Figure 1. Using a standard sweater bag, a reclaimed tarp and four grommets, our team created a 99-RUPEE ($2) WATER FILTER: a bag for transporting water that could unfold and expose its contents to the purifying power of the sun.

CONSIDERED BUILDING: EXPERIMENTAL CONSTRUCTIONS IN MUMBAI

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Abstract
In the summer of 2008, a team of art, architecture, and design students from seven universities and six disciplines traveled to India where they redesigned school and health centers for children living on construction sites of Mumbai. Working side-by-side with people who speak a different language, have different customs, and carry different values, our students used their creative talents to uncover new techniques of design and construction based upon undervalued materials and indigenous methods of working. Their work was neither a replication of existing local methods nor an imposition of foreign solutions. Rather, it was a synthesis of both traditions – a hybrid address that empowered those served to possess and evolve the given strategy in a meaningful way.

To test the value of this address, our team worked closely with local professionals to create a series of experimental constructions. Ranging in scale from small classroom-based initiatives to full-scale wall constructions, these prototypes allowed our team to bring their technologically advanced and highly sophisticated understanding to bear upon a paradigm of reclaimed material, mud, and trash. At the same time, these constructions also provided an invaluable platform for exchange between our team, our client and those who would inevitably be responsible for executing this work. Tailors, educators, designers, laborers and students gathered around the work, creating a design language that will directly impact the lives of the 10,000 children served by our non-profit partners. Just as importantly, they unearthed a new professional methodology – one that could potentially help our field to articulate a much more sensitive, humane, and sustainable response to the world around us.

Figures 2+3. Our partner, Mumbai Mobile Crèches, is an Indian non-profit that provides schooling and health programs for children living on the CONSTRUCTION SITES of Mumbai.

1 INTRODUCTION

"I cannot then explain beyond that, but I know that there is more than a simple collapsing and arrival of material. I struggle to say these things and I know that I can just get them out but there is a world beyond what words can define for me. Words can do their job, but what I am doing here says a lot more."
Andy Goldsworthy, from *Rivers and Tides*. (Goldsworthy and Riedelsheimer, 2001, Chapter 10)

In the summer of 2008, a team of art, architecture, and design students representing seven universities and six disciplines traveled to India where they redesigned school and health centers for children living on construction sites of Mumbai. Working side-by-side with people who speak a different language, have different customs, and carry different values, our students used their creative talents to uncover new techniques of design and construction based upon undervalued materials and indigenous methods of working. Their work was neither a replication of existing local methods nor an imposition of foreign solutions. Rather, it was a synthesis of both traditions – a hybrid address that empowered those served to possess and evolve the given strategy in a meaningful way.

This project is made possible by a partnership between Temple University, D.Y. Patil School of Architecture in New Mumbai, Mumbai Mobile Crèches and the International Design Clinic (IDC) – a registered non-profit started in 2006 to provide students with the chance to use their unique creative talents to help those in need around the world. Since its inception, students and volunteers from the IDC have designed and constructed five projects, ranging from an urban tent for the homeless made of trash to a communal playspace for Romanian orphans using primarily dirt, rock and broken bits of concrete. In the summer of 2008, the IDC (in partnership with the Study Abroad Program at Temple University) took 16 US students to India, where they joined professionals and students from around the US and India to redesign the schools run by Mumbai Mobile Crèches – an Indian non-profit that provides schooling and health programs for children living on the construction sites of Mumbai.

Figures 4+5. MOBILE CRECHE's facilities only remain in existence for two to three years before they would give way to the condos and offices under construction. Thus, our work also had to be flexible enough to move beyond these known conditions and address the unknown sites, programs and clients offered by future projects.

During this five-week project, our team, consisting of three faculty members, seven professionals and 32 students from two countries, eight universities and six disciplines, would be asked to forge a collaborative effort with people they had never met, for a client they knew little about in a country most members had never seen. In addition, this team would also have to address a parallel series of challenges as they attempted to address the complex and fluid nature of the programs, sites, and communities served by their work.[1] In terms of program, our client, Mumbai Mobile Crèches did not want, or need, a beautifully designed school; they needed a beautifully crafted vision that could inform interventions at a range of scales, including furniture, curriculum and interior design to architecture and urban planning, for years to come. Correspondingly, the site for this project also varied widely, as did the nature of the communities served. To be useful, our work had to thus function well within the city and the suburbs, as an infill within the buildings under construction and on the construction sites outside of them, and within communities ranging in size from a few dozen families to several hundred. Moreover, as these facilities would, on average, only remain in existence for two to three years before they would give way to the condos and offices under construction, our work also had to be flexible enough to move beyond these known conditions and address the unknown sites, programs and clients offered by future projects. Only then could our team hope to address the demands of this program and create a work capable of informing not only the dozens of schools currently operated by Mobile Crèches, but the dozens more they would open over the next two years to double their capacity and provide services to over 10,000 children by 2010.

To craft a fitting response, our team had to develop a new design language for our client and our team. As indicated above, our client required work that functioned as architectural infrastructure and could inform projects in a range of conditions for years to come. Our team required an approach that would enable this work to be the result of a shared language, whereby the varied perspective of the team, client, those responsible for the execution of the work, and the children and families of the crèche could each play a vital role in the process. Although these efforts are obviously inspired by a range of sources, including the writings of Guy DeBord, Lebbeus Woods, Colin Rowe, and Andy Goldsworthy, the core of this design approach remains rooted in the concept of a shared language. Thus, it bears a strong relationship to many of the theories of language development and learning posited by John Dewey, Jerome Bruner and others.

For this reason, this paper will also turn to these sources to describe how these theories might enable the designer to develop alternative approaches to design education and practice. To be specific, this paper will use the four fundamental principles for language development as posited by author Jerome Bruner in his publication, Towards a Theory of Instruction. Using these principles as a point of departure, this paper will then look to the writings of thinkers such as Claude Levi-Strauss, Guy DeBord, and Lebbeus Woods to discern how these theories might posit a new mode of architectural practice. From this context, this paper will then analyze the value of the work in India and begin to assess the professional and pedagogical value of the methodologies proposed by it.

1.1 PREDISPOSITIONS TOWARD LEARNING

"I don't think that the earth needs me at all. But I do need it. To just go off into the woods and make a piece of work roots me again. And if I don't work for a period of time I feel rootless ... I don't know myself ... If I don't work for two, three weeks and I give a lecture, I feel like I am talking about someone else."
            Andy Goldsworthy, from *Rivers and Tides* (Goldsworthy and Riedelsheimer, 2001, Chapter 9)

Bruner begins his discussion about language development with what he believes to be the necessary root of all instruction: the predispositions held by the learner. After all, Bruner reasons, if "learning depends upon the exploration of alternatives" then one of the principle goals of instruction must be to facilitate and regulate this exploration. (Bruner 1966, 43) As said exploration will quite naturally be motivated and informed by the gifts, talents and experiences of the student, then these attributes must furnish a base for instruction. The predispositions of the learner thus become a primary point of departure for any act of teaching and a fundamental attribute in any theory of instruction. Author John Dewey also cites these predispositions as a core principle in learning by writing that, "training must, however, be itself based upon the natural tendencies, - that is, it must find its point of departure in them...Training, in short, must fall back upon the prior and independent exercise of natural powers; it is concerned with their proper direction, not with creating them."[ii] (Dewey 1997, 29)

This then, places great emphasis upon the ability of any mode of instruction to not only engage the natural powers of the learner, but also to activate, maintain and direct these naturally occurring predispositions in a manner that will encourage the exploration of alternatives. That is, to encourage learning, an educator must do more than acknowledge the interests, talents and leanings of the learner; they must use these attributes to cajole the learner into action. Knowing this, Dewey, Schon and Bruner all point to several prevailing tendencies of the learner, including curiosity and the drive for competence, which can be used to this end. Regarding curiosity, author John Dewey postulates that this attribute is, without a doubt, "the most vital and significant factor in supplying the primary material whence suggestion might issue." (Dewey 1997, 30) Curiosity is the reason babies place everything in their mouth and babble incessantly; curiosity is the reason why toddlers tirelessly explore their environment and ask 'why' at every turn. Curiosity is the reason blocks are stacked and playgrounds explored, caves mapped and the oceans plumbed. It is how we learn about our environment and ourselves and is a key asset to not only learning, but also survival. Because of this, curiosity often aligns with the second attribute cited by Dewey: the drive for competence. To learn (and survive) it is not enough to endlessly plumb the depths of the unknown. Eventually, one must develop that which is discovered through such activities into useful knowledge, skills, and talents. Otherwise, we, as a species, would engage in an endless search for new facts and abilities without every developing any one into something useful: babies would babble, but never talk, toddlers walk, but never run. Curiosity and the drive for competence are a pair: as curiosity breeds discovery, so must the drive for competence breed mastery. Curiosity gets the ball rolling; the drive for competence directs and maintains its momentum.[iii]

Although they vary in their specific application, both curiosity and the drive for competence share a common root; they are both "a response to uncertainty and ambiguity." As these tendencies are the fundamental motivation behind exploration and learning, it seems altogether logical to agree with Dewey when he deduces that "a felt difficulty is needed to prompt thought." After all, "without an emergency (some crisis, slight or great) there is no call for judgment." (Dewey 1997, 107) Or, to quote author Donald Schon, "It is such conjecture, in this case quite unanswerable, that produces rational, self-consciously problem-finding behavior so crucial to the growth of intellectual power." (Schon 1990, 159)

Furthermore, given the necessary role assumed by the predispositions of the learner in understanding and engaging this difficulty, it seems reasonable to assume that thinking will not occur unless the predispositions of the learner are cajoled into action. The difficulty must be felt. Thus, in order to adequately fulfill their role as defined above and "keep alive the sacred spark of wonder" that already exists within the learner, the instructor must offer something strange to the learner – a phenomenon, thought, or experience that can be appreciated by the predispositions of the learner, but not completely explained by them.[iv] (Dewey 1997, 34) To simply point to a moment of strangeness is not sufficient; to provoke engagement, this strangeness must be articulated in a manner that is relevant and accessible. If the problem can be read at a glance, then it is not a difficulty, students may apprehend, but will not judge. If the problem is too obscure, then it will not be felt ... it will be addressed as a blind mystery and no judgment will occur. To prompt thought, the difficulty must be structured as a "doubtful possibility" that affords the learner a platform for exploration and a method of inquiry."[v] (Dewey 1997, 108-9) In this way, the instructor allows the students to begin to create a dialogue between their previous experience and the presented point of strangeness. This not only rips the rug out from the assumed normative condition offered by the student's naturally-occurring predispositions and rescues "the phenomenon of social life from familiarity," it begins to contextualize previously strange conditions, resulting in a more nuanced understanding. (Bruner 1966, 94)

Figure 6.   Starting with fairly straightforward acts, such as EXPERIENTIAL FORAGING, all parties, including students from the US, students from India and the various professionals interning with the IDC, engaged the context of their work through a lens that could be appreciated by the predispositions of all parties involved, yet could not be completely explained by them.

1.2 DESIGN PRACTICE AND THE PREDISPOSITIONS OF LEARNING
"It is hard, hard going, and it is cold sometimes on the hand and I do get up very early ... And all that effort is, ultimately, going to make something that is effortless."
      Andy Goldsworthy, from *Rivers and Tides* (Goldsworthy and Riedelsheimer, 2001, Chapter 2)

Obviously, the project in India did not suffer for lack of felt difficulties. Before even setting foot in Mumbai, our team knew that they were going to confront conditions that were strange to them as travelers, students and professionals. Rather, the challenge was to provide a framework that would allow these points of strangeness to confront the students, compelling them make a decision: either they could rigorously engage this strangeness, deal with leanings that create it, and allow their unique perspective to become an asset to the project or they could attempt to ignore this strangeness. In the latter scenario, this feigned ignorance would over-prioritize the previous experience of the students and compel them to retreat into the perceived comfort of more 'normative' conditions, as provided by either the memorized givens of

professional convention, the sharply defined and clearly delineated edges offered by isolated classroom activities or the carefully edited perspective found within an air conditioned bus. On the other hand, if they chose to confront this strangeness, they would give up the opportunity to construct a more palatable version of their experience: as travelers, they would inevitably be confronted with offensive sights, abrasive sounds, and unsavory smells; as students they would have face the uncertainty offered by an unscripted and improvisational educational experience; as professionals they would have to face the fact that that value of their work lies not within the well-defined internal parameters imposed by employer, faculty member, or other established authority figure, but within a complex and changing matrix of conditions.

Due in large part to these discomforts, the experience of travelers, students and professionals often veers to more protected and edited confines. Reflecting upon this tendency within his own academic experience, artist Andy Goldsworthy, remarks:

> *"I was at art college in Lancaster and all the students were in their cubicles as they are and in that cramped space. And everyday I'd catch the train to Marcum where I was staying and you'd get off the train and see this big expanse, this space. Such stark contrast to the art college. One day I went off and worked on the beach. What struck me was that sense of energy when you were outside the art college... It was very secure in the college ... As soon as you made something that was outside there was this breathlessness and an uncertainty. Total control can be the death of the work."* (Goldsworthy and Riedelsheimer, 2001, Chapter 4)

This tendency is especially troublesome for those practicing within communities that are foreign to their experience, as is generally the case when designers and artists attempt to create socially-responsive projects. In this type of work, the gravitational pull of previous experience will generally produce work that is too isolated, imposed or paternalistic to be useful to the host community. To avoid this tendency toward large-scale acts of paternalism, those engaged in this type of work must remove artificial controls from the work, place themselves in a more inclusive situation and allow their work to face the less controlled conditions throughout the design process. In short, they must relinquish some measure of control. This will allow the observations and proposals based upon prejudicial judgments or assumed normative conditions to naturally atrophy, while encouraging those anchored upon a more inclusive vision will continue to grow and evolve.[vi]

Figures 7+8. Acts like COMMUNAL DERIVE MAPPING helped to bring together previously disparate experiences, providing a point of shared strangeness that facilitated dialogues between team members and allowed everyone to more sensitively engage the context of their work.

Bearing this in mind, during the summer of 2008, we asked all parties, including students from the US, students from India and the various professionals interning with the IDC, to engage the context of the work through a lens that could be appreciated by the predispositions of all parties involved, yet could not be completely explained by them. Specifically, we asked our team to engage the community through the

theories, activities and understanding proposed by the Situationists. (DeBord 1959, 62-66) Ranging from fairly straightforward acts of foraging (i.e. scavenger hunt) to much more complicated activities based upon the principals of the derive (i.e. a psychogeographic cab ride), we asked our team to simultaneously engage different mediums, including photography, collage, mapping, sketching, modeling, and building (virtual and actual) and see the site for our work strangely. Our team's near universal lack of experience with these methods provided an ideal platform for our work, one that cajoled the curiosity of every team member and prompted them to engage the inherent strangeness of their surroundings. At the same time, these activities were not completely foreign; each one could be engaged by the previously acquired skills, talents and experiences of our team members. Over time, as our team began to question (babble) and evolve (learn) these predisposition, these acts brought together previously disparate experiences, providing a point of shared strangeness that facilitated dialogues between team members and allowed everyone to more sensitively engage the context of their work.

Figures 9+10. To challenge and expand our team's understanding of their new context, we participants to complete Situationist-inspired activities, such as a PSYCHOGEOGRAPHIC CAB RIDE. In this activity, four team members were given cameras, placed in a cab, and asked to photograph the experience (including hidden or overlooked events). The results of this work were combined into a single collage.

2.1. THE STRUCTURE AND FORM OF KNOWLEDGE

The second principle of Bruner's theory of instruction is concerned with evolving the predispositions described above in a natural pattern, moving from the physical, to the social, to the intellectual. The argument behind this idea partly rests in the fact that curiosity and the drive for competence initially manifest themselves in physical exploration. Babies experiment by touch, by putting items in their mouth, by banging on things. This experimentation is continued into toddlerhood, when added mobility, dexterity, and strength allow for more advanced and articulate acts of reaching, opening, prodding and touching.[vii] As the child advances, these physical acts are supplemented by more socially based methods of exploration. Starting with one-word utterances or "holophrases" (dada, kitty, oh-oh), the child uses sounds encountered through their previous experience to experiment with other forms of expression. Through trial-and-error, manifest principally in babbling, the child then begins to combine these holophrases into syntactical utterances (mommy bye-bye) and, eventually, a syntactical structure. At this point, the child can begin to differentiate between "closed pivot point class" words (i.e. bye-bye) and every other word in their vocabulary (mommy). In the process, they have not only gained a way of expressing themselves (motivated by a socially based manifestation of curiosity), but a "a powerful instrument for combining experiences ... a tool for organizing thoughts about things." According to Bruner, "the combinatorial or productive property of language is an invitation to take experience apart and put it together again in new ways."[viii] (Bruner 1966, 106) Language development and intellectual investigation are quite naturally intertwined.

In this way, the experience, skills and knowledge already acquired become tools through which the student might express, amplify, and eventually supplement, their existing means. Bruner believes that this is fundamental truth to learning and key component in our evolution as a species:

> "Man's use of mind is dependent upon his ability to develop and use 'tools' or 'instruments' or 'technologies' that might make if possible for him to express and amplify his powers. His very evolution as a species speaks to this point. It was consequent upon the development of bipedalism and the use of spontaneous pebble tools that man's brain and particularly his cortex developed…It was not a large-brained hominid that developed the technical-social life of the human; rather it

was the tool-using, cooperative pattern that gradually changed man's morphology by favoring the survival of those who could link themselves with tool systems and disfavoring those who tried to go it with big jaws, heavy dentition, or superior weight. What evolved as a human nervous system was something then, that required outside devices for expressing its potential." (Bruner 1966, 24)

By applying this observation to the stages of learning already outlined, Bruner categorizes the "tools" for learning in three distinct orders: tools for the hand, tools for the distance receptors, and tools for reflection. The first type, "tools for the hand", is focused and haptically based. In essence, it is about learning "how to do" something. It is about the acquisition and mastery of certain givens. In this realm, a certain amount of memorization, activated in the manner already described, must be expected.[ix] The second type of tool, "tools for the distance receptors", is focused more upon how to represent an ever-growing store of knowledge. Through such tools, the learner creates a structure for their experiences, knowledge, and talents. Thus, these tools rely heavily upon acts of translation (to compare dissimilar tools), evaluation (to create a useful hierarchy) and organization.[x] At this point, the learner becomes able to evolve these tools into a much more symbolic apparatus. This third type, defined as "tools for reflection," are forged through the now translated talents, knowledge, and experience of the learner. Through them, thee student becomes able to "consider propositions rather than objects." This permits them to use their store of tools for reflection.[xi] (Bruner 1966, 27-28)

Returning to Bruner's observation that "learning depends upon the exploration of alternatives" then it stands to reason that to learn the student must not only possess the tools necessary to engage in this exploration, but they must be willing to do so. Or, to quote Dewey, if learning is, "the discovery of intervening terms which, which inserted between the remoter end and the given means, will harmonize them with each other," then a student's ability to learn is based on their ability and willingness to use their means to seek the remoter ends. (Dewey 1997, 72-3) Just as a child pieces together language through a messy, trial and error exploration based upon their current store of knowledge, a student will only acquire advanced or complex skills or knowledge through risk-centered experimentation with more basic ones.[xii]

1.2 DESIGN PRACTICE AND THE STRUCTURE AND FORM OF KNOWLEDGE

"The moment when something collapses ... it is intensely disappointing. And this is the fourth time it has fallen. And each time I got to know the stone a little bit more. And it got higher each time ... so it grew in proportion to my understanding of the stone. And that is really what ... one of the things that my art is trying to do ... trying to understand the stone. I obviously don't understand the stone well enough ... yet.
Andy Goldsworthy, from *Rivers and Tides* [emphasis mine]
(Goldsworthy and Riedelsheimer, 2001, Chapter 4)

In the first section, this paper outlined how the summer experience in India used the principles of language development to engage the innate strangeness inherent when operating within a team of formerly disparate parties in a location largely foreign to all group members. However, these principles did not address a second, equally pressing point of strangeness, namely the relationship between the members of our team and the parties involved in the project brief. To address this concern required that we develop a second, hybrid language based upon the predispositions of completely different parties. We could not assume a design-oriented approach, as offered by the incredibly biased paradigm created by mechanisms such as design charrettes or orthogonal representations of space. Instead our team had to develop mechanisms that enabled the predispositions of all parties, including the teachers and the children of the crèche, the directors of the non-profit and the developers responsible for actually building the school, to contribute to the design in a meaningful way.

Before discussing how this might occur, it is important to note that all parties involved in this work are equally susceptible to acting upon assumed normative conditions and creating work that presumes to know more than it does. This paper has already outlined the problems present when the designer does not confront these biases. For the insider (client, community member, developer, etc), these presumptions generally over-prioritize immediate needs and circumstance at the expense of long-term opportunities. Aside from undermining the longevity of the work, the overt acceptance of immediate circumstance is also antithetical to innovative thinking. Those operating in this manner thus often miss the opportunity to create alternative methodologies, materials and programs - pitfalls not generally encountered by the outsider, who is predisposed to finding new uses of inherently strange rituals and materials. Thus, despite the fact that the work created through the biases of the insider often responds quite well to its context (which is likely why

it does not receive the same scathing criticism as does work created under the prejudice of the outsider), it is nevertheless just as dangerous.

Figures 11, 12 + 13. Using the tools required through the previous exercises, our team began to design activities that would unearth, the understanding of Mumbai Mobile Crèche's students. One such activity asked over 1,000 children to "Draw Your Crèche." The results of this work helped us to understand the crèche through the eyes of the child.

Bearing this in mind, the community-based designer must either seek to eliminate the biases carried by everyone involved in the work or provide a working method that would allow all parties involved to bring their inherent leanings to bear upon each other. Given the obvious paradox posed by the former approach, which must welcome the potential offered by experience, talents, passions and expertise without admitting the obvious role played by personal experience in their acquisition, evolution, and use, it seems reasonable to assume that success within this realm is once again less a matter of editing than inclusion. To function

well as a community-based designer, one must cultivate a dialogue wherein the perspective of the outsider is immediately challenged the intimate understanding of the insider and the assumptions of the insider are immediately challenged by the provoking influence of the outsider. Or, to use the terminology offered by Claude Levi-Strauss, the key to this type of work is to create an equal exchange between the magical thought of the bricoleur which attempts to draw useful conclusions through sensory experience and intuition, and the scientific thought of the engineer, which offers a more detached and sustained look in order to create "knowledge for its own sake." [xiii] (Levi-Strauss 1966, 13-14)

To find an example of an approach that welcomes both the ordered, scientific approach of the scientist and the less-controlled, more improvisational methodology of the mystic, in practice, one can turn to the world of art. To once again quote Claude Levi-Strauss:

> *"The painter is always mid-way between design and anecdote, and his genius consists in uniting internal and external knowledge, a 'being' and a 'becoming', in producing with his brush an object which does not exist as such and which he is nevertheless able to create on his canvas. This is a nicely balanced synthesis of one or more artificial and natural structures and one or more natural and social events. The aesthetic emotion is the result of this union between the structural order and the order of events, which is brought about within a thing created by man and so also in effect by the observer who discovers the possibility of such a union through a work of art."* (Levi-Strauss 1966, 25)

Or stated more concisely: "By his [the artist's] craftsmanship, he constructs a material object which is also an object of knowledge." (Levi-Strauss 1966, 22)

Figures 14+15. Every team member spent at least two full days in a crèche, during which time, they used a range of mediums to discuss five key topics, including teacher scale (Figure 15), student scale, and movement (Figure 14). These exercises moved between acts of observation, making and thinking, drawing a clear link between tools for the hand, distance receptors and reflection.

In order to bring this perspective to bear upon the project in India, our team engaged in a concerted effort to operate in a manner that would move seamlessly between these perspectives and create a response that is hard-wired to the natural inclinations of both parties, as each would play an important role in the evolution of our work after our departure. To this end, during our first few weeks abroad, out team engaged in several research tracks, some of which relied very much on the methods and perspectives of the scientist, some of which relied much more heavily upon acts of bricollage. The insight offered by library and internet resources were thereby married with that offered by acts of experimentation with found materials and drawings completed by the children of the crèche. For example, the second week overseas, one of our team members, using a fairly scientific approach based upon traditional research mechanisms, discovered that children living in Mumbai have alarmingly high rates of illnesses brought about by various contaminants in the air. Seeking a solution, she expanded her researched to discover which indigenous plants could remove these contaminants. From this base of research, this team member then hypothesized that is might be possible to create a green wall that would help clean the air. Just as importantly to the project, once the school was no longer needed, the wall could be theoretically drained from the wall, placed back into the site and retrained with a different set of plants. Although quite interesting as a hypothetical, we had no idea if the idea was actually workable using the means and materials available to the project. To

answer these questions, another student proposed building several versions of the wall so as to uncover an economical way to construct the wall. For the next several days, this student worked with other students and local laborers, who would largely be responsible for building versions of this wall should it prove useful, to construct several versions of this wall. In the end, these efforts, when combined with the insight gained through various exercises conducted with the children of the crèche and more traditional research mechanisms, created a wall that spoke to issues of commodity (i.e. how the proposal spoke to the site, program and budget), firmness (i.e. how much deflection could be accommodated before the wall would crumble), and delight (i.e. how the unique deflection offered by this proposal animated the wall both immediately through the play of shadows and over time as the wall moved to accommodate different forces).
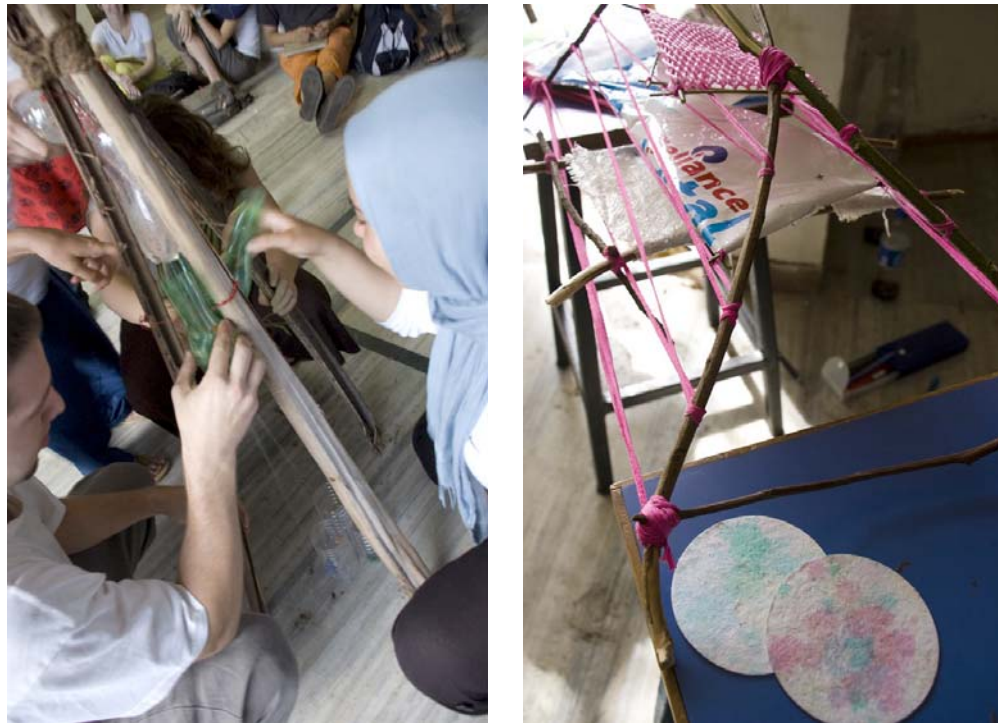
Figures 16+17. Some exercises relied heavily upon creating greater understanding through tools for the hand . In the exercise pictured above, team members were given 36 hours to create an educational toy about water from found objects. Figures 16 and 17 show, respectively, a game concerning the flow of water and an instrument for drawing with water.

3.1 SEQUENCE AND ITS USES

According to Bruner's theory, the tools described must remain an active participant in the learning process. Even in the first stage, which is often characterized by linear thought patterns and can contain acts such as memorization and recitation, the knowledge and talents gained by the student must be used as tools that may have certain leanings, but are certainly not fixed. In fact, according to Bruner, this is the essential characteristic of the tools cited: "What is most characteristic of any kind of tool using is not the tools themselves, but rather the program that guides their use. It is in this broader sense that tools take on their proper meaning as amplifiers of human capacities and implementers of human activity." (Bruner 1966, 81) Dewey asserts that "practical skill, modes of effective technique, can be intelligently, non-mechanically used, only when intelligence has played a part in their acquisition." (Dewey 1997, 52) In the minds of Dewey, Bruner and Schon, the acquisition of knowledge within an assumed framework, no matter how advanced the tool set, is inherently inert and reductive, whereas the acquisition of knowledge within a fluid and negotiable framework, no matter how simple the tool set, is inherently expansive. The former places the learner in a position of detached passivity; the latter stimulates self-consciousness and gives the learner a respect for their powers of thinking. The importance of this distinction is difficult to overstate. After all, to quote Bruner, "For if we do nothing else, we should somehow give to children a respect for their own powers of thinking, for their power to generate good questions, to come up with interesting informed

guesses. … [to help them become] more amenable to the use of mind in the large rather than mere memorization." (Bruner 1966, 95-6)

Bearing this in mind, instruction then becomes a matter of systematically leading the learner through a clearly articulated sequence of difficulties that gradually transform their predispositions and means into "tested powers." Properly directed, these powers can become an effective force for learning, enabling the student to use their store of tools to grasp, test, and evolve the content of their studies.[xiv] Bruner illustrates this methodology when describing his pedagogical approach to language development:

> "We hope to devise methods to help children discover some of the deeper features of grammar, better to grasp what language – for example, that one can start with relatively simple sentence frames, 'kernel sentences,' and transform them successively into negatives, queries, and passives, or any two or even three of these, and that more complex forms can be returned to simpler forms by applying the transformations in reverse." (Bruner 1966, 79)

The cycle created in this manner will energize the learning process, enabling the learner to activate their store of tools and increase their capacity for thought. As long as the learner remains willing to engage in this process, they will be able to use the momentum of previously acquired "tools" to mature their understanding and add to their growing arsenal.

Figures 18+19. As individuals developed their chosen pressure point for the project, we asked them to routinely bring their ideas back to the group through exercises such as the material study (Figure 18) and idea mapping (Figure 19) shown above.

This cycle of inquiry is far from a random process, involving a series of stages that gradually lead the learner into deeper engagement. Roughly following the evolution of tools described above, this cycle of inquiry begins with "…an appreciation of mathematical ideas through concrete constructions involving materials of various kinds." That is, through the creation of things, the student discovers the framework of their studies. This allows the student to use the most rudimentary skills, as offered by tools for the hand, to uncover deeper principals. The accessibility of this approach not only ensures that the students can play a vital role in the definition of their studies, but it guarantees that their existing set of tools play a critical role in this discovery. Acts of making and thinking are thus brought together into a symbiotic union, rescuing fundamental activities from their assumed impotence and starting a useful cycle of inquiry. From this base, the learner can then begin to represent and summarize these ideas using other methods. The once abstract idea, now crystallized through physical construction, becomes elastic, helping the learner to engage in other methods of representation. The tools for the distance receptors are thus brought to bear upon the initial address, forged through the hand, forging a relationship between new and acquired tools. This resulting representation structure effectively transcends the immediate image, forming a mediator between acts of making and thinking and rendering "a sequence of acts and images unitary and simultaneous."[xv] (Bruner

1966, 68) The created artifacts and the thoughts that describe them thus become "tools for reflection," though which the learner might consider propositions rather than objects. The learner can now use act upon this framework by constructing another embodiment of the idea using different materials, forms, and terminology. Most importantly, they can do so using any one or more of the aforementioned tools. Tools for the hand, distance receptors and reflection carry equal weight in the pursuit of knowledge; the learner can use even the most basic skills to promote advanced thinking and mastery. However, to be effective in this pursuit, the student must also be able to judge when their inquiry has produced a useful result. To quote Dewey: "The judgment when formed is a decision; it closes (or concludes) the question at issue." (Dewey 1997, 107) After all, it is possible to continue their inquiry indefinitely. To be useful, the learner must continually seek to understand the connection between their work and what has preceded it. In so doing, they complete Bruner's cycle of inquiry. (Bruner 1966, 65-8)

3.2 DESIGN PRACTICE AND SEQUENCE AND ITS USES
"The first wall that I had made with a waller ... my idea was that I work with him ... But he kept taking my stones off the wall. And he was right to do that. I have learned that you have to respect their work, their life...They bring their lives to it. They don't want me to touch the walls, playing at being a waller, just like I don't want them to play at being an artist ... Their dialogue with the stone is what makes the wall. The stones are laid on and on and on and the work makes itself to some extent. And it is that fluidity of working that gives the sculpture a sense of movement and energy."
> Andy Goldsworthy, from *Rivers and Tides.* (Goldsworthy and Riedelsheimer, 2001, Chapter 10)

As stated by Dewey, Bruner and Schon, to stimulate self-consciousness and give the learner a respect for their powers of thinking, language must be acquired within a fluid and negotiable framework. Given the long-term aspirations of our work and the complex and ever-shifting nature of its eventual home, our team realized that the value of such a framework is not only essential to their development, but the development of the project borne of their efforts. That is, the value of the products created through our work, in terms of our understanding, the physical proposal and the methodology that served to clarify both, lay not in their quality as isolated acts, but in their promise as progenitors of future evolution. Thus, the stuff we produced had to cultivate an evolving sensitivity to both immediate circumstance and long-term potential through an ongoing dialogue between acts of intellectual inquiry, physical construction and methodological understanding.[xvi] (Rowe 1984, 105)

Of course, our team could not hope to fully develop this dialogue during our five weeks abroad. Therefore, we focused our efforts upon creating several clear, concise and compelling acts of instigation that would prompt future evolution in a manner not dissimilar from the works of "radical reconstruction" proposed by author Lebbeus Woods. Prompted in large part by the observation that the homogenous vision offered by many works of architecture were too deterministic to function well with the densely-layered, urban construct, Woods believes that, "the complexities of buildings, streets, and cities, built up over time and across the span of innumerable lives, can never be replaced" and that any attempt to do so invariably props up " the interests of the decrepit hierarchies, struggling to legitimize themselves finally through sentimentality and nostalgia."[xvii] (Woods 1997, 15) Within such an environment, single-layered, cause-and-effect conceptions of process or place have limited viability, as do the self-assured, monumental architecture such conceptions generally provoke.[xviii] As an alternative, Woods proposes that the processes and products of the architect draw their "sinews from webbings of shifting forces, from patterns of unpredictable movement, from changes of mind, alterations of positions, spontaneous disintegrations and syntheses" to produce an "architecture resisting change, even as its flows from it, struggling to crystallize and be eternal even as it is broken and scattered – architecture seeking nobility of presence, yet possessed of the knowledge that only the incomplete can claim nobility in a world of the gratuitous, the packaged, the promoted and the already sold – architecture seeking nobility of persistence in a world of the eternally perishing, itself giving was to the necessity of its moment ... architecture drawn as though it were already built – architecture built as thought it had never been drawn." (Woods 1997, 17)

Wood's theories bore obvious relevance to our work in India. Not only did his theories respond very clearly to the ever-shifting collage offered by the informal communities that served as the site for our work, it also provided a fitting articulation of our work – one which would allow us to create specific proposals for our client without sacrificing the long-term potency of our work.[xix] Thus, we, like Woods, endeavored to create work that functioned as "visual evocations that however precise and detailed, are intended only as heuristic aids, guides that will stimulate transformations by others."[xx] (Woods 1997, 13)
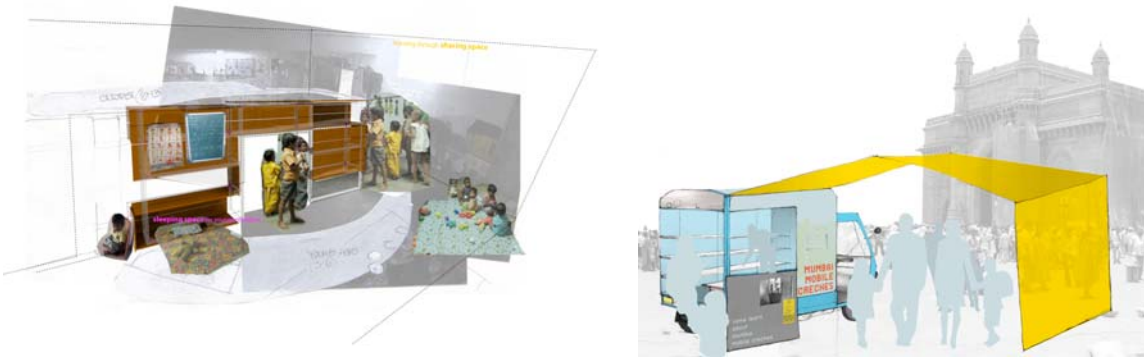
Figures 20+21. Instead of operating from the top down and attempting to immediately form a complete vision for the project, we asked each member of our team to find a point of great influence within the project and propose a single act of radical reconstruction at this moment. The resulting proposals varied widely, from small-scale furniture prototypes (such as the portable wall system constructed of standard shelving components already in use shown in Figure 20) or curricular strategies to large-scale urban interventions and autonomous mobile schools (Figure 21).

To accomplish this end, our team had to resist the urge to become fixated on immediate needs, no matter how pressing, and instead focus upon those conditions that would remain in place for long enough to stimulate evolution. Locating these moments within the project thus became the chief goal of the team. For example, during our first conversation with the director of Mumbai Mobile Crèches, our team learned that, in order to get permission to construct a crèche, our client had to first convince a developer to support the project through funding and land allocations. So that this arrangement might be as palatable as possible to the developer, our client generally limited their requests related to the built environment to the absolute minimum. Thus, our client had very little control over these variables – a situation that placed great importance upon any points that are either consistent between projects or have variation within the influence of our client. Correspondingly, these points of constancy or influence furnished the foundation for our work.[xxi] Every act undertaken, from the first acts of observation to the ongoing development of our proposals was designed specifically to help us understand the logic behind these moments. We, like artist Andy Goldsworthy, dedicated ourselves and our work to "understand that state and that energy" within the project and to touch "the heart of the place."[xxii] (Goldsworthy and Riedelsheimer, 2001, Chapter 3)

Figure 22. As members of a constantly-shifting community group, every house, every school, and every community the children called home would only exist for a few years before it was erased by the homes, schools and communities of others. In response, our team proposed several activities and curricular strategies intended to build identity and create physical reminders of the early life of these children. The project pictured above used various educational activities to translate water bottles into MEMORY CAPSULES.

In this way, our proposals became a coalescing activity capable of bringing together many systems and flows, creating knowledge and generating the "unpredictable regenerations" described by Woods. (Woods 1997, 14-6) Though this mindset is evident in all of the work produced, it is perhaps most eloquently demonstrated through the manner in which we organized our efforts to create an "ideal crèche" (the client's stated goal for the project). Instead of operating from the top down and attempting to immediately form a complete vision for the project, we asked each member of our team to find a point of great influence within the project and propose a single act of radical reconstruction at this moment. The resulting proposals varied widely, from small-scale furniture prototypes or curricular strategies to large-scale urban interventions and autonomous mobile schools. Yet, despite this diversity, there remained persistent gaps within our work; areas that one would think to be incredibly important to the idea of the ideal crèche, but somehow were missed. For example, out of over thirty proposals, only a handful addressed the project at the scale of building. The reason: this issue, although important, was not a key pressure point within the project. Mobile Crèches, due in large part to their historic lack of influence at the scale of building (and the fact that over 66% of their facilities were interior environments that temporarily occupied a small portion of the building under construction), had spent great energy developing a vision based upon matters of curriculum and the interior environment. The architecture, on the rare occasion it fell within their jurisdiction, correspondingly held negligible influence.

Yet, despite the fact that our work would inevitably have to address this scale within the few days remaining, we resisted the urge to address these gaps directly. Instead, we asked participants to test the assertions of their initial address and allow these moments of clarity to gradually expand. A Darwinian approach emerged: those ideas that were anchored upon core principles relative to long-term conditions (as offered by the ethos of the client, program, site, etc) naturally superseded those anchored upon short-term conditions (as offered by the specific needs of current sites or facilities). Those ideas anchored enough on key principles of the project received great attention, while those that needed additional tenacity sought out strategic unions through either a symbiotic merger or a complete consumption. Through this process, the team began to judge the value of their work not as a static product, but as an open, evolving movement. Gradually, our work coalesced around several key ideas, each of which occupied a key zone of the project. By the end of our time abroad, these points expanded, filling in many of the gaps within the work.

Figures 23, 24, + 25. To test whether it might be possible to create a PORTABLE EARTH WALL our team worked with local laborers, who would largely be responsible for building versions of this wall should it prove useful, to construct several versions of this wall.

4.1 FORM AND PACING OF REINFORCEMENT

The final principal of language development is based upon the idea that, in order for the cycle of inquiry described above to occur, the learner must first be taught to value of entertaining and suspending judgment. After all, according to Dewey, Bruner and Schon, the degree to which facts are held suspect will determine, to a large extent, the depth to which a system of thought is entertained. Knowledge that is fixed can only produce passive patterns of thought. The student may be able to recite the facts, but they will never be able to apply this knowledge to a problem that is not covered within their book. To quote Dewey, "If this meaning is at once accepted, there is no reflective thinking, no genuine judgment. Thought is cut short

uncritically, dogmatic belief, with all its attendant risks takes place." (Dewey 1997, 108) On the other hand, knowledge that is held in abeyance until its implications and voracity can be ascertained will become first active, then possessed, allowing the student to draw conclusions that would otherwise not have been possible.

This then brings us to the fourth feature within Bruner's theory of instruction: the form and pacing of reinforcement. If the instructor can get their students to accept the fallacy of the routine or the dogmatic as well as the innate value of alertness, flexibility and curiosity, then they might be able to get the students to "defer conclusion in order to in-fer more thoroughly."[xxiii] (Dewey 1997, 108) Instruction thus becomes a matter of redefining the goals of the student, of establishing a new hierarchy that stimulates the self-consciousness of the learner and helps them to master the "art of getting and using information." (Bruner 1966, 95) To perpetuate a cycle of inquiry, the instructor must define success as more than simply learning the next fact or gaining the next skill."[xxiv] (Bruner 1966, 27) Rather, they must demonstrate the value of arresting progress along a preconceived path. They must encourage their students to forgo climbing the first or most obvious riser and hold their knowledge in abeyance in the manner described by Dewey so that they might investigate alternative approaches.[xxv] Only then will students see that the true value of their previously acquired tools lies not in their ability to climb the next riser, but in their "generative value": the creation of new risers. Economy is trumped by effective power. After all, to once again reference Bruner:

> "To instruct someone in these disciplines is not a matter of getting him to commit results to mind. Rather, it is to teach him to participate in the process that makes possible the establishment of knowledge. We teach a subject not to produce little living libraries on that subject, but rather to get a student to think mathematically for himself, to consider matters as a historian does, to take part in knowledge-getting. knowing is a process, not a product." (Bruner 1966, 72)

Figures 26 + 27. Although the crèche successfully provides an oasis for the children at the scale of the school, they had limited ability to provide such a structure at a smaller scale. To address this, our team worked with local autorickshaw upholsterers to create a free-space at the scale of the child and allow the children of the crèche to create an oasis for imagination and learning at a more intimate scale.

Unfortunately, if left to the predilections established by previous educational experience, many students will unknowingly compromise this process. The reason for this is two-fold. First, the product-bias of previous instruction has created a strong paradigm of production and reward wherein the student produces work that is then judged by a governing authority. This paradigm of behavior and reward, can, at times, lead to a strong drive to earn the accolades of the instructor or simply 'get the A'. It is interesting to note that the focus of many design-build programs – a built work – provides a double-edged sword to this end. On one hand, the demands of the project do erode the authority of the faculty member and institution, somewhat compromising the draw of the instructor's praise or grade as a motivational end. On the other hand, the authority of the project can become an end in itself, feeding into the behavior-reward paradigm

and compelling the students judge their achievement by its anticipated conclusion. In this scenario, the need to 'get it built' replaces the need for an A. Either way, the product-bias behind the motivation naturally leads to linear thought patterns and an overarching anxiety when engaging less predetermined methods of learning. Any divergence from a preconceived path is viewed as a risk to achievement, at least as defined by the end of a grade or built work. This focus upon the end greatly limits the risks taken by the student in their study, leading to a functional fixedness wherein the given tools, be they for the hand or intellect, only have one use: hammer is only a hammer and not a plumb bob and a text is nothing but the answer key for an upcoming test. In this environment, the material presented is viewed as a given to be memorized and not a method of understanding that must be questioned and evolved. The students may climb the next step, but they will not create new risers.

4.2 DESIGN PRACTICE AND THE FORM AND PACING OF REINFORCEMENT

"My contact with the stone was still very, very strong. So I was with it down there. But I still couldn't see it ... I haven't simply made the piece to be destroyed by the sea. The work has been given to the sea as a gift and the sea has taken the work and made more of it than I could have ever hoped for. And I think that if I can see in that ways of understanding those things that happen to us in life, changes in life, that causes upheavals and shock ... can't explain that."

Andy Goldsworthy, from *Rivers and Tides*. (Goldsworthy and Riedelsheimer, 2001, Chapter 5)

This suspension of immediate gratification for long-term gain is profoundly evident within our work in India: as travelers, our team members could not define the value of their experience by the number of sites seen or activities completed; as students, they could not define the value of their studies by the grade achieved or the size of their contribution to the effort; as professionals, they could not define the value of their work by the size and beauty of a completed building. If they did so, they would have invariably begun to impose their will upon the program and our client, demanding to complete more glamorous work despite the fact that doing so would compromise long-term value of their efforts.

Figures 28+29. Each Crèche had one drain that served as both a restroom and an area for bathing infants and washing dishes. To help create a more hygienic situation without increasing the cost of the facility, our team used inexpensive wood strips and paint to build splatter mats: a modular walking surface that created a more hygienic walking surface and helped to discretely locate various hygienic activities.

Perhaps one of the most difficult moments to this end is related to the presumed end of all design-build experiences: the production of a final built work or complete drawing set. To succeed in India, every team member had to come to terms with the fact that their efforts would not yield a single work of architecture. To pretend otherwise would be a blatant oversimplification of the conditions posed by the project, a gross exaggeration of our role within this context and an affront to the methodology unearthed through our efforts. Such unfounded heroism would completely undermine the value of our work. Instead, they had to accept the fact that their job was not a complete project, but a complete vision through which many projects might be realized for years to come. To do this well, they had to produce work that existed in and through the gaps of the given project, functioning as self-contained acts of instigation that highlight, augment and, at times, exaggerate, these missed synapses within the work so as to provoke others to construct a more fitting response.[xxvi] Within this endeavor, the key to success is not only determining which gaps to occupy, but which gaps to highlight or leave provokingly open. For it is through this choice that our work becomes able to speak to varying levels of conviction within the project: key points can be matched with proposals

of equal conviction, while points of lesser importance are greeted with proposals that are less resolute. Issues pertaining to the longevity, constancy, mutability and conviction held by the various conditions of the project are thus given voice in the final proposal. It is hoped that in so doing, our work will effectively capitalize upon the naturally-occurring priorities of the project and allow these streams of influence to remain active and vital for years to come.

"As our technology grows more complex in both machinery and human organization, the role of the school becomes more central in the society, not simply as an agent of socialization, but as a transmitter of basic skills. To this we turn next as our final basis for redefining education – the changing society."

Jerome Bruner, Toward a Theory of Instruction (Bruner 1966, 31)

Figure 30. The final vision for the IDEAL CRECHE emerged as the team tested the value of each project relative to the existing flows of the project. A Darwinian approached emerged, one that would compel our team to judge the value of their work not as a static product, but as an open, evolving movement - a hybrid address of education that would allow our international partners to possess and evolve the proposed strategies in a meaningful way.

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ENDNOTES

[i] Suketu Mehta's *Maximum City* and Gregory David Roberts' *Shantaram* provide compelling accounts of this dynamic urban environment. Mehta, Suketa. 2004. *Maximum City*. New York: Vintage Books; Roberts, Gregory David. 2003. *Shantaram*. New York: St. Martin's Press.

[ii] Dewey, John. 1997. *How We Think*. Mineola, New York: Dover Publications, Inc. 29. Originally published under Dewey, John. 1910. *How We Think*. Boston, Massachusetts: D. C. Heath. Bruner reiterates this idea when he writes, "…since the merit of a structure depends upon its power for simplifying information, for generating new propositions, and for increasing the manipulability of a body of knowledge, structures must always be related to the status and gifts of the learner." Bruner, 41.

[iii] Or to quote Bruner, "… the tendency of the human being, in his learning of the environment, to go beyond immediate adaptive necessity toward innovation. Recent work on human development has underlined this drive for competence. It is present in human play, in the increased variability of human behavior when things get under control." Bruner, Jerome. 1966. *Toward a Theory of Instruction*. Boston, Massachusetts: The Belknap Press of Harvard University. 86.

[iv] "His [the instructor's] task is rather to keep alive the sacred spark of wonder and to fan the flame that already glows. His problem is to protect the spirit of inquiry, to keep it from becoming blasé from overexcitement, wooden from routine, fossilized through dogmatic instruction, or dissipated by random exercise upon trivial things." Dewey, John. 1997. *How We Think*. Mineola, New York: Dover Publications, Inc. 34.

[v] John Dewey notes this when he writes: "Taken merely as a doubt, an idea would paralyze inquiry. Taken merely as a certainty, it would arrest inquiry. Taken as a doubtful possibility, it affords a standpoint, a platform, a method of inquiry." Dewey, John. 1997. *How We Think*. Mineola, New York: Dover Publications, Inc. 108-9.

[vi] "I have to work with my bare hands 'cause my gloves stick and I don't have the sensitivity to do it with gloves. I always like to touch. You never shake someone's hand with a glove on." Goldsworthy, A. and T. Riedelsheimer. 2001, *Andy Goldsworthy's Rivers and Tides*. New York: New Video Group. Chapter 3.

[vii] Dewey notes that a "physiological uneasiness leads a child to be 'into everything.'" Dewey, John. 1997. *How We Think*. Mineola, New York: Dover Publications, Inc. 31-2.

[viii] This evolution is outlined in Bruner's work... At the conclusion of this description, Bruner notes, "…language serves the speaker outwardly, and then to consider which of these functions also serve internally to help us organize our thoughts about things." Bruner, Jerome. 1966. *Toward a Theory of Instruction*. Boston, Massachusetts: The Belknap Press of Harvard University. 106.

[ix] Tools for the hand are "relatively manipulative, marked by highly unstable and single-track attention. Knowing is principally knowing how to do, and there is minimal reflection." Bruner, Jerome. 1966. *Toward a Theory of Instruction*. Boston, Massachusetts: The Belknap Press of Harvard University. 27.

[x] Tools for the distance receptors involve "reflective functioning in which the young human being is capable of an internal representation, by representative images of greater chunks of the environment." Bruner, Jerome. 1966. *Toward a Theory of Instruction*. Boston, Massachusetts: The Belknap Press of Harvard University. 27.

[xi] Tools for reflection are "evidenced by an ability to consider propositions rather than objects; concepts become more exclusively hierarchical in structure; alternative possibilities can be handled in a combinatorial fashion." Bruner, Jerome. 1966. *Toward a Theory of Instruction*. Boston, Massachusetts: The Belknap Press of Harvard University. 28

[xii] "The principal deficits appear to be linguistic in the broadest sense – the lack of opportunity to share in dialogue, to have occasion for paraphrase, to internalize speech as a vehicle of thought …unless certain basic skills are mastered, later, more elaborated ones become increasingly out of reach." Bruner continues: "one teaches readiness or provides opportunities for its nurture, one does not simply wait for it. Readiness, in these terms, consists of mastery of those simpler skills that permit one to reach higher skills." Bruner, Jerome. 1966. *Toward a Theory of Instruction*. Boston, Massachusetts: The Belknap Press of Harvard University. 29.

[xiii] The only difference between the engineer and the bricoleur, according to Levis-Strauss, is the "inverse functions which they assign to events and structures as ends and means, the scientist creating events (changing the world) by means of structures and the 'bricoleur' creating structures by means of events." "Mythical thought, that 'bricoleur', builds up structures fitting together events, or rather the remains of events, while science, 'in operation' simply by virtue of coming into being, creates its means and results in

the form of events, thanks to the structures which it is constantly elaborating and which are its hypotheses and theories. But it is important not to make the mistake of thinking that these are two stages or phases in the evolution of knowledge. Both approaches are equally valid." Levi-Strauss, C. 1966. *The Savage Mind (La Pensee Sauvage)*. London: Weidenfeld and Nicolson. **13-14,** 22, also 1-33.

[xiv] To quote John Dewey, "the real problem of intellectual education is the transformation of natural powers into expert, tested powers: the transformation of more or less casual curiosity and sporadic suggestion into attitudes of alert, cautious and thorough inquiry."... taking "the learner through a sequence of statements and restatements of a problem or body of knowledge that increases the learner's ability to grasp, transform, and transfer what he is learning." 49 If this, as postulated by Dewey, Bruner and others, depends upon the predispositions of the learner, then to quote author John Dewey it "will depend upon a variety of factors, including past learning, stage of development, nature of the material, and individual differences." Dewey, John. 1997. *How We Think*. Mineola, New York: Dover Publications, Inc. 62.

[xv] Bruner, Jerome. 1966. *Toward a Theory of Instruction*. Boston, Massachusetts: The Belknap Press of Harvard University. 65. "…with the help of a symbolic notation that remains invariant across transformations in imagery, the learner comes to grasp the formal or abstract properties of the things he is dealing with…nonetheless continues to rely upon the stock of imagery he has built en route to abstract mastery." Bruner, Jerome. 1966. *Toward a Theory of Instruction*. Boston, Massachusetts: The Belknap Press of Harvard University. 68.

[xvi] Author Colin Rowe acknowledges the importance of this continued dialogue when he asserts that, through a relationship between the "civilized mind (with its presumptions of logical seriality) and the 'savage' mind (with its analogical leaps) ... it might even be possible to suppose that the way for a truly useful future dialectic could be prepared." Rowe, C. 1984. *Collage City*. Boston: MIT Press. 105.

[xvii] Woods wrote extensively about how to engage the unique opportunities offered by "the critical edge of urban life and culture." According to Woods great potential exists at this "critical edge of urban life and culture," where the dominant system is constantly confronted by the "refugees of the mind" (criminals, adventurers, opportunists, those who would inhabit an edge condition and .the guileless passivity that pervades the popular culture is confronted (and in some cases compromised) The unique opportunities offered by the edge condition (defined as those places within our social construct where the guise propagated by the dominant social power has weakened, thereby allowing the crisis that underlies the whole of existence to become exposed) is outlined by Woods, Lebbeus. 1997. *Radical Reconstruction*. New York: Princeton Architectural Press. 15, 11-17.

Also refer to author Michael Sorkin who writes, "Urban friction is the signal of a boundary and a symptomatic condition of urban social gradients. Such friction – by signaling difference – locates the internal edges of the city as well as potential sources of conflict." Sorkin, M. "Introduction." In *Giving Ground: The Politics of Propinquity*. 1999. ed. Joan Copjec and Michael Sorkin. New York: Verso. 7. Although the exact nature of the edge existent in our work is not the same as the dualities and edges described by Woods and Sorkin, the opportunities inherent within these points of friction are quite similar. More importantly, so is the methodology proposed.

[xviii] "... architecture must forsake the monumental, because there is no hierarchy to valorize anymore, no fixed authority or its body of knowledge external to human experience to codify." Woods, Lebbeus. 1997. *Radical Reconstruction*. New York: Princeton Architectural Press. 14.

[xix] Additional relevance was drawn from the fact that our work had to exist between two constructs: the shifting, informal settlements of the construction sites and the more rigidly defined work of the surrounding buildings. We quite literally occupied a gap between formal and informal, planned and improvisational, "architecture drawn as it already built" and "built as though it had never been drawn." Woods, Lebbeus. 1997. *Radical Reconstruction*. New York: Princeton Architectural Press.

[xx] "Accordingly, the architects of the spaces within walls do not make predictive designs. Rather, they produce visual evocations that, however precise and detailed, are intended only as heuristic aids, guides that will stimulate transformations by others." Woods, Lebbeus. 1997. *Radical Reconstruction*. New York: Princeton Architectural Press. 13.

[xxi] To once again quote Woods, "To inhabit the spaces of wall, edges, peripheries, border and the 'in-between' – the spaces of the extreme conditions brought about by radical transformations – is not a matter of creating entirely new knowledge, even less of discarding existing ideas or systems of knowing, but rather a matter of expanding them, precisely at their former, or present, limits." Woods, Lebbeus. 1997. *Radical Reconstruction*. New York: Princeton Architectural Press. 13.

[xxii] "Art for me is a form of nourishment... I want to understand that state and that energy that I have in me that I also feel in plants and in the land. The energy and life that is running through ... that is flowing through the landscape. It is that intangible thing that is here and then gone ... growth ... time ... change ... and the idea of flow in nature." 1 "You feel as if you have touched the heart of the place. That's a way of understanding ... seeing something that you have never saw before. It was always there but you were blind to it." Goldsworthy, A. and T. Riedelsheimer. 2001, *Andy Goldsworthy's Rivers and Tides.* New York: New Video Group. Chapter 3.

[xxiii] Dewey, John. 1997. *How We Think*. Mineola, New York: Dover Publications, Inc. 108. "... a constant tentative picking out of certain qualities to see what emphasis upon them would lead to; a willingness to hold the final selection in suspense; and to reject the factors entirely or relegate them to a different position in the evidential scheme if other features yield more solvent solutions." Alertness, flexibility, curiosity, are the essentials; dogmatism, rigidity, prejudice, caprice, arising from routine, passion and flippancy are fatal." Dewey, John. 1997. *How We Think*. Mineola, New York: Dover Publications, Inc. 105-6.

[xxiv]"…mental growth is not a gradual accretion …. It appears to be much more like a staircase with rather sharp risers, more a matter of spurts and rests. The spurts ahead in growth seem to be touched off when certain capacities begin to develop." Bruner, Jerome. 1966. *Toward a Theory of Instruction*. Boston, Massachusetts: The Belknap Press of Harvard University. 27.

[xxv] "Knowledge of results should come at that point in a problem-solving episode when the person is comparing the results of his try-out with some criterion of what he seeks to achieve." 51 … "Knowledge of results must, to be useful, provide information not only on whether or not one's particular act produced success but also on whether the act is in fact leading one through the hierarchy of goals one is seeking to achieve." Bruner, Jerome. 1966. *Toward a Theory of Instruction*. Boston, Massachusetts: The Belknap Press of Harvard University. 51

[xxvi] To quote author Lebbeus Woods "In the spaces voided by destruction, new structures can be injected. Complete in themselves, they do not fit exactly into the voids, but exist as spaces within spaces, making no attempt to reconcile the gaps between what is new and old, between two radically different systems of spatial order and of thought. These gaps can only be filled in time." Woods, Lebbeus. 1997. *Radical Reconstruction.* New York: Princeton Architectural Press.16 (emphasis mine).