Practicing Humility in Design Understanding Context and Community Engagement in International Projects

The intention of a development organization is, as the word 'development' implies, creation of positive change to environment. Historically however, development projects concerning the built environment dating to the late 19th century imperialists rampant construction of European style cities in foreign contexts to the mid-century use of Africa as a "laboratory and playground of modernist architects and town planners"[1] to today's countless failed and abandoned charitable projects, are often inefficient and detrimental to the cultural and ecological environment.

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Two of the seventeen recently released 2015 UN Sustainable Development Goals emphasize the need for building sustainable and inclusive infrastructure, cities, and communities. Goal 11.c tasks nations to, "support least developed countries including through financial and technical assistance, in building sustainable and resilient buildings utilizing local material."[2] While there is urgency to this call, leaders of design and construction need to exercise humility and reflection in how international design is approached to avoid further detrimental construction. Evaluating the sustainability and resiliency of a development project considers not only construction methods and materials employed, but also project's fundamental purpose, programmatic functions, and community ownership. A building is relevant—culturally, environmentally, and pragmatically- for only as long as it serves its intended function (or some meaningful extended purpose) rather than the degree to which the building imposes itself on the natural and cultural landscape. In a developing context, the actual implementation of a building (its design, construction, and use) can, become a tool for development.

This report summarized the findings of an academic research project which aimed to identify the indicators of success of primary schools in rural Uganda through the lens of community ownership, school design, and school functionality. The report also serves as a documentation of how the research was designed with intention taking into consideration the effects of conducting the research.

OVERVIEW

In 2013, our team of interdisciplinary and international collaborators began a study to determine how the intersection of community engagement, site-specific curriculum, and creative design could be employed in the development of a sustainable school master plan for rural communities in Uganda. The research team initiated and led by three students of the University of Notre Dame, also consisted of two advisory professors of the University of

RESEARCH DESIGN					FIELDWORK DESIGN			
	Concept or Mechanism	**Subdimension of the Concept**		**Operationalizations (measures/indicators)**	**Data Type**	**Where/How**	**When**	**Duration**
Outcome (DV)	Success/ Sustainability	A. Academic growth	1.	School completion exams % of repeaters	Exam results Teacher focus groups Community surveys Leader Surveys	BT site, BT office Archives to get school data Ethnographics and survey	During field stay	3 weeks
		B. Community ownership of school	1.	Grassroots generated academic programming and teacher training				
			2.	Grassroots generated additions to school				
			2.	Community satisfaction & connection				
Explanatory Factor #1 (IV)	Structures/ Facilities	A. Functionality B. Frequency of Use C. Building construction	1. 2.	Community satisfaction and survey responses	Community surveys	BT Site Ethnographics and survey	During field stay	3 weeks
			3.	BT Staff and Community satisfaction; Durability of structure				
Explanatory Factor #2 (IV)	In school Operations	A. Extracurricular Programs	1.	Number of programs created; demographic of students involved; parent, teacher and student satisfaction with quality of programs	Exam results Teacher evaluations Student and teacher surveys	BT Site survey Teacher interviews	During field stay	3 weeks
		B. Teacher Quality C. School Leadership	2.	Teacher evaluations; student feedback and educational progress results				
Explanatory Factor #3 (IV)	Community Ownership and Demographics	A. Demographics and diversity	1.	Number of religious, ethnic, etc. groups	Community demographic reports Surveys	BT Site survey interviews with local leaders	During field stay	3 weeks
		B. Community participation	2.	Degree and diversity of involvement in community groups and activities				
		C. Leadership	3.	Community views of leadership, political competition				

Table 1: The initial research framework set by the research team as developed under the direction of a political science professor. It lays out a framework for testing possible explanatory factors of success and sustainability. The framework changed while the research was being conducted, but it proved an effective organization tool for identifying possible indicator of success. This tool is an example of how working across disciplines expands understanding of the design context.

Note: The above framework was used as a working document/tool and is not to be considered a final research product.

Notre Dame and two students from Ugandan Martyrs University with funding and advisory support from the Notre Dame Initiative for Global Development. The team partnered with the Ugandan staff from Building Tomorrow, an international NGO focused building schools in rural Uganda. The team worked with Building Tomorrow to conduct impact evaluations in communities served by Building Tomorrow and in neighboring school through surveys, focus groups, and participant observation. The research was certified by the International Review Board (IRB).

The goal of the research was to identify indicators of success that would explain how and why certain schools in the Building Tomorrow program and surrounding area were performing better than others. This strategy of looking for "Bright Spots" is gaining traction in non-profit and for-profit organizations such as BRAC and the National League of Cities.[3] Often research projects expend extensive amounts of time and resources on discovering what is not working. In looking for bright spots, researchers instead focus energy on discovering small moments of success and then work in a series of feedback loops to replicate these methods on a larger scale. This research effort aims to develop a process to assess indicators of success to better identify why and where the organization is experiencing success and begin to suggest how it can be improved or replicated.

We hypothesized performance indicators within three key factors related to the implementation and ongoing success of a school: the product (school building), the consumer (students and teachers), and the infrastructure to support it (community ownership). The goal of the study was to identify bright spots relating to the three key factors that most clearly and efficiently contribute to the likelihood for success and long-term sustainability of a school, and how the factors relate to one another. The logic behind each factor is summarized in the following text and the resulting research design can be found above in Table 1.

Product: structure and facilities

The team assessed the key stakeholders' satisfaction with the school building and grounds facilities in terms of aesthetics and functionality. The organization has been incubating their design model and construction type with each new school they build. Over the years their building material, methods, and design program have changed in response to resources, location and skill level of staff and community workers.

In our evaluation, school facilities that could support everyday base functions for a school were considered successful. The team also documented when a school had extra facilities, such as teacher and/or student housing, a water collection system, washing facilities for girls, and garden plots, and how these facilities may support a more innovative learning environment for students and teachers. Looking for these "bright spots," the research team recorded construction methods, sustainability of construction, how the spaces were being used, and how well the spaces were performing to assess what additions or changes to the current design could translate to the greatest positive impact on the learning environment.

Consumer: in school operations

The quality of teachers and staff, the classroom experience, and extracurricular activities were analyzed for their impact on the students' and teachers' ability to learn and succeed in their roles. We considered the requirements for passing, teaching methods, extracurricular activities, class sizes, and teacher management by the headmaster. Because of the reality of scarcity of resources in terms of number of teacher, limited and inconsistent government funding, and sparse teaching materials, we aimed to understand what key interventions in curriculum made the most impact.

Supporting infrastructure: community ownership

The analysis of community ownership considered the potential positive or negative effect on the surrounding community as related to the presence of the primary school and especially in relation to the organization's model of community engagement. The logic for encouraging ownership is based in the idea that by utilizing and building upon strengths and assets of the community rather than simply filling needs, a development project can be inherently sustainable and acts as a catalyst for future development.

Building Tomorrow's implementation process requires community involvement in the design and construction. American donors contribute only in funding the schools, while the community at the site locations must meet and agree to a certain number of requirements for the school to be built. The community undergoes a rigorous pre assessment of need, must donate three acres of land, commits to providing 20,000 hours of labor to build the school, and coordinates the project management of labor (usually this is the job of a prominent woman leader). The schools are opened as government, public schools and the Ugandan Ministry of Education pays for teacher salaries and the operating costs. The school is turned over to the community after its opening and from there Building Tomorrow provides a smaller-scale supporting role. The sustainability and evolution of the design product and the school operations is dependent on a continued high level of ownership by student, teachers, and community members which is actually the primary focus of the development project.

1

RESEARCH DESIGN PRIORITIES

Partnership with non-profit

Our team chose to work with Building Tomorrow because of their past relationship with the University of Notre Dame through the funding of three schools and design of one school and because of their unique implementation model.

In 2011, Building Tomorrow made a commitment to construct sixty academies by 2016 to address the lack of education through a Commitment to Action as part of the Clinton Global Initiative.[4] At the time of the research project, Building Tomorrow has completed about twenty academies. At this point in Building Tomorrow's growth, strengthening monitoring and evaluation feedback loops would be beneficial if not essential to track their progress and ensure they are meeting their objectives. The organization's inherently interdisciplinary approach to design and construction, their past relationship with the University of Notre Dame, and their need for support in monitoring and evaluation rendered them the perfect partner organization to conduct a study of design through a variety of lens.

Inter-research team partnerships

Understanding the impact of the design and construction of the school environment by this organization benefited from the interdisciplinary lens. The team of researchers started with three students: (myself) an architecture student with a research background in development studies in East Africa, two political science students with research focuses in international development, a political science professor with a strong background in research methods, an architecture professor with a research focus in environmental design, and two Ugandan students with research backgrounds in business and community development.

The research partnership with Ugandan Martyrs University was a conscious effort to take the approach of reciprocal learning with local students. The research model paralleled the research of analyzing the success of an international NGO operating on a US—Ugandan partnership work model. Research teams parachuting into a community can cause the same detrimental effects of NGO's operating on an international model. As one participant of a previous research project commented, asking questions without giving back is like, "asking a child if they want a bowl of rice and then not giving the child anything."

Figure 1: Research team of three American and two Ugandan students testing iSurvey application survey method to interview a community member living nearby Building Tomorrow school. The questions presented to the interviewee related to community demographics, environment, personal interaction with local school, and personal level and importance of education.

BREAKING DOWN DESIGN THINKING

Inspiration: the problem or opportunity that motivates the search for solutions: There is a need for a school building in rural Ugandan communities that currently do not have adequate education facilities to serve the youth in the surrounding area. Most of these communities either conduct school in an informal setting currently (i.e. informal structure or outside) or students are required to walk long distances (sometimes 1 to 2 hours) to attend a different school. This problem can be identified and assessed in two ways:

- Conventional Research Methods: employ focus groups and surveys to understand baseline status
- Participatory Research Methods: gain trust in community observe actual experiences of school children, teachers, and parents

Ideation: the process of generating, developing, and testing ideas
This step of the design thinking is constantly revisited as the organization and the product evolves and grows. Each time a school is designed and built, the design is revised to become more efficient and effective. Building Tomorrow has informal feedback loops involving not only members of their organization but community members , therefore utilizing human capital. This process allows the organization to innovate and community members to participate beyond the initial construction. The survey developed in this research project aimed to assess the status of the organization's past efforts and distill what is learned to progress.

Implementation: the path that leads from the project stage into people's lives
Building Tomorrow operates efficiently by capitalizing on the needs, demographics, and strengths of the of the community. While the community members do not have money to build their own school, they are able to offer free labor, empty land, in depth knowledge of their community, and leadership. Through this participatory implementation process the community builds not only a school but a skilled labor force, leaders, trust, a greater understanding of the role of education, and ownership.

2

Figure 2: Human centered design thinking is used to process Building Tomorrow's method.

The two Ugandan Martyrs students provided invaluable perspective and background of their home country and in the creation of the survey, conducting interviews, analyzing data, and finally reflecting on the overall research process. Outside of the research, the partnership led to auxiliary success in building relationships between the two universities, networking between the NGO and the Ugandan students, and training for the Ugandan students in resume writing and iSurvey.

Integration of technology

Part of the research methodology involved employing surveys of key stakeholders—a common research methodology used in social science research programs. In order to employ this methodology, the team decided to integrate technology by using the program iSurvey. iSurvey can be used on any smart phone, tablet, or computer. It increases efficiency recording data on site, saving the data to an online database when connected to Wi-Fi, and providing basic analysis functions. The technology can also streamline and help codify the survey process as surveys can easily be administered or taken by anyone with basic knowledge of a smart device (see Figure 1).

Part of the research involved exploring the applicability of this technology not only in academic research but for an organization like Building Tomorrow to use for in-house monitoring and evaluation. Each member of the research team partnered with a member of the onsite Building Tomorrow staff to practice using the application in the field.

RESEARCH METHODOLOGY: LITERATURE REVIEW, PROCESS, AND DATA COLLECTION

Preliminary literature review

To create the research design, the team conducted a series of case studies of similar international design-build projects and found the most successful projects capitalized on the environmental and cultural assets. For example the Meti-Handmade school in Bangladesh utilized bamboo throughout their design because it was a readily available material. The architect used the bamboo for structure in an uncharacteristic two story building, thereby showing the structural capabilities that local people did not think was possible and creating much needed density in this rural village thereby making better use of land.[5] In the Mahiga Hope High School Rainwater Court in Kenya, the architect created an outdoor basketball court with a large roof over the top. The roof served not only as protection from the harsh sun, but as a rain collector. The space also became very effective with its beautiful light aluminum truss work and shading and is used for community assemblies in addition to a school gym.[6] From these examples we hypothesized that design can capitalize on contextual assets to address contextual challenges.

Another set of case studies focused on the process designing and implementing development projects. The idea of human centered design came to the forefront and has also recently become a buzzword in the field of design and design thinking.[9] Designers who practice this method prioritize not only the product but building deep empathy with the people who will experience or consume it and the infrastructure that supports it. Throughout all the phases of a design—the inspiration, ideation, and implementation—the consumer is at the center of the design solution. Figure 2 is an example of how design thinking can help analyze Building Tomorrow's process of implementation.

Surveys and focus groups with key stakeholders

The team conducted a series of surveys and focus groups using iSurvey and recording devices. Our data set included six primary schools in rural Uganda near the country's capital of Kampala. Two of the schools were typical government schools and four of the schools were

schools built by Building Tomorrow. At each school the team conducted a set of interviews:

- interview with the headmaster;
- group interview with teachers
- group interview with the PTA; and
- individual interviews with community members and parents

Considering school planners and designers are more apt to create a school structure and learning environment that promotes the goals of a community by understanding context the baseline survey aimed to understand needs, priorities, and strengths of the community members (see Table 2 for summary of results). The second half of the survey dealt with member's perceived status of the school, the effect of the current school and building process, and the perceived role a school can play in fostering the community's development.

Participant observation

The third research method used was participant observation. For a true participant observation the project would occur over a longer duration and with more direct contact in the communities where the research was being conducted to capture a more holistic picture than the snapshot view of interviews and surveys. Unfortunately the research project time was limited to two weeks because of budgetary and safety concerns. The site visits lasted a half day to conduct interviews, observe classrooms, walk through town, and photo document as a way to illustrate how students, teachers, and community members interacted with the space daily.

In most academic research projects such as this one, limited time and budget does not allow for observation participation, therefore compiling a research team with past local experience is essential. The partnership with the local students and Building Tomorrow staff was essential because of their local knowledge of the education system and study sites. My personal understanding included prior research over five months in three years of living and teaching in East Africa. Everyday interactions with the challenges and opportunities the built environment presented and becoming familiar with residents, gave way to informal conversations, along with candid interview responses.

RESEARCH FINDINGS

Our research findings related to the three key performance indicators described previously namely infrastructure, school operations, and community ownership. This section will elaborate on those findings related to infrastructure. A full report was prepared for Building Tomorrow to provide analysis of data and advice on how to prioritize potential improvements for their process.

School facilities

From our parent interviews we learned that 85 percent of parents believe effective and motivated teachers are the most important aspect to their child's education. In an environment where educational supplies are limited (i.e. computers, books, teaching materials), the teacher is the most important resource investment. When interviewing teachers we found the greatest limiting factor for them was motivation to teach at the rural schools because of the lack of electricity, basic resources, housing (and therefore the distance to travel to the site). Most teachers had not received pay in months, and therefore teacher absenteeism is always an issue. Teachers identified key motivators as personal garden plots, proper restrooms, teacher housing. As a designer, understanding teachers as a key component to rural schools, gives greater utility to the designer and, in turn, the consequent design.

OVERVIEW OF SCHOOLS						
	Building Tomorrow: Lutisi	**Control: Lutisi**	**Building Tomorrow: Sentigi**	**Building Tomorrow: Mpigi**	**Control: Mpigi**	**Building Tomorrow: Kyetabia**
Grades taught at school	PP-P7	PP-P5	PP-	PP-P4	PP-P7	PP-P4
Enrollment numbers	368	328	NA	NA	725	NA
Status (Government or private)	Government	Government	Private	Private	Government	Private
School Feeding*	Inclusive school feeding	School feeding	Inclusive school feeding	Inclusive school feeding	School feeding	School feeding
Pre primary program?	Yes	Yes	Yes	Yes	Yes	Yes
Teacher garden plots?	Yes	Yes	No	In progress	Yes	Yes
Automatic passing policy?	No	No	No	No	No	No
Teacher housing?	In progress	Inadequate	Insufficient	Insufficient	Insufficient	None
School board involvement?	With government (some parent interaction)	None	With parents, teachers, and headmaster	With parents, teachers, and headmaster	With government (no parent interaction)	NA
Garden plots for student funding/ school profit?	Yes	No	No	No	No	No
Satisfaction with quality of main structure?	Yes	No	Yes	Yes	Yes	Yes
Student motivators	Yes	No	Yes	Yes	Yes	Yes

Table 2: A summary of schools surveyed comparing the baseline indicators of each school.

*Inclusive school feeding means that every child received food at school even if their parents failed to make the payment to participate in the program, and these costs are absorbed by the school. School feeding means that these students who do not make the payment, do not receive food until the payment has made.

A majority of parents and teachers noted student absenteeism is a key factor which hinders success. Potential solutions include student housing in order that students, especially young girls could avoid walking long distances in the dark before or after school. A school garden could also enable a school feeding program motivating parents to send their children to school and allow students to study later into the afternoon. Sanitary restrooms can also increase attendance not only for the obvious health benefit, but also for young girls reaching the age of puberty who would otherwise stay at home once per month.

Other observations made about school design included the importance of noise as a factor in design. Classroom sizes can become very large because of limited number of teachers. Open trusses between classrooms transfer a great amount of noise. Corrugated metal roofs can also reflect sounds. What may seem like trivial aspects of design can affect whether a student is able to focus and understand a lesson.

School perception

We learned from our interviews with the local PTA, surrounding community members, and students that the community's perception of one's school can either severely hurt or help the school and commitment parents and students feel towards their education. Through the research we found a successfully sustainable building also takes into account the building's users and community's sense of ownership of the building. Building Tomorrow's unique model of relying on the community for the construction of the school gives the design a greater sense of agency. In the reverse also the building can promote another kind of sustainability in the community- the sustainability of development. The presence of a school means generations of students who do not have to learn their grammar and math lessons under

a tree. It is a sign of an established presence of education. Because the community built it themselves, it is also a symbol of the community's commitment continuing support education, hinting at a connection between the dignity of one's built environment and the sense of development people have of themselves and their community.

Context-specific challenges

By partnering with Building Tomorrow and visiting the sites rather than studying them from afar, the team experienced challenges can help understand the challenges for designers/engineers/construction in this environment. Language and cultural constraints were a given, but also very relevant in this environment because Uganda has a large variety of languages between regions. Key efforts by the organization to overcome this challenge include a simple design, creation illustrated instructions for construction, and reliance on a local project manager.

The scarcity of water is an obvious constraint but until one experiences the roads and distance from a water source that a designer will start to consider water as a main factor in the design. Designing a roof that easily collects water can translate to one less morning of water collection by students, facilitate a school lunch program by allowing for onsite farming and cooking, and provide basic sanitary water needs for students and teachers that stay on site.

Lack of electricity is another amenity dearth that affects the length of the school day due to daylight. Also simple uses of technology in the classroom were found to have exponential positive effects on learning. At one school, the teachers used a simple TV and video phone to film students speaking English playing back the recordings so students could hear themselves and suggest improvements. The students at this school had the highest level of English proficiency and pronunciation compared to the other schools in the study. Solar panels integrated into the design of other schools could bring the same capabilities.

From our long drives into the villages along treacherous roads, we learned quickly the additional challenges to remote rural schools. The level of outside communication from the government for evaluation and payment of teachers can be delayed. Resources for building materials, teaching materials, etc. can take weeks to reach. The remoteness can also be an asset. Communities are already heavily reliant on one another (we saw informal bartering systems, parents watching neighbor's children) and these relationships make community engagement easier when led by a local leader.

3

Figure 3: Seeing a school as an opportunity to construct more than a building is a reason Building Tomorrow continues to innovate on design. The top picture is from one of their first schools employing a typical brick constriction and covered in stucco. The middle picture is a government school of CMU construction. The bottom picture is of a later school constructed with Interlocking Compressed Earth bricks and a design by American architecture students. All three designs are functionally effective but the construction method, community participation process, and sustainability vary widely (ie. The middle is more labor and cost intensive by uses more sustainable and local materials). Understanding the needs of the community allows designers to prioritize while designing.

LESSON FOR FURTHER RESEARCH

Lessons on sustainability

The built environment has been one of the most constant elements throughout human history and across cultures. Although it is a sustained element, some buildings are more sustainable. In past research and often in the industry levels of sustainability between different building construction methods and materials analyzes material assembly's embodied energy, embodied water, lifetime, maintenance, and material density. The results of the research generated a refined definition of sustainability considering not only construction methods, but ownership, and functionality to understand what it means for a school as a building and as an educational institution to be inherently sustainable. Yet another level of sustainability comes from predicting and planning for future development of a buildings' functionality. Without foresight of development, possible challenges, and goals there is a great risk for stagnation, overburden, and ultimately deterioration of structures and trust between design- build organizations and communities.

Lessons on prioritization and design

Time spent on researching design in international has been seen as time better spent on more urgent needs such as health or safety. Approaching design with interdisciplinary collaboration accentuates the need for creative design thinking because we begin to see that design is not frivolous, but can actually provide solutions to more urgent needs. In converse, the challenges of working in a developing context (i.e. limited materials, lack of infrastructure) asks designers to create a design with agency.[8]

Building Tomorrow experienced a lesson in prioritization at one of the case study schools. The construction methods of the schools are evolving as Building Tomorrow continues to learn and tailor the design to the needs and requests of the community. A construction method proposed by the students of a donor university used interlocking compressed earth bricks. While this method was viewed as more sustainable and innovative building technique, in application it was costly in time and materials actual implementation. When faced with the question of choosing this building construction method or using the savings in funds to build teacher housing our research suggests the school should invest in teacher housing for the greatest agency of the built environment.

Lessons on international research and design

In conducting this research project, as in many academic project, the relevancy and intention of the research goals and design came into question, especially considering the amount of time and energy spent not only by the research team, but by the participants and Building Tomorrow staff. Academic research projects provide unique opportunity to test innovative ideas that may not be tested in practice; however, it is also easy to forget in the academic setting that good intentions do not equate to authority to conduct research. It can be easy to fall into the mistake of the mid century modernist architects who saw Africa as an interesting case study or as a 'laboratory' to test new design theories. International research in an academic setting is however also an unique opportunity to tap into knowledge through university partnerships with local students and professors. In the setting of East Africa, one of the most rapidly urbanizing areas in the world, understanding the evolution and success of the built environment is most comprehensively perceived by the person interacting with the environment directly.

From the study it became clear the organization can continue to refine their design process by implementing a more robust post-construction survey process. Documenting how the school infrastructure is being used successfully by students, teachers, and community the organization focus on replicating and scaling these bright spots thus producing a more sustainable, appropriate, and dignified design with each feedback loop. The organization can use knowledge in conjunction their knowledge of the specific community's needs and assets to design a school of relevant character and function to each specific community.

ENDNOTES

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