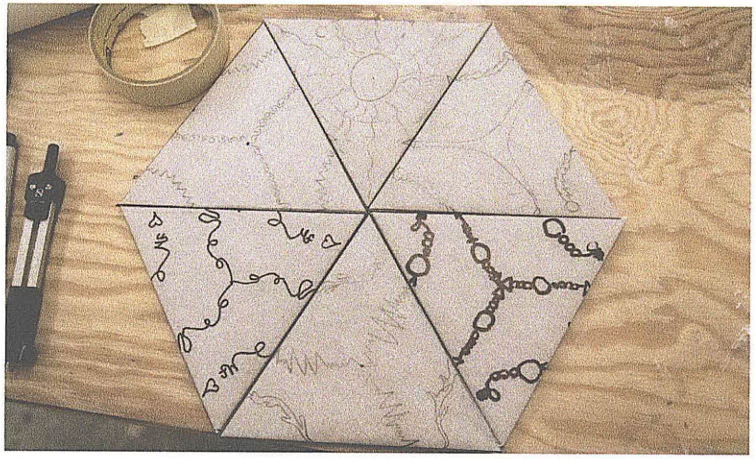
STORE AND SECURE! NOT JUST A REGAL ENTRY OVER THE DRAWBRIDGE, BUT A CONVENIENT PLACE TO STASH OUR STUFF.




**X-PANSION MODULE**

A MODULE TO CALL OUR VERY OWN! SHOULD WE TRY TO SOLVE A PROBLEM? STUDY SOMETHING OFF-THE-WALL? OF COURSE, THERE'S ALWAYS FUN & GAMES... WE'LL COME UP WITH SOMETHING GOOD AND DESIGN-BUILD A SPACE FROM SCRATCH!



Sketches of student-designed patterns tesselate on the floor tiles.

Planter boxes anchor the columns and give a space for living things to grow.

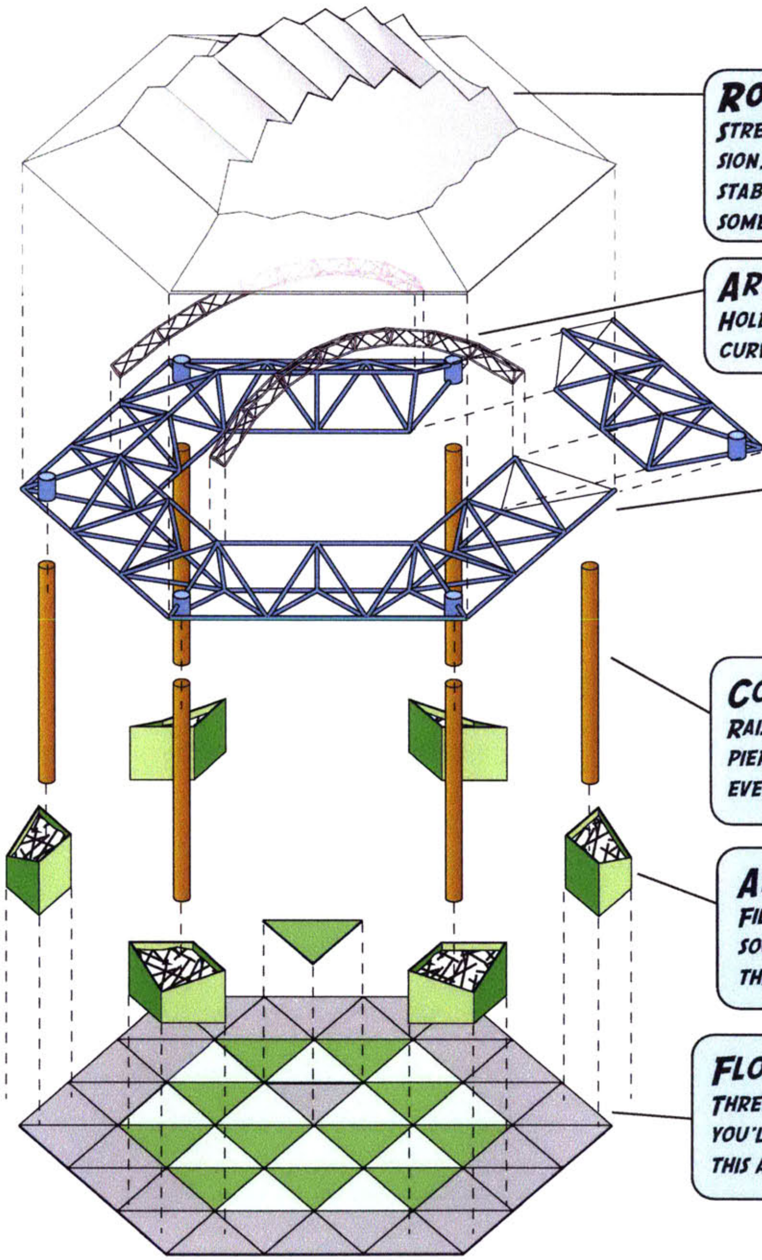
## Structure and Assembly

The modules plug in to a structural framework that is designed to be assembled and customized by the students working with this system. The diagram on the facing page shows an exploded isometric view of the different components that form the skeleton of the classroom.

The floor is composed of equilateral triangular tiles in a regular grid. These tiles are made from plywood framed with 1x4's for strength. Even something as utilitarian as the floor is seen as an educational opportunity. The repetitious geometry allows for students to paint patterns on the tiles that fit together in reconfigurable tesselations.

Because the classroom is designed to be nomadic, digging a foundation to keep it from blowing away would be problematic. Instead, stability is achieved by bringing the foundation above ground with plywood boxes that, once filled with heavy dirt, anchor the structure to the earth. The boxes double as planters to grow flowers or vegetables—an especially welcome feature in a dense urban environment. One box is placed at each of the six corners of the room.

Each anchor box holds a column to support the roof. These columns are made from cedar wood logs, chosen for their resistance to weathering and distinct character. They are also a vestige of an earlier idea where we wanted to use materials and forms that are commonly found in the urban landscape—in this case, the sturdy timber evokes the ubiquitous utility pole.



**ROOF:**
STRETCH SOME FABRIC, PUT IT IN TENSION, HOLD IT DOWN WITH CABLES FOR STABILITY, KEEP OUT THE RAIN, LET IN SOME SOFT LIGHT, AND CUT THE GLARE.

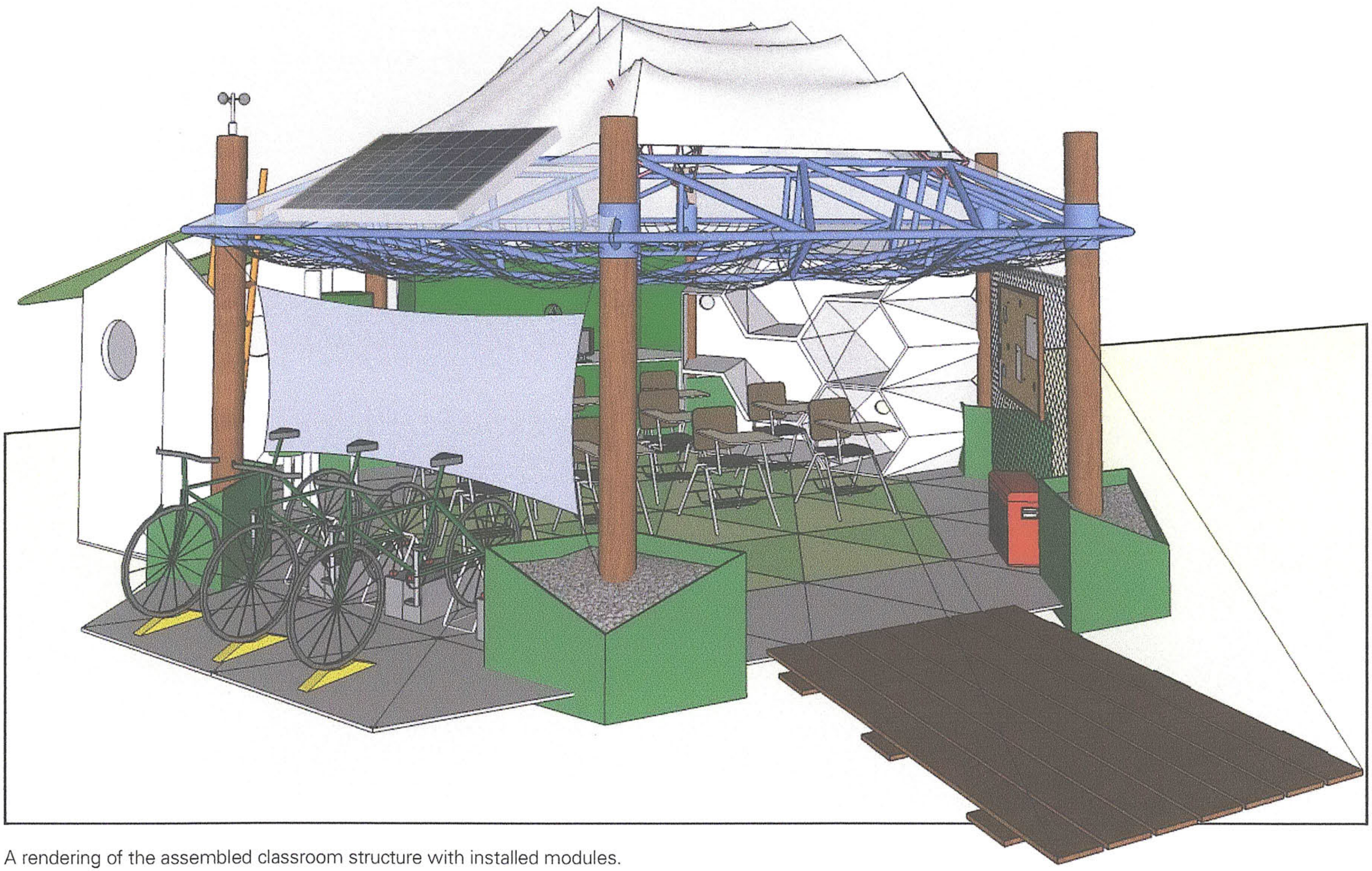
**ARCHES:**
HOLD UP THE ROOF WITH SOME NICE CURVES.

**RING TRUSS:**
A SPACE FRAME TO CONTAIN THE FORCE FROM THE ROOF. A SOLID FRAMEWORK FOR CLAMPING, HANGING, LASHING ON WHATEVER IS NEEDED. BREAKS DOWN INTO PIECES FOR EASY STORAGE.

**COLUMNS:**
RAISE THE ROOF ON SOME STURDY PIERS. COVER 'EM IN FLIERS AND LET EVERYONE KNOW WHAT'S UP!

**ANCHOR BOXES:**
FILL THESE UP WITH DIRT FOR A SOUND FOUNDATION. GROW SOMETHING NICE WHILE YOU'RE AT IT!

**FLOOR TILES:**
THREE POINTS TO LEVEL MEANS YOU'LL ALWAYS WIND UP FLAT. USE THIS AS A GRID FOR PLANNING.



A rendering of the assembled classroom structure with installed modules.

Attached to the columns is a space truss that runs along each edge of the hexagonal plan. This truss is made of steel tubing, providing a convenient place for clamping and tying overhead to support furniture, lighting, or utility services of each module. The space-filling geometry defines a volume to store classroom objects out of the way but disassembles into its individual linear elements when the classroom is put away. The truss is assembled at ground level and then hoisted into place with ropes and pulleys at the top of the columns. Once at the proper height, the truss clamps on to the timbers to stay in place. It can be lowered for disassembly in a similar manner.

Bill raises a portion of the ring truss into place with a simple system of pulleys and ropes. Collars made from large-diameter pipes split in half guide the truss up the timber column. At the proper height, the bolts on the collar are tightened, clamping the truss in place.

The ring shape of the truss helps it contain the thrusting forces from two arches which span across the roof. These arches give a domed form to the membrane roof stretched on top. The roof membrane can be made of a waterproofed synthetic canvas or a plastic film, like architectural vinyl or even reused PVC from an old billboard. Alternating cables stretched on top of the membrane hold it down and create a pleated shape that is more stable under the dynamic forces of the wind. As we were not able to prototype the roof system, the details of this portion of the design remain somewhat unspecified.

In total, a relatively small number of unique components are required to erect the structure making it simple to build and easy to extend.

## Summer Prototyping

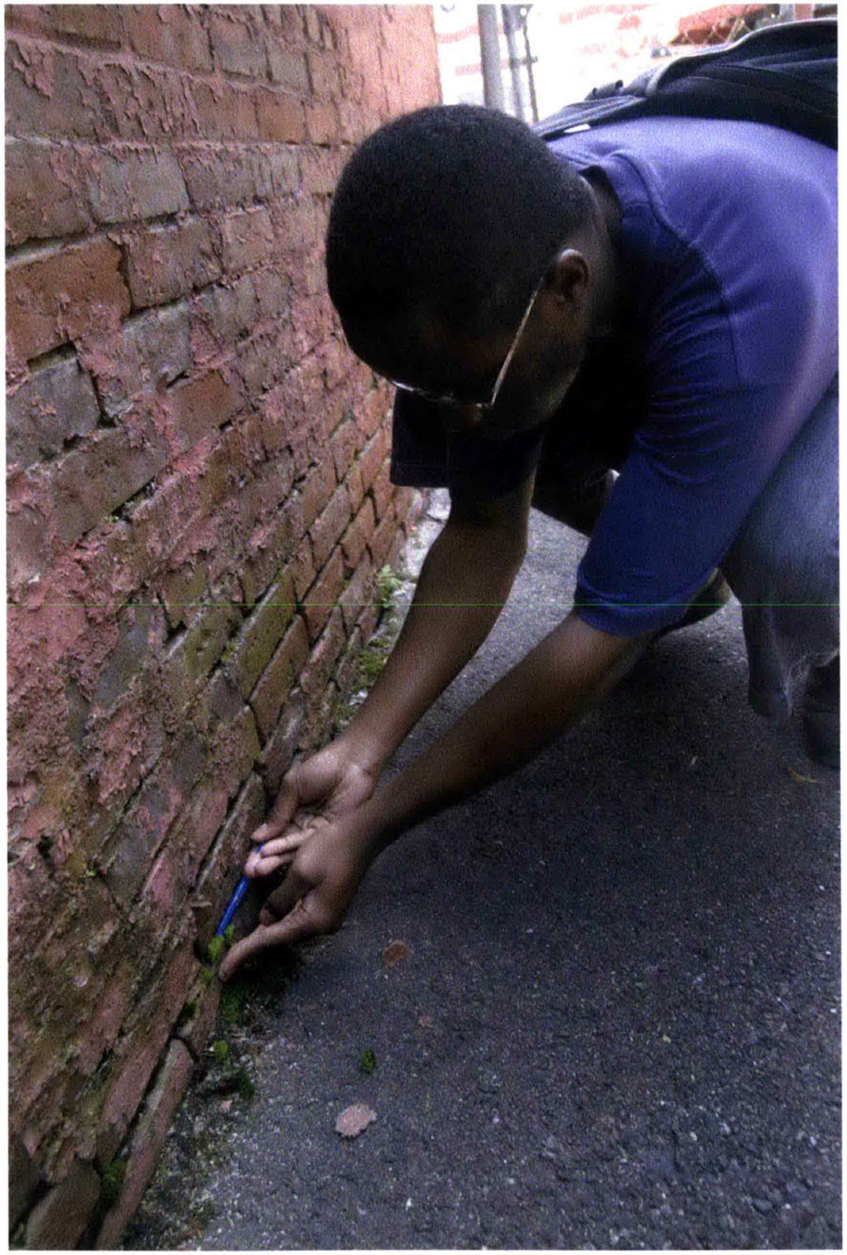
With much of the design on paper at the start of summer 2009, we were ready to get out hands dirty and start prototyping different systems of the classroom. It was important that we continued to work with the high school students during this phase so that our assumptions about what students were capable of and interested in weren't left unfounded. Six students from Prospect Hill joined us as interns for around 20 hours each week for seven weeks and we began to build together.

The components that the interns were most helpful in prototyping were the anchor boxes. One of the first activities we engaged in with the interns was making models of the boxes. Each student was able to cut and customize their own at 1:8 scale. Students were encouraged to decorate their box to their liking, as we hoped would happen on the larger scale. Even at the model scale having six of these boxes started to give us all a sense of the space we would be creating.

Just like their full size counterparts, the model scale boxes were filled with real dirt and used as planters. We took this as an opportunity to get out and engage with the urban environment around us. To populate the planters, we sought out moss and other small plants growing in the cracks of sidewalks and on shady walls in our neighborhood. This was a fun outing where we got to see up close some of what cities and buildings are made of. It also helped bring some personality and life into an otherwise simple and potentially sterile model. Activities like this show the pedagogical potential for combining traditional architectural endeavors like model-building with explorations in diverse fields such as urban ecology.

With the models assembled and growing, we moved to build the real thing. For some of the students we were working with, this was the first time they had used a tape measure or held a saw in their hands. It was a surprising challenge to really start with basics like these, but it made the work feel all the more worthwhile. Translating a design from dimensioned drawings on paper to physical stuff seems like a fundamental skill that these students (and likely many others) had never had the chance to develop. Even in my own high school, these skills were relegated primarily to vocational classes perceived by many as somehow inferior to core academics. Project-based work like this can help bridge this divide and expand the skillset of students without requiring a complete shop class curriculum.

The full scale boxes are made out of 3/8" OSB panels joined with fiberglass and epoxy at the edges. This construction method is not only appropriate to the function (the epoxy coating and lack of metal fasteners protects the wood from rotting in the soil) but it provides students a chance to learn about the interesting properties of these materials. The reasoning behind the choice of materials can be explained using knowledge these students learn in their core science classes. Understanding the biology of a tree, for example, clarifies the logic of the alternating orientations of wood flakes in OSB; the reaction that hardens epoxy resin is accessible to a high school-level chemistry class; and the reason for combining these



The activity of model-building was enhanced with a field trip through the city to find small plants for to grow in the scale anchor boxes.


High school students from Prospect Hill help lay out and cut the parts for one of the classroom's foundational anchor boxes.

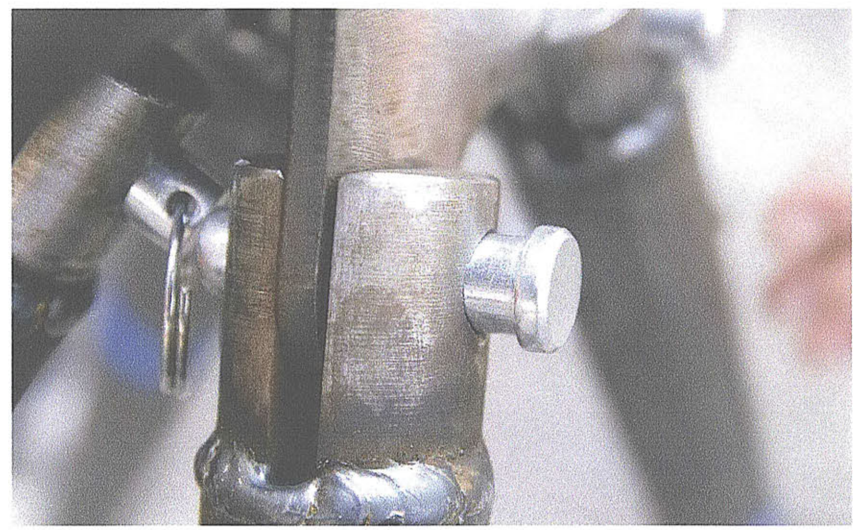
Students testing out the full-sized components engage their whole bodies to construct their classroom.

materials to form composites fits in with a physics curriculum. It was difficult to make these connections with the students we were working with because they were spread across different grade levels and we did not have a full knowledge of their science curriculae, but their usual classroom teachers working with this system could find numerous hooks to bring textbook knowledge to life.

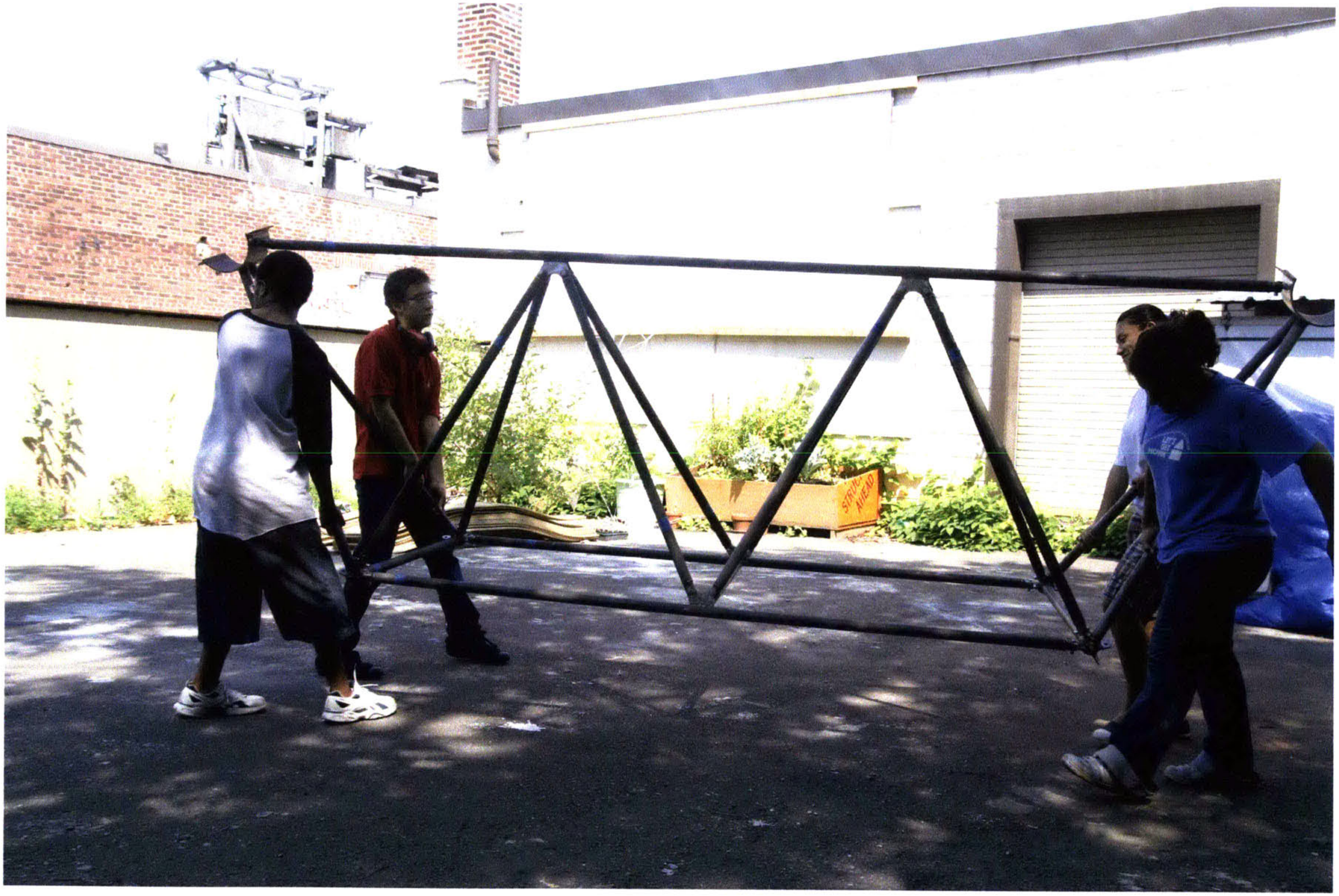
Testing assembly of the components was an exciting part of the summer's experiments. The students seemed able to handle even bulky components with a combination of teamwork and planning ahead. While I handled the welding of the steel space truss (an activity within the reach of high schoolers in general, but out of the scope of what we could teach with everything else in one summer), the students were able to put together its pinned joints without much trouble. The students' reaction to some of these tasks was surprising at times. In the case of assembling the space truss, we first gave the pieces to them without any markings indicating where they were to be placed. We thought this would be a challenge that would reveal what sorts of color-coding or notation would be most helpful to the students in the long term. However, when we asked the students for their thoughts, they said they liked that the task was a sort of puzzle and too much help would have made it too easy and uninteresting. Assessing the appropriate amount of challenge in assembly for this age group would not have been possible without working with the students directly.

In the end, we completed our summer goal of prototyping one of the six modules, demonstrating most of the structural systems used in the design. With a floor, a wall, and the start of a roof overhead, we

Students assemble the space truss. No instructions were provided yet they were able to put it together with minimal intervention.

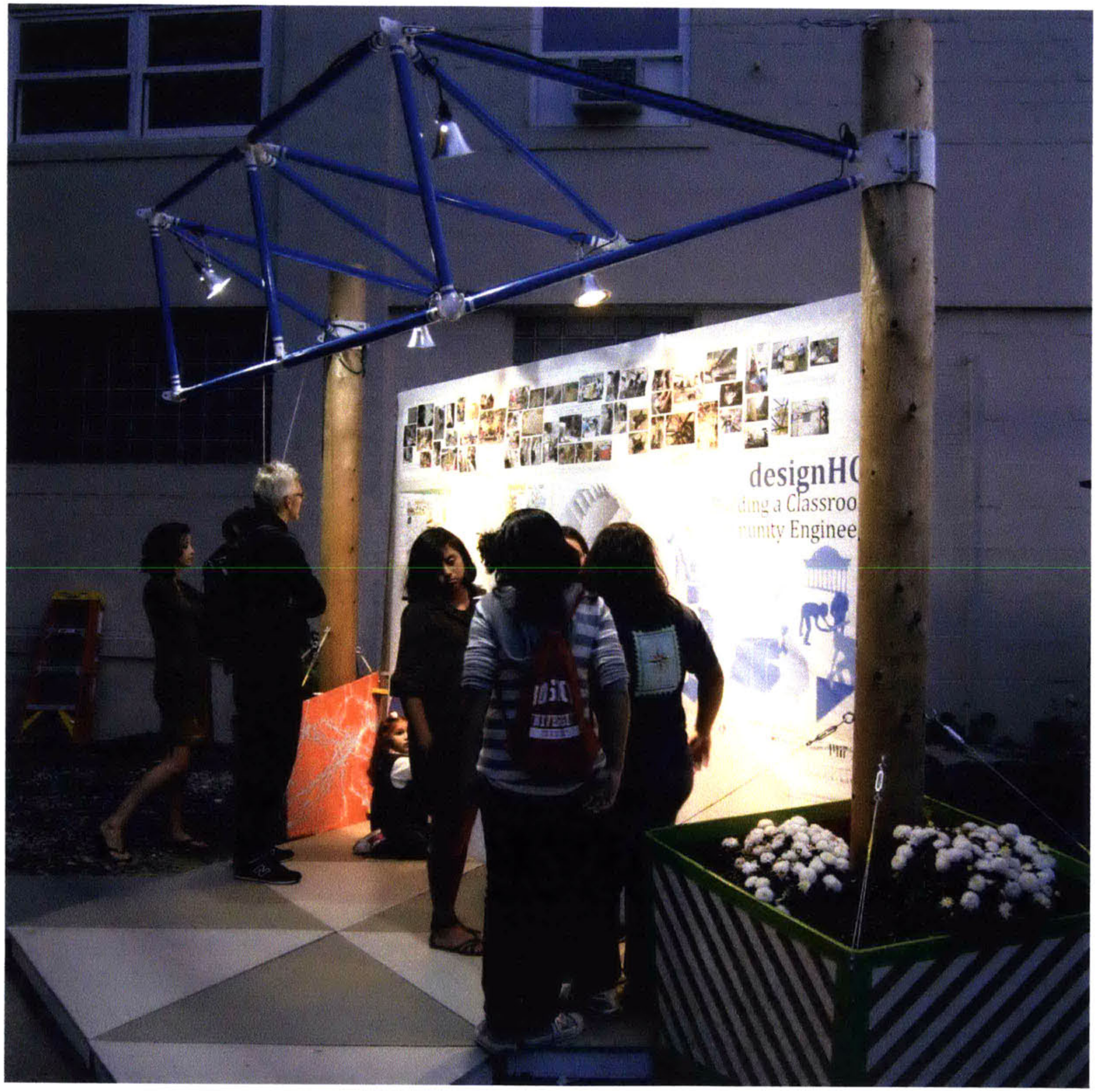


Connection detail of space truss system. Custom-machined pin joints require no tools for assembly and enable the truss to break down into its individual linear elements for easy storage.



Teamwork is required to  work with some of the larger parts of the classroom. This secton of the ring truss is ready to be lifted into place on the waiting columns.


A prototype for one of six modules was completed over the summer, demonstrating most of the building systems used in the classroom.



Students, teachers, and parents get together at the end-of-summer review to check out the work completed in the preceding weeks.

began to get a sense of how this space could function. The finished module prototype was used as a display space in the courtyard of MIT building N51 to showcase our work at the end of the summer for the students, their parents, and our own professors and peers.

The summer was not an unequivocal success. Building a design in real life reveals its weak points with great prejudice. The paint on the space truss chipped with the abuse of assembly; the anchor boxes didn't stack and nest as nicely as we had hoped; we iterated through several bracing patterns for the floor tiles to find one that was efficient yet strong enough; the wind made more noise than we expected blowing around materials that weren't completely secure; many of the steps of construction took much longer than we had planned, just to name some examples. But this was half the fun as a designer and the source of much learning for all involved. I don't even know if I would go forward and build the complete classroom with our original design given the chance, but it certainly wasn't a waste of time or even of money. The total budget for the summer[4] was $5,000, including incidental materials like paper and notebooks for students, materials we wound up not using, and transportation costs. Much of the hardware and raw materials could be re-used and re-worked for continued experimentation, though this was not possible for us as the school year began. As unsatisfying as it is to label the various frustrations of the summer as "learning experiences," this perhaps captures the feeling best.

Bill demonstrates part of the module assembly process.


High school students have a chance to show off their work at an end-of-summer presentation inside the module constructed over the preceding months.

## On Teaching, Designing, Participating, etc.

We intended for the summer to be a sort of microcosm reflecting how the classroom would function in the long term. Planning a curriculum and coordinating day-to-day activities for the interns proved to be one of the most difficult challenges for us, most likely because no one involved had extensive experience with this sort of venture. We wanted to combine construction activities with opportunities for students to develop individual or group projects that experimented with or improved the classroom environment. We had hoped that the students would have found the same sense of motivation and passion as we did for the project to be self-directed and not require constant attention. Unfortunately this situation never fully developed.

Perhaps we just weren't good at sparking interest in the students, but this wasn't for our lack of trying. We offered many different resources (access to the MIT libraries, tools, materials, etc), ideas, examples and created activities that we thought they would find engaging but nothing really caught on. Maybe our standards were unreasonably high and our desire to implement a somewhat radical education plan over the course of one summer with no prior experience just wasn't feasible.

On the other hand, our approach could have simply been fundamentally wrong. For perspective, I looked to a project that uses a completley different medium in an effort to achieve similar goals: the *Foxfire* magazine of the Rabun Gap-Nacoochee school in rural Georgia. This magazine is produced entirely by students, beginning with interviews of local people to document the unique knowledge in their area of the Appalachians through writing, editing and formatting for publication. Perhaps writing is already "participatory," but this project achieves a level of engagement, interest, and relevance to the involved students' lives that we had hoped our classroom would generate as well. The description of the "*Foxfire* Approach" gives insight into why the program has worked for more than 40 years:

> The success of the *Foxfire* program was due in large part to the fact the the students chose to create a magazine. Since the magazine was their choice, the students were deeply invested in the work of creating it. The magazine product itself was not the solution to classroom woes that so many teachers thought it would be. Kaye Carver Collins, an early magazine student and later a *Foxfire* staff member for 13 years, explained the problem like this: "It seemed that people couldn't understand the importance of the difference between the magazine, which was the choice we made, and the fact that we made a decision."[5]

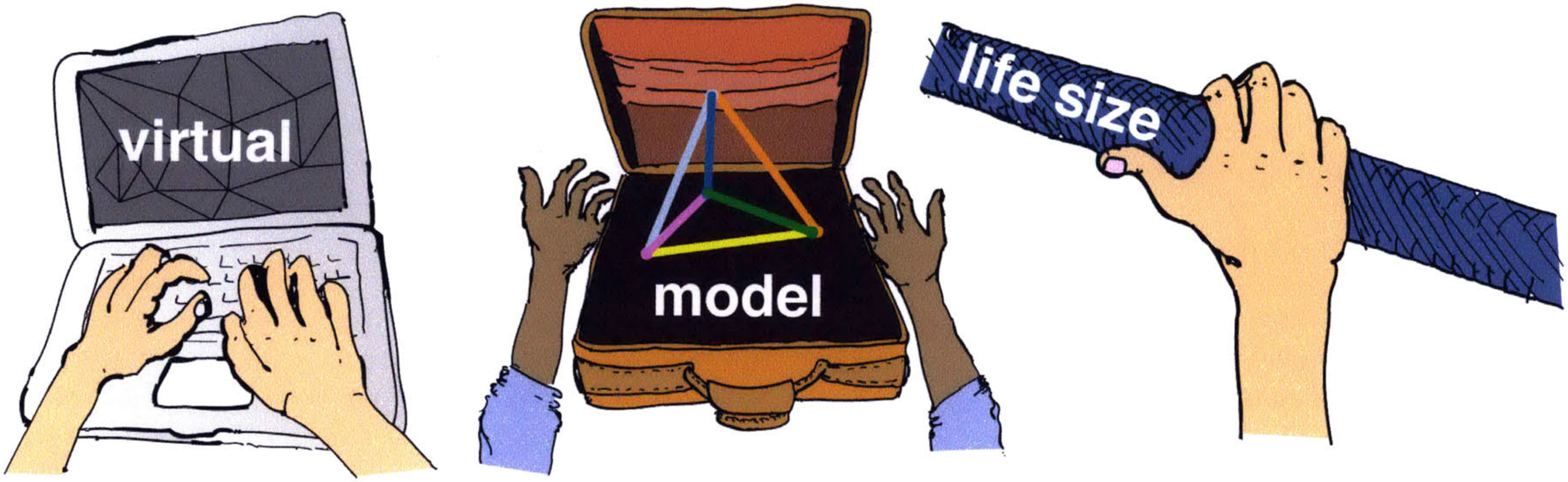
This perspective seems to offer a relevant diagnosis to our frustration as teachers: students didn't get excited about building their own classroom because they didn't want to do so in the first place. Their attitude never moved beyond that which I remember from my own high school days: they were students working (happily, perhaps, but not with true passion) on an assignment created by us, their teachers. No amount of external motivation could restructure that relationship once established.

Admittedly, our approach was very different than that touted by the *Foxfire* magazine project. The idea to create the classroom in the first place did not come from the students. The students offered opinions on what they liked and didn't like, but they did not set the priorities of what/how/when to design, build, make in the start. Yet the "*Foxfire* Approach" explanation seems so unsatisfying because we felt as if we were entering into a situation where students had very little desire to come up with their own project even if given the chance. Would this project have been more successful only if a group of high school students came to us and asked us to design a classroom with them to their specifications? If so, it seems incredibly unlikely that anything remotely resembling our design would have arisen at all, and perhaps that is a sign our work was merely done to fulfill our own desires. But was I not too once a high schooler facing the daily drudgery of school? A few years later, with some additional perspective from travel beyond my hometown and exposure to new architectural possibilities, I felt that I finally had an idea that could break the discouraging cycle of completing assignment after assignment without feeling really engaged. I would have never been able to think of this project while caught up in that environment, yet I feel that if I had been a part of such a system it would have enhanced my education greatly.

Most teachers we talked to posited that the key to success in teaching was setting initial constraints and gradually relaxing them as students felt more comfortable working in a given domain. I thought the constraints we set up front were rather lax: here is a space, fill it in with something. Yes, the space had a given character, a distinct geometry, and a strong agenda, but we intended all of our design choices to be in the service of students' choice in the end, creating opportunity for them to complete the picture as they put into practice new ideas they were learning about.

At the end of the summer, this grand experiment left me doubting whether there was any legitimacy in my conception of participatory architecture at all. Is it ever really possible to restructure the role of "designer" to be less than authoritarian? There is, in my mind at least, a difference between the authority of an individual who organizes and leads and the authority that becomes inscribed in the built environment. The former, as in the case of a designer, is necessary to instigate change, while the latter structually divides people and defines which actions are possible by whom. Giving total control from the start to the students would have most likely resulted in something unremarkable or impossible to build in reality. What I can strive for is to stay modest in my powerful role and design systems and tools for others to expand their knowledge of and agency to change the spaces they inhabit.

To keep things in perspective, I reminded myself that I was working with a relatively small sample size of students and attempting to take on a lot of different ideas at once. Jumping to build with raw materials at full scale was the most exciting potential success, but I began to think of other ways of exploring my original ideas. How else could I use architecture and design as tools of intervention to tease out the desire to create an environment of one's own that I believe lies dormant and unexpressed in many people, young and old?

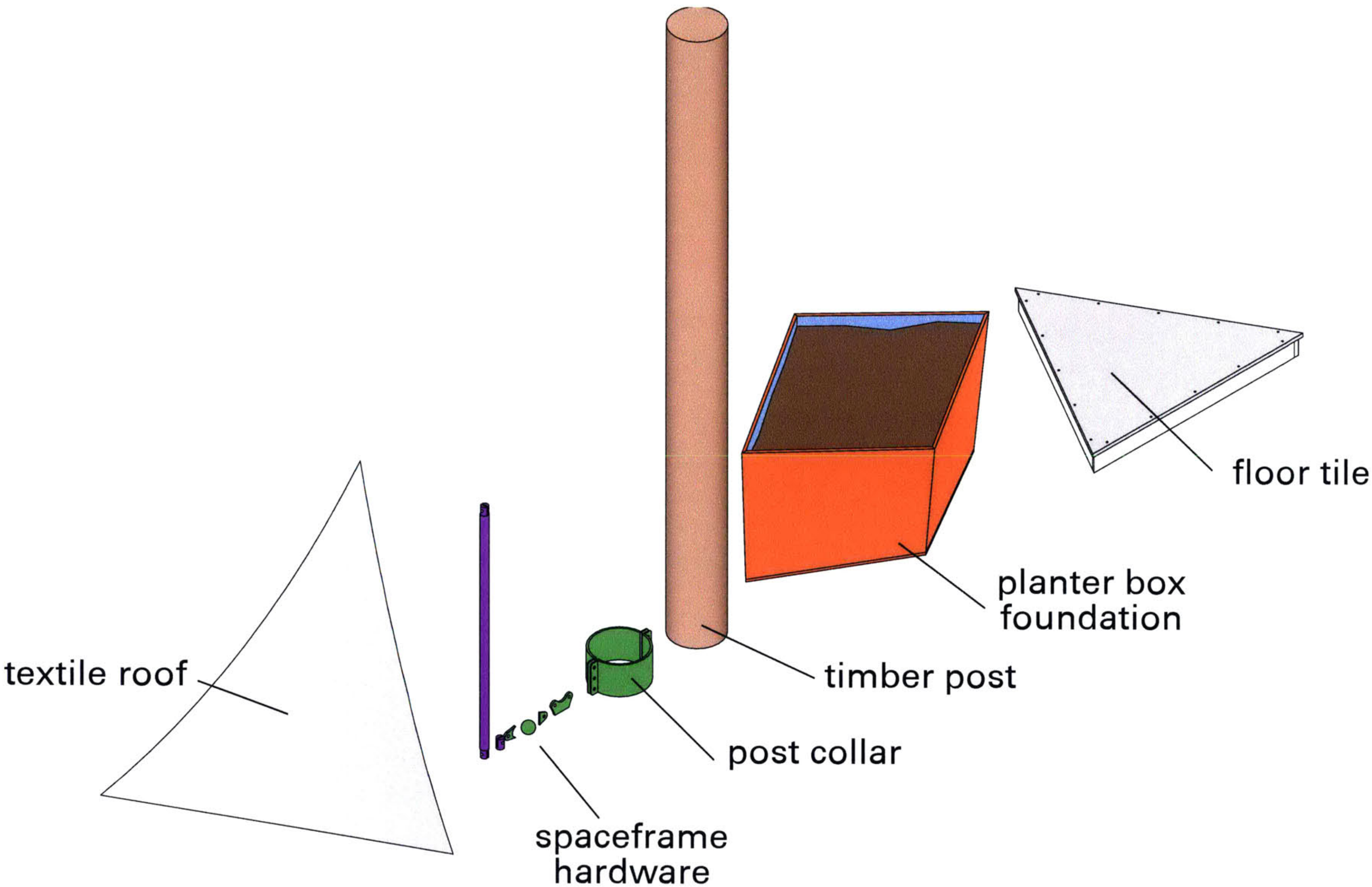



## A Three-Fold Toolkit

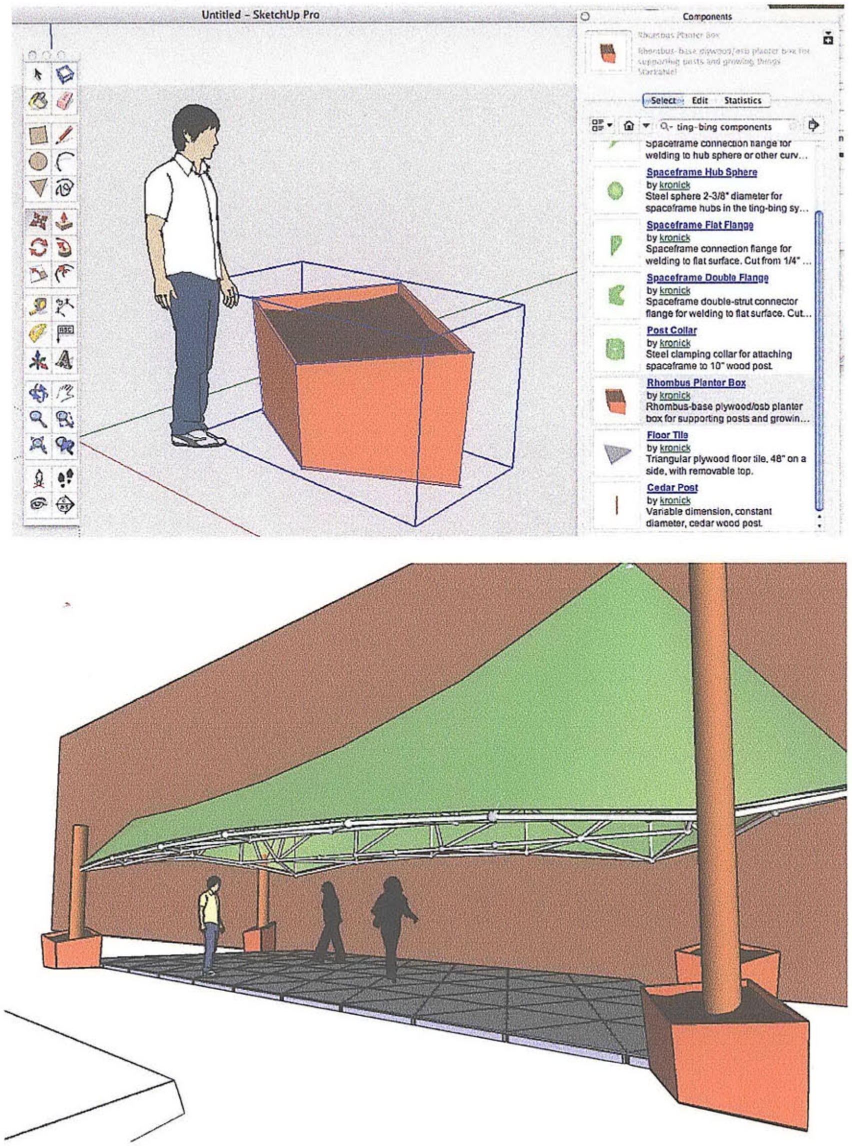
To increase the rate at which students can prototype ideas with the ting•bing kit of parts, I developed a toolkit for building in three different modes: virtual, model, and life size. By dividing the classroom system into its modular components and creating representations of these components in each building kit, students can build in one mode and translate their design to another medium for further development.

The lowest-risk building kit is virtual. Each component is modelled in 3D using Google SketchUp and distributed for free using the Google 3D Warehouse.[6] Anyone with a computer can experiment with as many of the components as they desire. Building in this manner also allows one to save a design and share it with others. Going virtual has great potential to encourage exchange of ideas for modules and learning activities between different schools using the system. It also enables students or teachers whose schools do not yet have physical components of the system to begin exploring the possibilities.

Google SketchUp was chosen as the environment for the virtual kit because of its shallow learning curve. It readily supports the use of pre-made virtual components and has integrated support for downloading and sharing these in the 3D Warehouse. Models of many things that students might want to place in their classroom (such as desks, books, computers, etc) are available for easy download, keeping the focus on arrangement of the components to build spaces. SketchUp also supports scripting of plugins to create tools or constrain components. This makes it possible to limit students to designs that are more likely to be buildable (e.g. by limiting the length of a truss span), to add up the number of




The components of the ting•bing construction system.




Components of the building systems are available as free downloads in the Google 3D Warehouse, ready to import into SketchUp (top). They can be used to design radical reconfigurations the classroom space with a standard kit of parts (bottom).

each component that is needed to provide a cost estimate, or to automatically generate cutting templates for parts that need to be fabricated. Scripting is a future direction that has not been fully explored with this project at this point in time.

The physical model kit provides the most immediate feedback for students about how a space could feel and fit together. The pieces are designed to snap together with fewer restrictions than LEGO blocks, for example, but with more constraint than traditional architectural modelling materials like sheets of chipboard. To encourage tinkering with the kit, nothing is meant to be permanently glued together. Instead, the pieces slide, snap, or clamp in place, similar to the life size kit, so that they can be assembled, disassembled, stored away, and reassembled many times over.

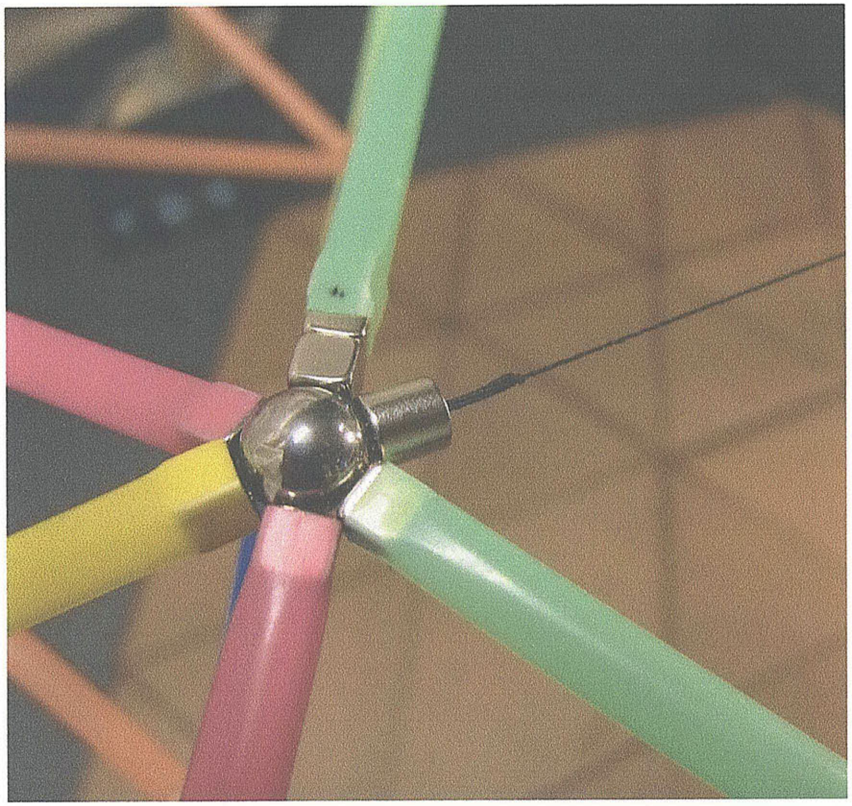
One of the most engaging pieces of the physical model kit is the space truss system. This consists of regular plastic drinking straws with magnets inserted into the ends that serve as the struts and small steel ball bearings that act as the hubs.[7] It is very similar to the Geomag construction toys with the key difference that struts are not limited to one uniform length.[8] The drinking straws can be cut with scissors to produce a trianguated truss of any arbitrary design. This allows a student to design something on the computer and then model it accurately in real 3D or vice versa.

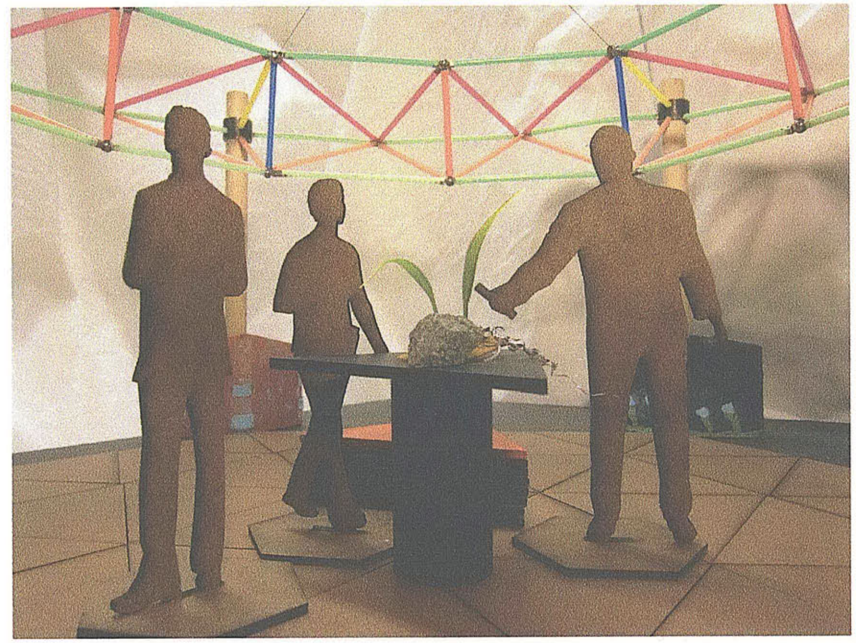
To test the model kit, I held a one-hour workshop with students at Prospect Hill Academy. I introduced the kit as part of the larger ting•bing project, but I did not constrain the students to designing a particular part of the classroom. Instead, I gave them enough guidance to suggest the kit was intended for building some kind of architectural space and left the rest up to them. The students seemed to enjoy working with the kit and built a variety of structures. Some worked alone while others got together in small teams; the kit seemed to accommodate both styles of working.

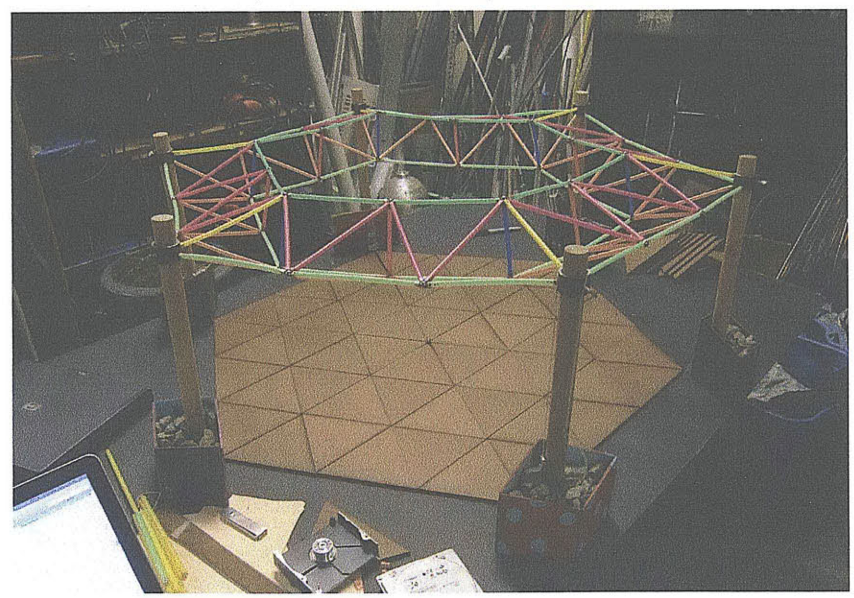
One of the most exciting outcomes of the workshop was that students were not only able to express themselves creatively, but they showed how such a kit might be used to enhance a more traditional curriculum. A group of students working together found that their columns were rather unstable standing on their own and began to link them with the space truss pieces. This, too, proved unstable at first until they came up with the idea to cross-brace the columns. The improvement was immediately apparent upon modification. By making this lesson in statics and geometry so tangible and casual rather than abstract and contrived, it is more likely that the knowledge will be retained.

Using the virtual and model kits in a series of in-class workshops and encouraging students to play with the kit on their own could generate many ideas and streamline the process of converting to the life-size components. This seems almost like common sense, but I feel that producing quality prototyping tools can make such a process more enjoyable and productive. It would be an exciting experiment to repeat this entire project with all three levels of building kits in hand, though it seems the experience as it happened was necessary to understand the need for a good toolkit in the end.

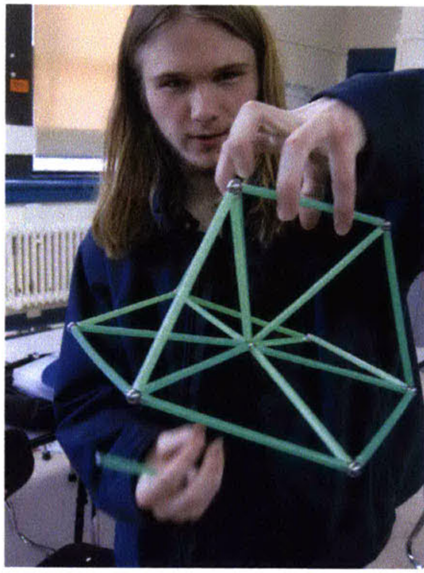
The physical model kit packs away in a suitcase and contains model analogs to all the classroom's components, plus craft materials for decoration.

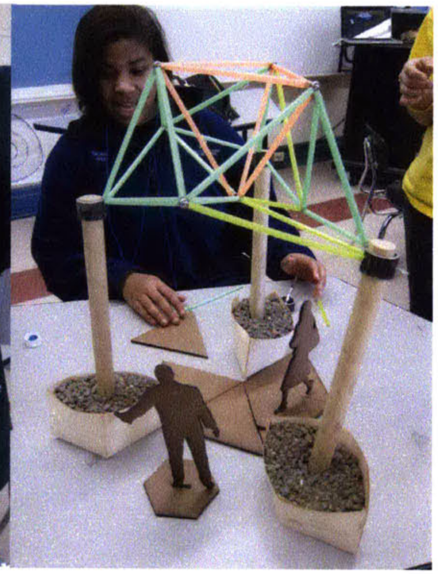


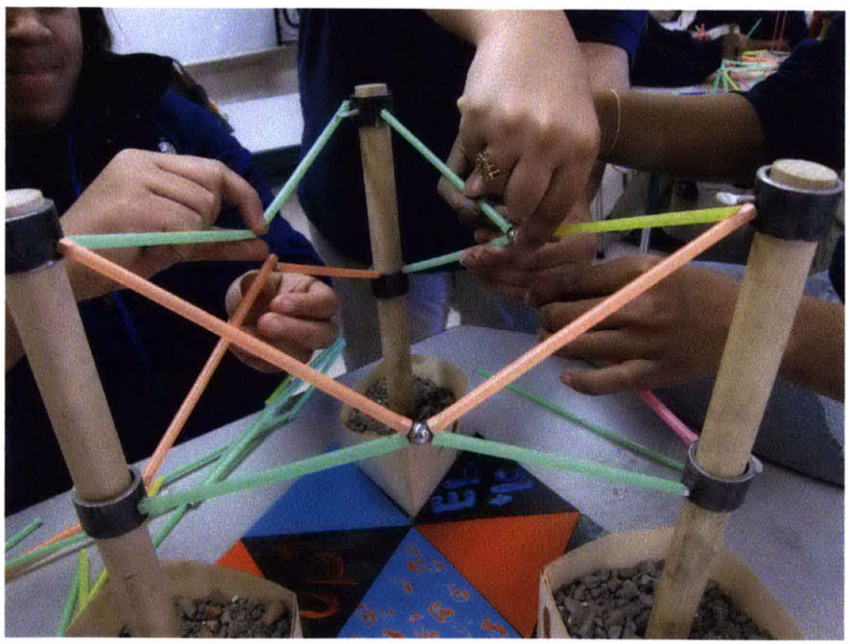


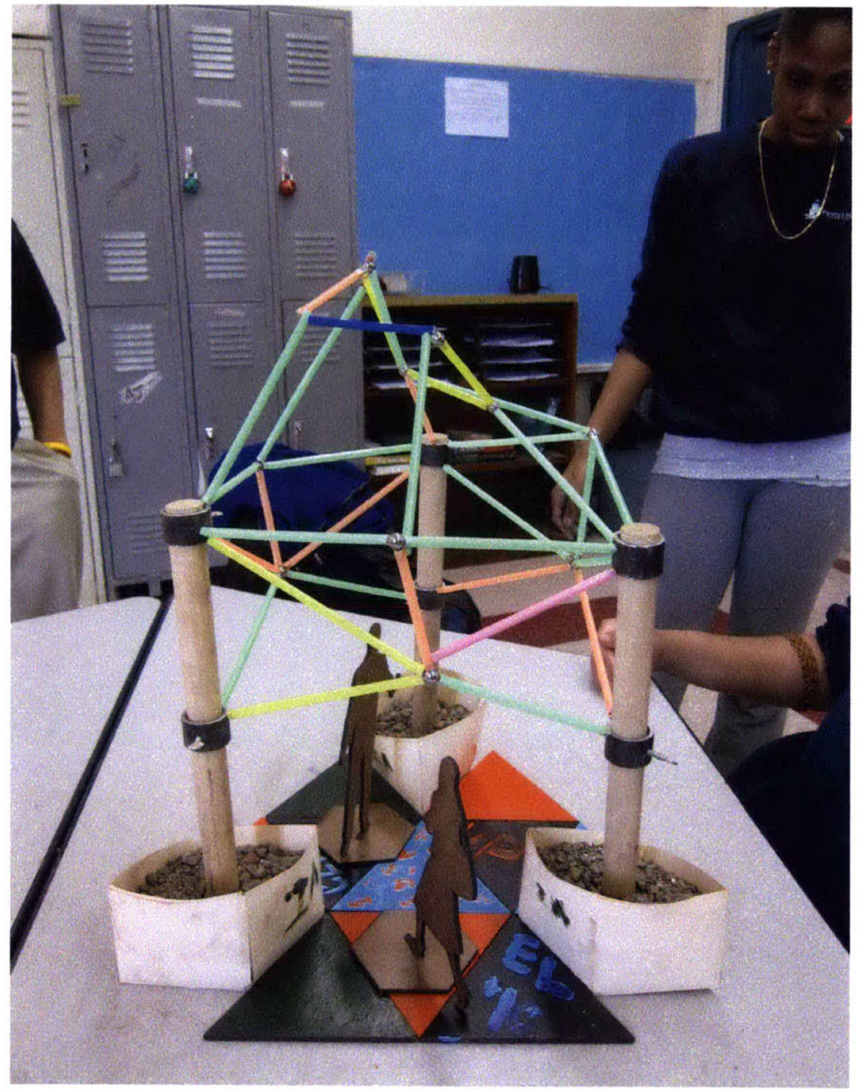


The space truss model allows for triangulated structures of arbitrary dimensions to be built and rebuilt using the magnetic connectors and omnidirectional nodes. Truss struts can be cut to length, unlike many other hub-and-strut building kits.









High school students at Prospect Hill get their hands on the physical model kit. The kit proved flexible enough to allow for creative expression and could be used to enhance other curricular goals.

# I Never Played Björk on the Microdot

*Declare independence / Don't let them do that to you*
-- Björk, Declare Independence (2007)

**From:** Samuel Kronick <kronick@mit.edu>
**Subject:** Build Your Own Reality on the Microdot - April 19th + 20th

You are cordially invited to build your own reality on the Microdot from Monday April 19th to Tuesday April 20th.

The Microdot will be a temporary autonomous micronation bounded by the circular lawn of McDermott Court on the MIT campus.

The Microdot will declare independence from the Institute beginning at 9am on the morning of April 19th. The Microdot will dissolve at 9pm on the evening of April 20th. This coincides with the Institute's observation of the Patriot's Day holiday.

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SCHEDULE OF EVENTS:
* * * * * * * * * * * * * * * * * * * * * * 

(The structure of a dot provides us with some guidance [as the clock, sun, sundial, etc] but really you should construct your own formalization of time)

Monday 9-12 - BUILD BUILD BUILD (all day)
Monday 12-2 - Collage passport workshop
Monday 2-4 - Flag and toponymy workshops
Monday 4-6 - Alter-Institutional talks featuring Ute Meta Bauer on micronations and Mark Jarzombek on the politics of collage
Monday 6-9 - Hang out, build, etc.

Tuesday 9-12 - REBUILD REBUILD REBUILD
Tuesday 12-2 - Communication workshop
Tuesday 2-4 - Transportation workshop
Tuesday 4-6 - BUILD BUILD BUILD BUILD and open workshops
Tuesday 6-9 - LIVE MUSIC featuring Mark Trecka & Beth Remis and Elephant Micah hosted by WMBR 88.1 FM

* * YOU'RE FREE I'M FREE IT'S ALL FREE * *

(This event is happening at LIFE SIZE so come prepared and bring a friend)

-------> on the Dot!

* * * * * * * * * * * * * * * * * * * * * *

The Microdot will be built by those present within its borders. Communication infrastructure, transportation, public space, and the architecture of The Microdot will be constructed by its citizens and visitors. Possible projects include tin can telephones, a shopping cart subway, colorful tent cities and inflatable classrooms.

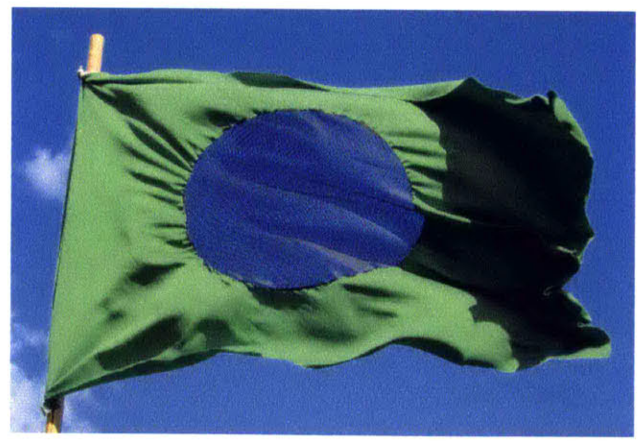
Citizenship of The Microdot is extended to those who hold an official passport. An official passport can be obtained by collaging photographs from magazines and maps from around the world in the passport workshop. Blank passport booklets and collage materials will be provided.

"The Microdot" is a temporary name; all citizens and visitors will be encouraged to choose their own place name in the toponymy workshop.

The official flag of The Microdot will be continually re-designed by its citizens and visitors. Materials to make flags will be provided in the flag-making workshop.

The primary national anthem of The Microdot will be the Hokey Pokey. The chorus will be sung in a modified form ("You do the Hokey Pokey to build it like you want / That's what it's all about!"). Additional national anthems may be authored and sung by citizens.

The Microdot will be governed by the tenets of Dotocracy: respect, construction, and joy. The Microdot will have no rulers (tape measures, however, will be provided).

Modular dot posters advertise The Microdot's events (top) and the flag flies as independence is declared (bottom).

## Declaring Independence

I guess I'll be honest and admit that it started with a Björk song. Every cry of "raise your flag!" in the single "Declare Independence"[1] resonated with a naïve but sincere revolutionary spirit somewhere within me. Björk has used the song to promote the causes of long-established sovereignty movements (chanting "Tibet, Tibet" during a concert in Shanghai, for example)[2] but I wasn't really in a position to engage in such grand proselytizing. Still, the evocation of national symbols (stamps, flags, languages) interested me and I began to wonder how participatory architecture could become a tool for critique of nationalistic power structures. I imagined the song as an anthem for everyone from the historic pioneers homesteading the American West to the determined squatters on the fringe of urban slums who express a DIY-ethos that proclaims "we don't need to wait; we can build it ourselves!" Ultimately the tone I adopted was less-than-serious though my motivations were earnest. The outcome of these thoughts was the creation of a new nation built on the act of building: The Microdot.

The Microdot didn't secede from anything in particular. It wasn't a rejection of MIT, the U.S. Constitution, or any other specific power structure. I didn't feel like it needed to be. Of course there are many valid things to fight against in this world, but would this be the appropriate venue? Does the act of building autonomy need a counterpoint, some grand enemy to stand in opposition? The words of Hakim Bey which follow his proclamation that "chaos never died" seem relevant in this context:

> There is no becoming, no revolution, no struggle, no path; already you're the monarch of your own skin--your inviolable freedom waits to be completed only by the love of other monarchs: a politics of dream, urgent as the blueness of sky.[3]

Bey posits that declaring independence is not the ultimate revolutionary act but merely an expression of freedom that is the natural state of things. I agree with this sentiment wholeheartedy and feel it provides justification for the creation of his Temporary Autonomous Zones. In this spirit, I conceived of the Microdot not as a protest, but rather as a demonstration of our human ability and determination to be free.

## Microschedule

The term "micronation" is generally used to describe countries that claim only very small regions as their sovereign territory. They frequently struggle for international recognition and the establishment of a permanent identity. This seems an uphill battle as a glance at political maps of the world over the past 100 years will reveal; major nations come and go with great enough frequency that "permanence" seems relative, and regions like Taiwan show that recognition is not a simple matter of majority rules. In the face of such a world, The Microdot was designed to be "micro" in both *space and time.* It needed to exist only long enough to make one point.

The Microdot is an inherently nomadic country, designed to be reinstalled elsewhere at other times with a potentially different set of relevant activities; this incarnation's schedule presents only a sampling of what could be. The activities were chosen to demonstrate the possibilities of working on a variety of scales to construct new spatial identities.

## If a Tree Declares Independence from the Forest and No One is Around to See It, Does It Make a Passport?

Citizenship of The Microdot is extended to those who hold an official passport. An official passport is made by collaging photographs and text from magazines and maps from around the world. Blank passport booklets and collage materials were provided on The Microdot and this activity proved to be one of the


Dot-shaped badges proclaiming various micronational slogans. The badges advertised The Microdot as pin-back buttons and a set of modular posters.

most popular workshops. New citizens tended to enjoy displaying their passports as they crossed the border from the surrounding territory, though without an armed forces or border guard the act was largely ceremonial. The passports became highly individualized tokens of national identity.

## Reading List of the Alter-Institution

- <u>Micronations: The Lonely Planet Guide to Homemade Nations</u> by John Ryan, George Dunford, Simon Sellars
- <u>How To Start Your Own Country</u> by Erwin S. Strauss
- <u>The Temporary Autonomous Zone, Ontological Anarchy, Poetic Terrorism</u> by Hakim Bey
- <u>The Whole Earth Catalog</u>, Stewart Brand, ed.
- <u>Where the Wild Things Are</u> by Maurice Sendak
- <u>A People's History of the United States</u> by Howard Zinn
- <u>Critical Path</u> by R. Buckminster Fuller
- <u>Power</u>, an anthology of essays by Michel Foucault
- <u>The Millenial Project - Colonizing the Galaxy in Eight Easy Steps</u> by Marshall T. Savage
- <u>Travel as a Political Act</u> by Rick Steves

The preceding list of books currently composes The Microdot's library. These books are suggested reading as part of The Microdot's educational program, the Alter-Institution. Education is not the central focus of The Microdot as it was with ting•bing, though it still plays an important rule. Learning to build and building to learn go hand in hand.

MIT professor and director of the Program in Art, Culture, and Technology program Ute Meta Bauer gave the inaugural institutional talk on the history of micronations. This event was structured as an informal discussion, followed by a ceremonial inflating of the Alter-Institutional Ironic Ionic Columns.

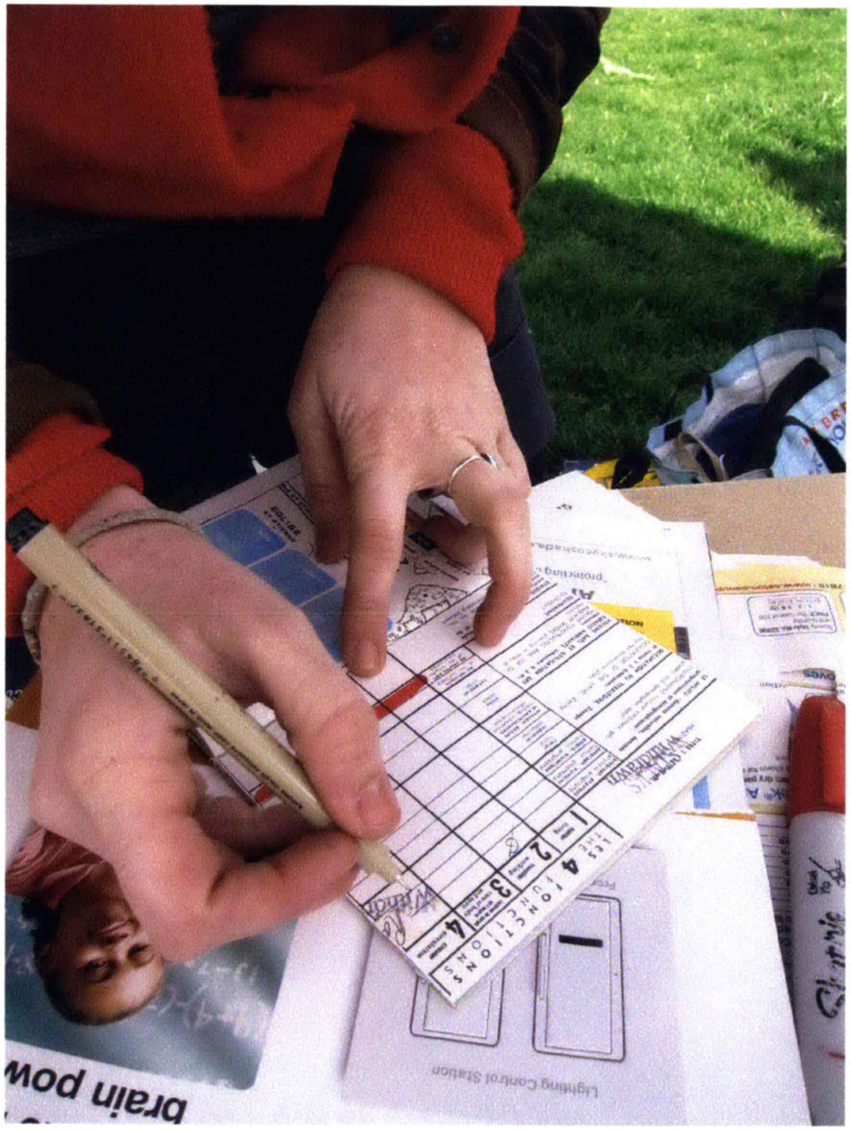
My peer in the literature department, Seohyung Kim, planned a workshop to write manifestos in the form of poems but unfortunately it did not garner a sufficient audience as a late addition to the schedule. Nevertheless, a selection of its reading list is included here for posterity:

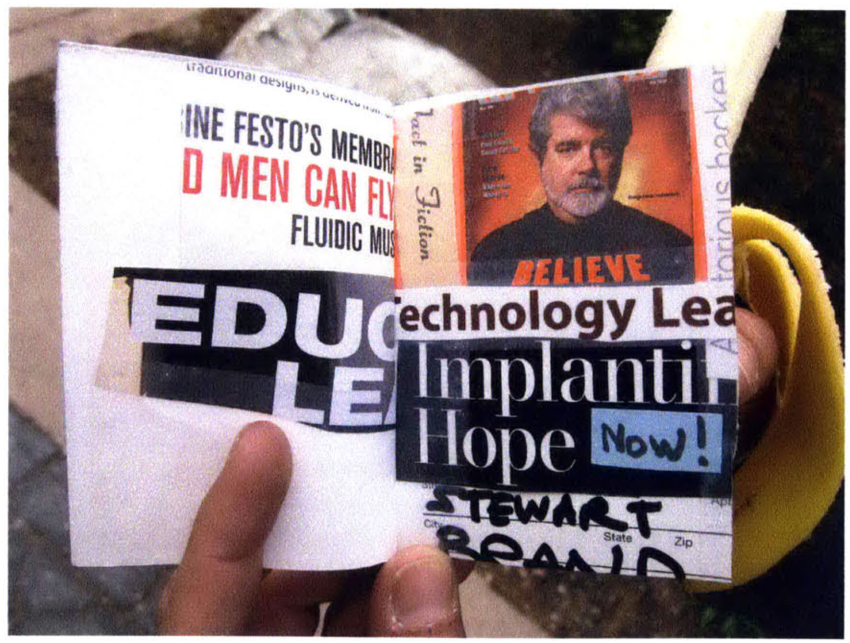
- *Excerpt from IV, The Heights of Macchu Picchu* by Pablo Neruda
- *The Year* by Czeslaw Milosz
- *Questions of Travel* and *Crusoe in England* by Elizabeth Bishop

## This Geometry Kills Fascists[4]

The Microdot is governed by the tenets of Dotocracy: Respect, Construction, and Joy. Further political considerations are left unspecified. There are no rulers on The Microdot; tape measures, however, are provided. The architectural structures of the nation reflect this governing structure accordingly: straight ruled lines are eschewed in favor of tape-measurable curves.

One of the beliefs behind the choice of architecture for the Microdot is that unconventional temporary spatial environments can provide transformative experiences. This is a viewpoint shared with other radical architecture groups who have used their designs






The collage passport workshop proved to be one of the most popular activities on The Microdot. Everyone was eager to earn their citizenship with this accessible and highly personal craft.

The construction method used to make The Microdot's Spandex tents requires minimal tools and results in easily-transformed, transformative spaces. Nylon zip ties enclosing ordinary pennies create structural connection nodes and bamboo poles elevate the fabric canopy.

to engage with the public. Inflatable architecture in particular has been used to this effect, exemplified by the work of Ant Farm in the 1960's. In an analysis of Ant Farm's work, critic Caroline Maniaque offers the following interpretation of their inflatables:

> Ant Farm pointed out that the inflatable structure and the effect it has on behavior when one penetrates inside are far from harmless. Like a drug, it amplifies emotions, and thus changes human behavior. They drew attention to the fact that men and women who enter an inflatable structure gain a heightened awareness of their body. [5]

Ant farm's own Chip Lord explains that:

> Rooms have to do with rectangular limits... Laws enacted now enforce static living patterns, grid graphs which are two-dimensional laws and inflatables allow a kind of fourth dimension ... where there are no rules.[6]

For a more contemporary example, critic Joseph Grima writes about Raumlabor Berlin's "Spacebuster" inflatable: "One of the remarkable qualities of the Spacebuster ... is that by virtue of its humble, cheap construction, it is born free from the shackles of authority to which 'Architecture' is beholden by convention."[7] In all these cases, the implication is that the geometry and materials of these unconventional spaces run counter to the norms of authoritative architectural power structures.

The architecture of The Microdot is not inflatable. Instead, it exhibits a similarly flexible, dynamic, and perhaps even more

The Microdot is a nomadic nation-- all the materials needed to build it pack up for easy transport in the back of a pickup truck or similar.

participatory construction of my own device. The materials used are sheets of stretchable spandex fabric, bamboo poles, pennies, nylon zip ties, rope, and stakes. By using a zip tie to enclose a penny within a corner or edge of the fabric, a connection point is formed. These connection points can be used to "sew" two sheets of the fabric together to create a larger sheet or as a node to which rope can be tied and staked down. The bamboo poles lift the fabric off the ground to create tents with sweeping curves characteristic of tensile structures.

Because the fabric is elastic, these structures can be built in an ad-hoc manner. Additional nodes can be added to pull and distort the canopy in new directions, bamboo poles cut to different lengths open or close zones of activity, and more fabric can be tacked on to expand the floor plan with minimal effort. Tension structures sometimes behave in a counterintuitive manner so experimentation is favored over planning and design; no amount of engineering or architectural training provides an advantage over a true sense of curiosity. The only tools required are a hand saw and a pair of scissors; this process is accessible to any skill level. It is a technique of *intuitive building.*[8]

These elastic tent structures have the potential to extend the vocabulary of transformative nomadic architecture. They provide an alternative geometry to that of the inflatables bubbles and serve a different architectural function; tents give shade under an airy hyperbolic canopy rather than encapsulating occupants within a translucent amoeba. Like inflatables, the tents are lightweight and collapse to a small volume for easy transport. The materials used are not particularly difficult to obtain and the construction processes are easy to master in both cases. This encourages replication of the ideas by other groups for other audiences to generate unanticipated experiences. One major advantage of the spandex tents is that they are buildable and changeable by people on the site of their installation without defining the form ahead of time; inflatables can be built by just about anyone but the plastic sheeting must be cut and joined according to a plan that is not conducive to radical reconfiguration after the fact. I don't know exactly what the fourth dimension is that Ant Farm was referring to, but perhaps working with an actively mutable architecture provides an additional layer of experience to the world of soft and unexpected geometries. Imagination and participation—not the rules of rectangular rooms—set the only boundaries.

Microdot citizens and visitors relax on the grass while enjoying music from Indiana-based band Elephant Micah. Participants joined us on the dot after receiving the e-mail invitation, by word of mouth, or simply out of curiosity while passing by. The citizenry consisted of students, staff, alumni, and friends not only from MIT but the surrounding area as well. Bringing outside music acts to the dot as part of the campus radio station WMBR's concert series was a highlight, attracting a diverse audience.

Inflatable ironic Ionic columns solidify the image of the pop-up Alter-Institution.

**The Microdot Alter-Institutional Rap**

*(Ironic*
*Ionic*
*Messin' with yo' tectonics)*

*Our institute is tall*
*Our institute is clean*
*Our institute is made of polyethylene*

*Inflatable*
*It's debatable*
*Whether or not*
*Our institute is even ratable*
*Number one or ninety-two*
*Shouldn't matter to you*
*Just build it like you want*
*Go grab some bamboo*
*And build it!*

*(Ionic*
*Tectonic*
*A little bit too ironic)*

Director of the MIT Program in Art, Culture, and Technology Ute Meta Bauer hosts a discussion about micronations at the Microdot Alter-Institution. Note the democratic dot-shaped seating arrangement.

Beth Remis and Mark Trecka of Pillars and Tongues play a concert on the dot at the conclusion of The Microdot's instantiation on McDermott Court. The tent structure was dynamic and flexible enough to convert into this arrangement that frames the stage for such a performance.

To capture the growth and development of the temporary micronation, MIT Media Lab student Jeffrey Warren, aided by Jack Murphy on the right, lent his expertise in low-cost balloon mapping. From above, the ad-hoc nature of the settlement is apparent, made possible by the flexibility of the tensile tent construction system.

# Conclusions


Woody Allen's character in *Annie Hall* finds that his attempt to recreate the original energy of a lobster chase is met with indifference.

## Chasing Lobsters

There is a scene in the Woody Allen film *Annie Hall*[1] where Allen's character Alvy and the title character/love-interest engage in comedic pursuit of live lobsters around the kitchen floor as their dinner preparations go awry. The two exhibit a remarkable chemistry, transforming feigned anxiety into sincere affection as the chase escalates. Later in the film, Alvy attempts to recreate the scene with another woman. Despite his effort to capture the original spirit of the moment, his antics are left unrequited. The other woman is cooly unimpressed with such contrived romanticism and his jokes fall flat. It just isn't the same the second time around.

The story of this thesis is perhaps one of chasing lobsters. Both projects I have presented show very strong influence from my experiences in Denmark two years ago. There was something captivating about the action on Refshalevej that seems so unshakable, yet impossible to reproduce. The motive to build in that case was organic, growing out of a common sense of purpose and collective identification of a site for intervention. My efforts feel strained in comparison, struggling to build such momentum.

I have received multiple comments on my work that suggest I have a certain amount of nostalgia for some Utopian past. From the echoes of Buckminster Fuller in the triangulated geometry of ting•bing to my citation of Ant Farm as a political-formal influence to the evocation of symbols of Christiania on The Microdot, I fully acknowledge my fascination with projects that began long before I was born. Yet I disagree heartily with insinuations that such references are merely quaint or naïve and ultimately of little value to contemporary society. These experiments from the past (that have by no means come to a close in many cases) stir passion within me because they explore how individuals, communities, and societies can accept or reject certain structures of authority; they engage fundamental questions of human relations. The experiments are worth remembering and remixing *because* they have failed to achieve Utopia; their radical incongruence with the world we live in justifies further intervention to build support for such alternative desires to flourish.

The protagonists in *Annie Hall* ultimately go their separate ways despite Alvy's longing to be reunited. This is the trajectory that I believe my work will follow in the long run. As ting•bing gives an architectural site to constructionist educational ideas and the Microdot's tents riff off a building typology that saw its heyday in the 60's, these projects attempt to reassemble thoughts from the past and take them into new territory. In doing so, I hope that new tools and frameworks for viewing timeless questions of authority can take shape and be implemented when needed most.

## Literacy

The project of participatory architecture does not dream of a world without architects. It does not intend to suggest that all design is fueled by ulterior motives of divisiveness or oppression. It does, however, seek to clarify the structural imbalances in how the built environment looks, functions, and is subject to change. It seeks to promote a sort of *spatial literacy.*[2] Traditional literacy is not just a matter of being able to read and write; it entails grasping the mechanics of these skills so that one can participate as an active member of democratic society. Through a combination of knowing what *has been* written and what *could be* written, literate people are able to advocate for change from what *is* written. I believe an analogy between this understanding of texts and the understanding of spaces is a useful framework.

My experiments have focused on experiencing architecture via tools that are not necessarily those adopted by the architectural profession. Spatial literacy is not directly concerned with the ability to read a blueprint or navigate Building Information Modelling software as a layperson. It is about becoming more articulate in describing what makes different spaces feel and function differently. It asks, "who's in charge here?" based on the layout, materials, and symbols embedded in a place.[3] It is about developing skills to construct an image of what one desires from the built environment so that others (professionals, when appropriate) can aid in the realization of such spaces.

That modular classroom building kits, curvilinear tents, and inflatable columns might directly increase the agency everyday people have in determining the character of the built environment is not the ultimate argument of this thesis. Such interventions are intended as invitations to particpate in the further questioning of our world. In civilizations without such experiments, desire is left unbuilt, acceptance takes the place of action, and walls take the place of will.

# Notes

# Refshalevej: A Manifesto

1. The most up-to-date and readily accessible information in English seems to be Wikipedia: <http://en.wikipedia.org/wiki/Freetown_Christiania>

2. "Danish protests spark 100 arrests," *BBC News,* 3 March 2007, accessed 19 May 2010 <news.bbc.co.uk/2/hi/europe/6414481.stm>.

3. Hakim Bey, T.A.Z.: The Temporary Autonomous Zone, Ontological Anarachy, Poetic Terrorism, "Chaos," (New York: Autonomedia, 1991), <hermetic.com/bey/taz1.html#labelChaosSection>.

4. Hakim Bey, T.A.Z., "Pirate Utopias," <hermetic.com/bey/taz3.html#labelPirateUtopias>

5. Michel Foucault, "Of Other Spaces," 1967, translated by Jay Miskowiec, *foucault.info*, acessed 20 May 2010, <foucault.info/documents/heteroTopia/foucault.heteroTopia.en.html>.

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1. Seymour Papert, Mindstorms: Children, Computers, and Powerful Ideas, 2nd ed., (New York: Basic Books, 1993).

2. Norman Brosterman, Inventing Kindergarten, (New York: Abrams, 1997).

3. Annette Krauss, Hidden Curriculum, (Rotterdam: episode, 2008).

4. Michael Eisenberg, "Mindstuff: Educational Technology Beyond the Computer," Convergence 9.2 (2003), 29-53.

5. Jonathan Sterne, "Bourdieu, Technique, and Technology," Cultural Studies 17.3 (2003), 367- 389.

6. Thomas Alkemeyer, "The Physicality of Education. On the Silent Power of Symbolic Violence" in Hidden Curriculum 47-65.

7. Michael Eisenberg, "Mindstuff."

8. Arvid Bengtsson, ed, Adventure Playgrounds, (New York: Praeger, 1972).

9. Stanley Mathews, From Agit-Prop to Free Space: The Architecture of Cedric Price, (London: Black Dog Publishing, 2007).

10. Rusk et al, "Origins and Guiding Principles of the Computer Clubhouse," in The Computer Clubhouse: Constructionism and Creativity in Youth Communities, (New York: Teachers College Press, 2009).

11. Richard Andersen, "From an educational point of view," in Adventure Playgrounds, 84-89.

12. Seymour Papert, Mindstorms.

13. Stanley Mathews, From Agit-Prop to Free Space.

14. Amber Frid-Jimenez, "Leave Any Noise at the Signal: Participatory Art Online," Diss. Massachusetts Institute of Technology, 2006.

15. Christoph Schaefer, "The City is Unwritten: Urban Experiences and thoughts Seen through Park Fiction," in Brett Bloom and Ava Bromberg (eds.), Belltown Paradise/Making their Own Plans, (Chicago: WhiteWalls, 2004), 39-51.

16. Clive Thompson, "Build It. Share It. Profit. Can Open Source Hardware Work?" Wired 11.16, Nov 2008.

17. Children's environments advisory service, "Adventure Playground Information Kit," (Canada: Central Mortgage and Housing Corporation, Sept 1977).

18. Stanley Mathews, From Agit-Prop to Free Space.

## Thinking, Building

1. EPICS is a larger program developed by the engineering department at Purdue University <https://engineering.purdue.edu/EPICSHS/>.

2. Stewart Brand, How Buildings Learn: What Happens After They're Built, (New York: Penguin).

3. <en.wikipedia.org/wiki/Theory_of_multiple_intelligences>

4. The summer prototyping activities were graciously funded by the Council for the Arts at MIT, the MIT Public Service Center, the MIT Community Service Fund, an MIT Visual Arts Program Director's grant, the office of MIT Dean of Architecture Adele Santos, and the office of the MIT Provost for the Arts Phil Khoury.

5. "The Foxfire Approach," The Foxfire Fund, Inc., 2010, <http://www.foxfire.org/teaching.html>.

6. SketchUp is available from <sketchup.google.com>. The 3D Warehouse is found at <sketchup.google.com/3dwarehouse/>. Components specific to this project can be found by searching to "ting-bing" in the 3D Warehouse.

7. These are commonly available materials, but finding straws and magnets that press fit with exactly the right resistance is important. Too loose of a fit will cause the magnets to pull out easily and too tight of a fit will make the magnets impossible to insert reliably. I found success with .21" diameter drinking straws and cube magnets .1875" on each side, though

magnets sold as 3/16" cubes from different distributors produced different results. Two different plastics seem to be used for drinking straws; the ones most useful for this were of a harder, more brittle type. The hubs are 3/8" steel spheres sold in packs of 250 from McMaster-Carr (Part #96455K54).

8. <www.geomagworld.com/>

## I Never Played Björk on the Microdot

1. Björk, "Declare Independence," Volta, compact disc, (Atlantic 2007).

2. Tania Branigan, "Björk's Tibet protest offends Chinese fans," *The Guardian*, 5 March 2008, accessed 18 May 2010, <www.guardian.co.uk/world/2008/mar/05/china.musicnews>

3. Hakim Bey, T.A.Z., "Chaos," <hermetic.com/bey/taz1.html#labelChaosSection>.

4. Apologies to Woody Guthrie, known for his anti-authoritarian folk songs played on a guitar adorned with the words "this machine kills fascists."

5. Caroline Maniaque, "Building the ephemeral: Two or three things about Ant Farm" in Ant Farm, FRAC Centre, Berkeley Art Museum, Editions HYX (Le Plessis Robinson: IMP Blanchard, October 2007).

6. The Ant Farm, Ant Farm Video, DVD, (Video Arts, 2004).

7. Joseph Grima, "Spacebusters sighted in NY city," Abitare 493, June 2009, <www.abitare.it/highlights/avvistati-spacebuster-a-ny-city/>

8. A term borrowed from Alex Gilliam of Public Workshop: <publicworkshop.us/?tag=intuitive-building-techniques>.

## Conclusions

1. Woody Allen, dir., Annie Hall, perfs. Woody Allen and Diane Keaton, 1977, DVD, MGM, 2000.

2. This term has been used differently in the context of geographic spatial literacy and promote GIS as a learning tool; see: National Research Council of the National Academies, "Learning to Think Spatially," Washington: The Natioanl Academies Press (2006), <www.nap.edu/catalog.php?record_id=11019>.

3. For a pictoral exploration of this question, see Richard Ross, Architecture of Authority, (New York: Aperature, 2007).

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Page 17 (top): <www.fynskebilleder.dk/billede/7940?page=1&tag=legende-boern#ia>

Page 17 (bottom): <www.millenniumpeople.co.uk/2009/08/fun-palace-for-people.html>

Page 26-27: Drawings by Bill McKenna

Page 60: Photo by Carmel Dudley

Page 66: Stills capture from Annie Hall.

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