ARCH 384: Essay Component, Bamboo Living Int'l Design Competition
Author: Sarah Khalid
Due: January 22, 2007

The Kāi Huār Primary School is located in the hot/humid climate of southern China, an underdeveloped, rural area where many lack the essentials for well-being and everyday life. The typology of a school is intended to provide children with a means for at least one of these essentials – education. The Kāi Huār Primary School performs this function while also reflecting its context. The building consists of vernacular bamboo building techniques while its form pays tribute to traditional Chinese architecture. Its name, *Kāi Huār*, means 'to blossom', for it is where young minds can learn and grow towards a brighter future.

Throughout history, humankind has been driven by a quest for knowledge and a love for learning. It is only natural then that the idea of a physical school dates back to ancient times, and appears in many forms, for a school is the physical structure that fosters this learning. Many large educational institutions appeared with strong religious backbones. Such examples are monasteries in the Christian world, of which St. Antony's Monastery in Egypt, founded in 356 A.D. (Figure 1a) is said to be the oldest.[1] In the Islamic world, *madrassas* (Figure 1b) appeared as the institutions where spiritual and scientific knowledge was intensely pursued. The first of these is said to have been established in 1005 AD in Egypt.[2] Monasteries, *madrassas*, and their even older precursor – the schools and Academies of Ancient Greece such as Pythagorus' School in 318 BCE (Figure 1c) – are examples of large institutional structures that served a purpose towards higher learning. Today's university and colleges are derived from these. As for schools for children, some typological examples include traveling to a 'master's' house for tutoring, one-room school houses, boarding

Figure 1: left to right: St. Antony's Monastery, Madrassa Barkouk, Pythagorus' school (ruins)

[1] Dunn, Jimmy, "The Christian Monasteries of Egypt," 12 November 2006, InnerCity Oz, Inc., 20 January 2007 <http://www.touregypt.net/featurestories/monasteries.htm>.
[2] Anzar, Uzma. "Islamic Education: A Brief History of Madrassas with Comments on Curricula and Current Pedagogical Practices, " March 2003, University of Vermont, 20 January 2007 <http://www.uvm.edu/~envprog/madrassah/madrassah-history.pdf>.

schools, and what can be seen in the modern North American hierarchy of pre-school, primary school, middle school and high-school (public and private) (Figure 2).

.

Figure 2: left to right: North American preschool, primary school, middle school, highschool

The trend of formally educating females in institutions is a relatively new concept in human history. Where institutionalized education was once reserved for the elite and wealthy males, it has moved towards becoming more available to the poor, and becoming less gender exclusive. While multiple forms, candidates and price tags for schools exist, they generally share the same creed; this one, for example, being taken from the University of Waterloo: The University provides the assets for students to "graduate with the knowledge, skills, and practical experience required to solve today's complex and pressing problems and to embrace future challenges."[3] The role of the school is essentially to benefit the community.

The Kāi Huār Primary School is not alone in its designation as a primary school in an underdeveloped region. Many such schools exist, as there has been recognition and push for alternatives to distant, expensive and overcrowded public schools in the cities of the developing world.[4] An example includes the Tagwa Centre in Sudan. It is a simple, single-storey building with five classrooms, made out of mud-brick construction (Figure 3). The construction of its new walls, windows, doors and roof have largely been community efforts. The Near East Foundation describes it, "In

Figure 3: Tagwa Centre

[3] "About UW," 22 December 2006, University of Waterloo, 19 January 2007 <http://www.uwaterloo.ca>.
[4] "Sudan Community School Reconstructed and Upgraded," Reports from the Field 9 February 2006, New East Foundation, 19 January 2007 <http://www.neareast.org/main/news/article.aspx?id=501>.

short, the community continues its involvement in their school, a very meaningful activity for them, providing a sense of ownership, dignity, and pride in what they have achieved so far."[5]

Another example is the Gando Primary School in Africa. "[The people] used their bare hands to dig out and sieve the clay, which was transported in donkey carts to the building site… [children] were at the school carrying stones to the construction site… and the women of the village would bring water needed for construction…"[6] The school is a simple, single-story structure consisting of traditional mud-brick construction (Figure 4).

Figure 4: Gando PrimarySchool

The idea of having the community heavily involved in the construction of the school is echoed with the Bamboo Primary School in Vietnam. It consists of four classrooms, a teacher's room, library and washrooms, each separated by open gardens (Figure 5). By using bamboo, "We wanted to show that we can make beautiful architecture with a simple material," explains architect Nguyen Chi Tam.[7] "With the local architect," he further explains, "we had to draw details so that they could be built by the local workers."[8] Aside from the community integration aspect, these schools "are driven by the principle that young children should learn as close to home as possible. The result is an educational environment that is small, local, personal, and

Figure 5: Bamboo Primary School

[5] "Sudan Community School Reconstructed and Upgraded," Reports from the Field 9 February 2006, New East Foundation, 19 January 2007 <http://www.neareast.org/main/news/article.aspx?id=501>.
[6] Architecture for Humanity, editors. Design Like You Give a Damn: Architectural Reponses to Humanitarian Crises. (New York: Metropolis Books, 2006) 254.
[7] Architecture for Humanity, 256.
[8] Architecture for Humanity, 259.

age-integrated and that potentially provides a much richer learning experience than large schools in urban environments."[9]

Like the aforementioned projects, the Kāi Huār Primary School is designed to allow for the community to be heavily involved in its construction. The primary material, bamboo, is not only a natural and sustainable resource, but species such as *bambusa stenostachya* are abundant in the area and are ideal for building.[10] In fact, bamboo has been used in Chinese buildings for centuries, and has great cultural foundation in Chinese history. "Bamboo was a structural element in the earliest shelters of Asia not only because of its abundance, but also because crude tools could work it easily."[11] It is a resource that fits the hand + land = house equation.[12] Working hands are able to construct the school through the simplicity of the construction details (Figure 6) inspired by "Building with Bamboo," a handbook compiled by Jules Janssen. It offers construction methods that are tried-and-true, practical and traditional, and have a high chance of already residing in the skill set of local villagers. These characteristics of the details allow the villagers to build, construct and expand the school with ease.

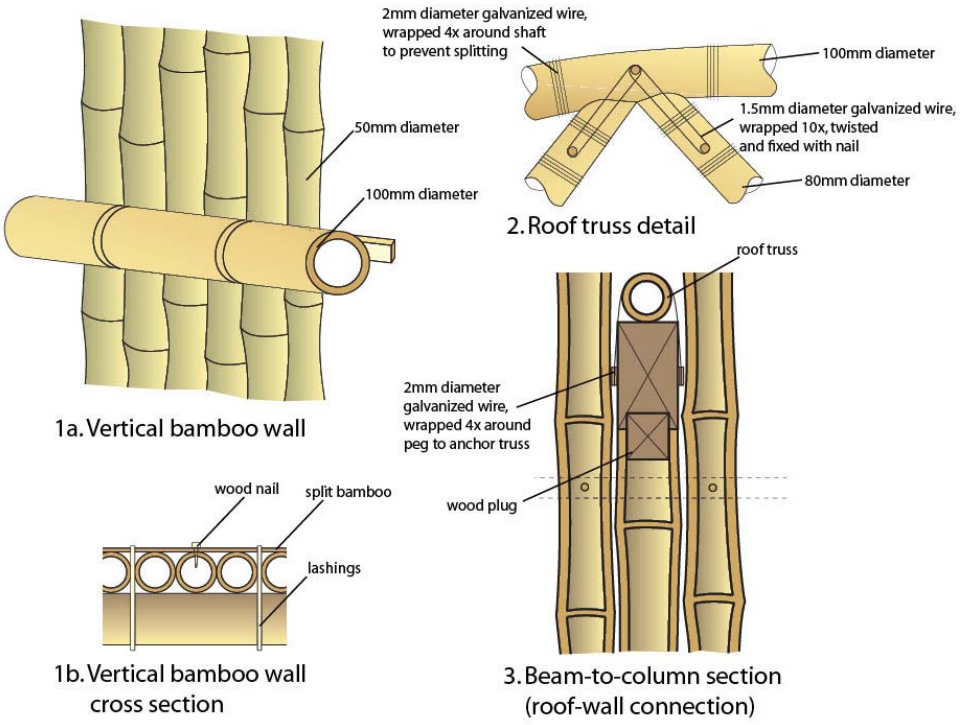

Figure 6: Connection details

[9] Negroponte, Nicholas. "One-Room Rural Schools," WIRED September 1998, Wired Ventures Ltd., 20 January 2007 <http://web.media.mit.edu/~nicholas/Wired/WIRED6-09.html>.
[10] Farrelly, David. The Book of Bamboo. (San Francisco: Sierra Club Books, 1984) 183.
[11] Farrelly, 101.
[12] Farrelly, 117.

Aside from shelter, bamboo has been put to a variety of uses in making bridges, brushes, furniture of all types, decorative items, carts, toys, farm equipment, boats, fabric, paper and instruments. The School employs bamboo in various forms: entire shafts for walls; thatch on the roof; reinforcing in the floor; for school commodities such as furniture, pencils and paper; and as handcrafted woven mats for eastern and western shading.

Providing east and west shading on the porches helps cool the building and creates a comfortable, usable zone. Another site-responsive technique is the large roof overhang which shades the north and south. Flexible solar panels are placed on the roof to help harness the sun's energy. Greywater is also managed on-site through a natural system (Figure 7a). Natural ventilation is encouraged through louvered panels and openings on opposite sides of the buildings, and a floating roof structure which allows rising hot air to be expelled (Figure 7b).

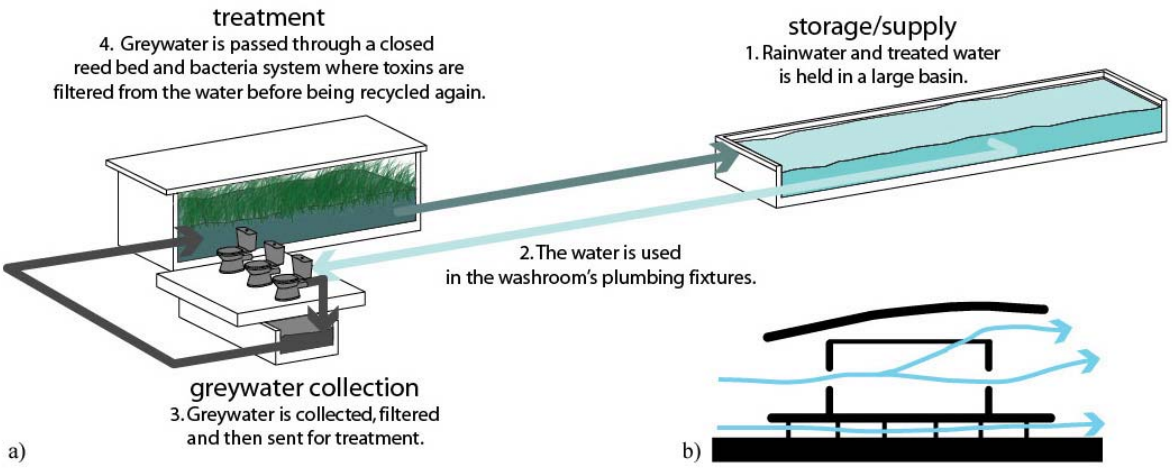

Figure 7: a) Greywater treatment system b) Natural ventilation

The roof is not only an ideological reflection of a 'soaring minds' and 'the sky is the limit' attitude; it also pays tribute to the large, iconic sweeping roofs of traditional Chinese architecture. Other elements in Chinese architecture reflected in the School are its emphasis on horizontals, its elevated height on a platform, and its use of bright colours[13] (Figure 8).

[13] "The Art of Chinese Architecture," 2005, ChinatownConnection.com, 20 January 2007 <http://www.chinatownconnection.com/chinese_architecture.htm>.

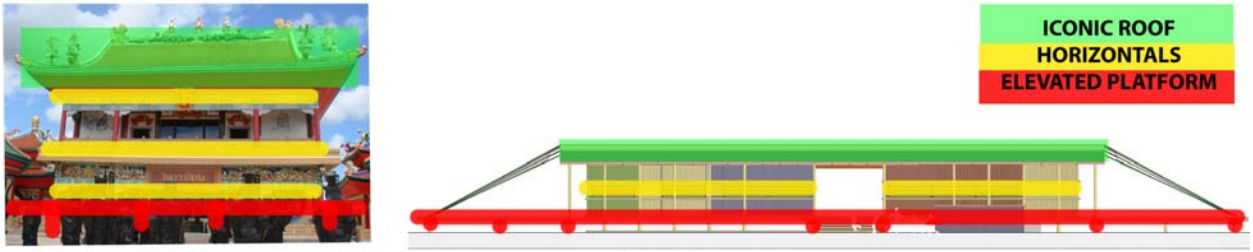

Figure 8: Traditional architectural elements highlighted on a tradtional Chinese temple (left), and on the School (right)

Traditional Chinese buildings make use of modulated rectangles; rooms are sized and divided into parts based on their importance. This idea is also communicated in the plan of the School (Figure 9). Balance or symmetry are other key concepts, carried through by the 2 metre grid the School is designed on. Furthermore, Chinese pavilions also tend to have a water element, which can be seen in the rainwater collection basin/reflecting pool near the School.

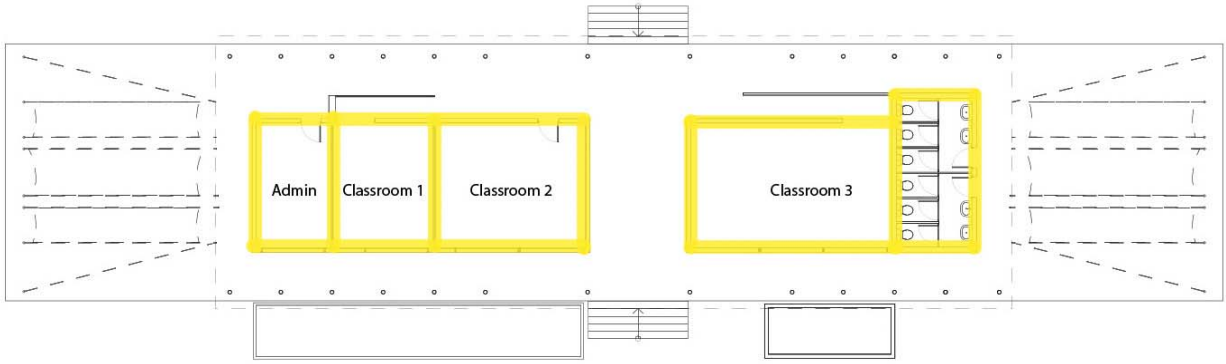

Figure 9: Dominant rectangular forms in plan

The School's materiality is not only significant from a sustainable standpoint, but a cultural one as well. In China, bamboo is known as the "the friend of the people"[14]; the "mother culm" is a symbol of altruism in Chinese folklore and an empty culm is seen as the womb of the race, the spiritual parent or "godfather."[15] In fact:

> If parents are too poor to bring up their children… the child may be commended to the care of a tree…. Because it is regarded as a prince among trees, the bamboo is preferred before all others for this kind of adoption. On this account the child, because he has become the ward of such an influential spirit, may have a better chance in life.[16]

[14] Farrelly, 3.
[15] Farrelly, 74.
[16] Farrelly, 74.

Hence, the idea of using bamboo to construct the school is not only fitting because of its abundance and familiarity with locals, but also due to its cultural significance as being friend and parent to the people.

Building with bamboo is a sustainable, low-budget alternative to the concrete and glass structures sweeping across China. While most believe that it is commonly used in China today, use has actually declined.[17] Architecture offices such as Atelier FCJZ are focused on reintroducing it. When speaking of a modern bamboo gallery, architect Hui Wang notes that, "The whole structure is elegant because of its material simplicity and the humanity of its craftsmanship."[18] Although the concept of building with bamboo has been around for centuries, it is not as apparent today.

Similarly, the prestige of an education has been noted throughout history, yet, 275 000 children never attend or complete primary school education, and 870 000 000 of the world's adults are illiterate.[19] Many initiatives are underway to change this, such as the One Laptop Per Child Program and the idea of 'LEOpolitical learning', where Low Earth Orbit satellites will allow telecommunications in even the most remote parts of the globe, for significantly lower costs.[20] Together, with updated and low-cost technologies, and employing the skill of community members through the use of vernacular techniques and indigenous materials, access to education can surely blossom.

---

[17] Elsea, Daniel. "Chinese Architects Look to the Future while Connecting with the Past," Architectural Record 2006 The McGraw-Hill Companies, Inc., 20 January 2007 <http://archrecord.construction.com/ar_china/featureZhuChang-2.asp>.
[18] Elsea, 2006.
[19] Architecture for Humanity, 248.
[20] Negroponte, 1998.

Bibliography

"About UW," 22 December 2006, University of Waterloo, 19 January 2007 <http://www.uwaterloo.ca>.

Anzar, Uzma. "Islamic Education: A Brief History of Madrassas with Comments on Curricula and Current Pedagogical Practices, " March 2003, University of Vermont, 20 January 2007 <http://www.uvm.edu/~envprog/madrassah/madrassah-history.pdf>.

Architecture for Humanity, editors. Design Like You Give a Damn: Architectural Reponses to Humanitarian Crises. New York: Metropolis Books, 2006.

Dunn, Jimmy, "The Christian Monasteries of Egypt," 12 November 2006, InnerCity Oz, Inc., 20 January 2007 <http://www.touregypt.net/featurestories/monasteries.htm>.

Elsea, Daniel. "Chinese Architects Look to the Future while Connecting with the Past," Architectural Record 2006 The McGraw-Hill Companies, Inc., 20 January 2007 <http://archrecord.construction.com/ar_china/featureZhuChang-2.asp>.

Farrelly, David. The Book of Bamboo. San Francisco: Sierra Club Books, 1984.

Janssen, Jules J.A. Building with Bamboo: A handbook. London: I.T. Publications, 1988.

Negroponte, Nicholas. "One-Room Rural Schools," WIRED September 1998, Wired Ventures Ltd., 20 January 2007 <http://web.media.mit.edu/~nicholas/Wired/WIRED6-09.html>.

"Sudan Community School Reconstructed and Upgraded," Reports from the Field 9 February 2006, New East Foundation, 19 January 2007 <http://www.neareast.org/main/news/article.aspx?id=501>.

"The Art of Chinese Architecture," 2005, ChinatownConnection.com, 20 January 2007 <http://www.chinatownconnection.com/chinese_architecture.htm>.

Image Credits

Figure 1a: http://www.touregypt.net/featurestories/antony.htm
Figure 1b: http://library.thinkquest.org/C0110188/Gegypt.htm
Figure 1c: http://www.montereybay.noaa.gov/new/news/italia/rizzuto.html

Figure 2a: http://www.alphabet-preschool.com/
Figure 2b: http://schools.olathe.k12.ks.us/briarwood/
Figure 2c: http://www.pembinatrails.ca/henrygizatt/home.html
Figure 2d: http://johnfraserss.peelschools.org/

Figure 3: http://www.neareast.org/main/news/article.aspx?id=501
Figure 4: http://www.akdn.org/agency/akaa/ninthcycle/page_04txt.htm
Figure 5: http://tsib.free.fr/
Figure 6: Sarah Khalid
Figure 7: Sarah Khalid
Figure 8: Temple picture on left: http://www.flickr.com/photos/laurelgrey/
right: Sarah Khalid
Figure 9: Sarah Khalid