Skills Center Nairobi

Nairobi, Kenya

design build studio	Departement of Timber Construction, Prof. Hermann Kaufmann, Faculty of Architectur TUM
project managers	Susanne Gampfer, Stefan Krötsch
assistents	Matthias Kestel, Christoph Perl
design group	Tom Horejschi, Felix Haberstumpf, Serafina Eipert, Max Langwieder, Ulrike Kiesel, Valentin Popp, Hannes Hofmann
construction group	22 students of architecture TUM
1st phase	20 students of onstrucion management JKUAT 20 lokal workers
2nd phase	16 students of architecture TUM 3 students of architecture Augsburg 6 students of structural engeneering Augsburg 12 lokal workers (list of participants see at the end of report)
design phase	10/2010 - 07/2011
construction phase 1	08/2011 - 09/2011 (7 weeks)
construction phase 2	02/2012 - 03/2012 (5 weeks)
data	overall floor area 458 m²
	indoor area 285 m²
	roofed outdoor area 83 m²
photographer	Matthias Kestel

After secondary school, most juveniles from Mathare Valley, the second largest slum of Nairobi, hardly have the opportunity of a professional training or further education and face unemployment on the long term.
Therefore the German NGO „Promoting Africa“ in co-operation with the Kenyan NGO „Youth Support Kenya“ initiated the project of the Skills Centre Nairobi to teach simple craftsmen skills necessary for a self-employed base of living.

Design and Build

From October 2010 to February 2011 a group of 18 students of architecture at the Departement of Timber Construction (Prof. Hermann Kaufmann) of the Technische Universität München (TUM) developed designs for the building complex. Seven students carried on working on the construction planning from April to July 2011 under the supervision of two tutors. At the same time construction was prepared by collaborating Kenyan students at the Departement of Construction Management (Prof. Danial Saiva) of the Jomo Kenyatta University of Agriculture and Technology (JKUAT).
Under guidance of Susanne Gampfer and Stefan Krötsch the Skills Centre was built by the students from Germany and Kenya in collaboration with local workers in August and September 2011 and in March 2012.
The school started training programs for tailoring, carpenty and electrical installation after the opening in November 2012.

Inner yard looking towards dormitories and teachers house

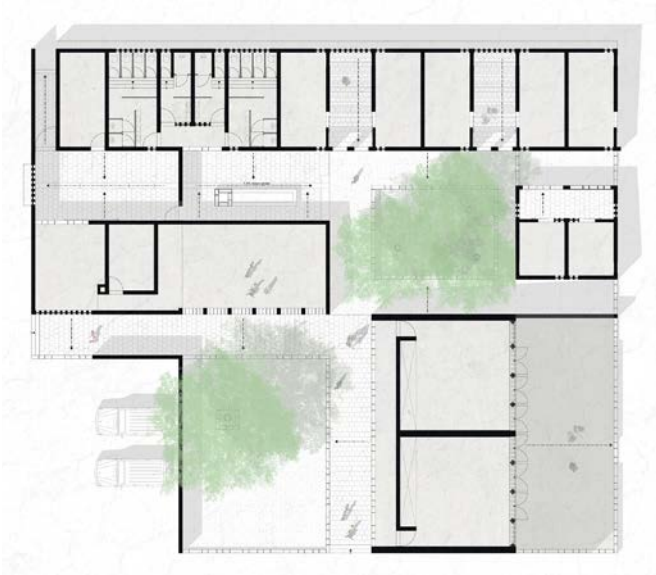
Since the request is very large, the Skills Centre will be extended in summer of 2014. The future extension was already part of the initial design, but is adjusted to the specific current demands and executed by a group of architectural students from the University of applied Sciences Augsburg.

Architectural design

The layout of the school is a composition of four buildings froming open spaces of diffenrent qualities and utilizations. Size, enclosure and connection to interior spaces define outdoor spaces of graded intimacy.
The entrance yard welcomes with its open sape only defined by buildings - dining hall and workshop - on two sides. Entering the inner courtyard one finds a green area and an eclosed space between all four buildings providing a quiet atmosphere. In front of the girls- and boys-dormitories there are little yards for even more private outdoor utilization. Also kitchen and lavatories are extended into enclosed exterior working spaces, while the partly roofed terrace in front of the class rooms enlarges the workshop area.

Materialization

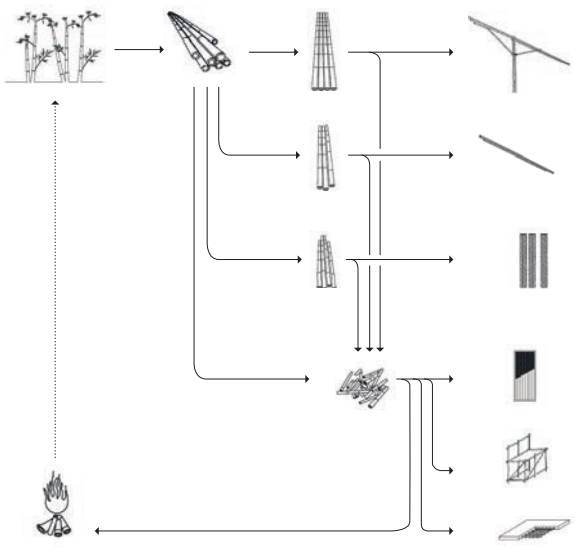
All walls are made from the local, hand-dressed natural stone in the local walling method. The roofs are covered with iron sheets. The roof structure is a prefabricated bamboo construction. During design phase the developement of a suitable construction made of the indigenious Kenyan bamboo *Yushania Alpina* occupied a lot of efford. Even though materials tests led to reliable calculation values for the widely unknown kind of bamboo, it was not possible to define a reliable base for computation of the load-bearing joints.



Workshop building with roofed terrace

Bamboo door and column, wall made of local, natural stone

Workshop



Cascade sorting system:
Wholesale material use by sorting the bamboo by quality and length for diffenet use and various devices.

Kitchen

Kitchen, extending into backyard

Therefore, samples of the basic parts of the bamboo construction were manufactured and tested for their structural performance by the students in Munich. In this way, it was not only possible to gain knowledge about the structural design but also about possibilities and challenges of the manufacturing process.
As a side effect, the workshop prepared students for construction site and made them familiar with materials and tools. The final structure and details of the roof construction were developed in continuous, circular process of planning and manufacturing samples. Finally, the structure was optimised to the specific demands of broad prefabrication and safe assembling of building elements.
In building prototypes, attention was drawn to the topic of wholesale material use. Sorting out poles suitable for the wide span truss in the workshop building out of a bunch of harvested bamboo poles leaves 70% to 90% reject.
In order to be resource efficient, the concept of the skills centre was to use a cascade sorting system into types of

dining hall looking into entrance yard

dining hall looking towards the kitchen

declining quality of bamboo poles for different applications. The straightest and longest poles were used for the structure of workshop building with a span of 6,50 meters and cantilevers of 3,50 and 1,80 meters. A second quality level was used for the structure of kitchen building with a span of six meters, while the remaining material could still be used for dormitory ceilings. Leftovers of the manufacturing process were recycled for auxiliary constructions like scaffoldings, or used as concrete reinforcement and for fillings of door and window shutters.

Indoor climate

Kitchen, dining hall and workshop building are - accoring to their use - well ventilated, roofed spaces, but not concluded to exterior climate. To avoid heat radiation from the iron sheet roofing on sunny days, ceilings are back-ventilated and covered with insulating layer of papyrus mattings. The roof structure of the dormitories contains a 7 cm layer of clay and proviedes - in combination with glazed windows and closable ventilation openings - a balanced room temperature making use of thermal masses and night cooling. This way comforable indoor temperatures are made possible without airconditioning or heating.

Energy and wast water treatment

Since the Skills Centre has no access to public infrastructure, a self sufficient supply from renewable sources in terms of a photovoltaik power plant, a dry toilet system, constructed wetlands and the collection of rain water is of mayor importance and may serve as a blueprint for the ongoing developement of the surrounding.
Thru the cooperation with JKUAT the knowledge gained from the project can be comunicated to a wider public.

entrance to dormitories

dormitories with bamboo ceilings

Loggia of teachers house

Layer of clay on bamboo ceiling in the dormitories

design group
wintersemster
2010 / 11

Serafina Eipert, Viktoria Geywitz, Yang Feng, Felix Haberstumpf, Hannes Hofmann, Tom Horejschi, Ulrike Kiesel, Max Langwieder, Nikolina Lutz, Dominik Oberprieler, Valentin Popp, Sascha Posanski, Irina Rubinstein, Viola Scheumann, Cornelia Schweiss, Wolfgang Stache, Michael Streidl, Huang Yongqiu

design group
sommersemster 2011

Tom Horejschi, Felix Haberstumpf, Serafina Eipert, Max Langwieder, Ulrike Kiesel, Valentin Popp, Hannes Hofmann

Students on site
construction phase 1

Students TUM:
Linus Dreier, Matthias Eckert, Serafina Eipert, Viktoria Geywitz, Felix Haberstumpf, Hannes Hofmann, Tom Horejschi, Ulrike Kiesel, Theresa Ludwig, Dominik Oberprieler, Valentin Popp, Irina Rubinstein, Cornelia Schweiss, Wolfgang Stache, Michael Streidl,Theresia Brandl, Florian Kubarsik, Markus Kaularz, Karin Rauch, Melchior, Anna, Anjesa

construction phase 2

Students TUM:
Leonhard Strübin, Veronika Karl, Sarah Kulmann, Marlene Witry, Magdalena Vondung, Laura Strähle, Katarina Humpel, Babara Trojer, Maximilian Peter, Moritz Rieke, Max Hahner, Maximiliane Wölfl, Hannah Knoop, Cornelia Schweiss, Dominik Oberprieler, Karin Rauch

Students Augsburg:
Anna Pechtl, Carina Michler, Michael Mair, Benjamin Bauer, Christoph Janitzky, Florian Möckel, Franz Zech, Robert Lang, Jörg Krottenmüller