

JENGA – Joint Development of Courses for Energy-efficient and Sustainable Housing in Africa



Students and staff experienced hands-on activities in class.

PROJECT IMPLEMENTATION PERIOD

October 2013 – April 2017

CONSORTIUM

- University of Applied Sciences Augsburg, Germany
- Jomo Kenyatta University of Agriculture and Technology (JKUAT), Kenya
- Uganda Martyrs University (UMU) - Faculty of the Built Environment, Uganda
- University of Rwanda - College of Science and Technology (UR-CST), Rwanda
- Stellenbosch University (SU), South Africa

Associated partners:

- UN Habitat, Kenya
- American University Cairo (AUC), Egypt

PROJECT CONTACT

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PROJECT WEBSITE

<http://www.jenga-network.org>
<https://www.facebook.com/people/Jenga-EU/>

SUMMARY OF RESULTS

Flexible and experimental teaching methods were introduced, aimed at academic capacity building for energy efficiency and low-carbon technologies in construction. Existing curricula for architecture education were enhanced by introducing design-build projects, a special type of problem-based learning. Through joint studio teaching, staff members were exposed to international developments and for the first time students experienced hands-on activities embedded in their academic training.

BACKGROUND

JENGA aimed at academic capacity building and knowledge transfer in the field of sustainable housing, addressing the fact that the building sector accounts for 40% of global energy consumption and 30% of greenhouse gas emissions.

Supply and generation of electricity cannot keep pace with the growing demand of households and production processes. Higher energy prices coincide with inefficiency in the use of energy, particularly in the domestic sector. Energy has become one of the limiting factors for sustainable development. The amount of energy used in a building for cooling, heating and lighting is directly related to its design layout, construction and materials used. The objective of JENGA was to implement strategies for practical education on energy efficiency in construction at schools of architecture in East Africa, introducing the method of problem-based learning through the implementation of design-build courses into existing curricula in Kenya, Uganda and Rwanda. Central elements were the analysis of best practice examples and design models of all scales to improve students' understanding of the needs and challenges of sustainable building in their own regional, social and climatic contexts.



Design models of all scales were used as part of problem-based teaching.

METHODOLOGY

Design/construction courses

Implementation of new criteria into existing courses, based on sustainable, low-carbon building techniques. In parallel to the courses, practical workshops and excursions to prepare design-construction studios.

Teacher training

Staff members received training on course content and teaching methods, like group work, practical applicability, or problem based teaching.

Upgrading of courses

6 courses on BA level and 4 courses on MA level adapted.

Enhance knowledge and technology transfer

For energy efficiency in design, construction and operation of buildings through practical projects for the specific needs of the targeted regions..

Harmonisation and quality assurance

Interdisciplinary exchange of ideas about building in Africa. Similar courses at partner universities in East Africa were linked in order to increase mobility of students and academic staff.

Upgrade of teaching material and equipment

The materials testing laboratories at UMU and JKUAT, and the environmental laboratory at JKUAT catalogued and evaluated for recommended upgrades.

Disseminate the results

Academic and political institutions targeted via workshops, presentations and an international conference (SFC2016).

RESULTS

→ Outputs

Capacity building

- 12 teachers trained in practical teaching methods.
- 15 academic and technical staff exposed to activities linking theoretical knowledge to architectural studio design.
- 45 students participated in applied research projects and excursions, increasing their practice-based knowledge.

Design-build projects

- 330 students engaged in design-build projects exhibiting energy efficient design,

local and low-carbon technologies and materials. Projects reflected densification in urban sprawl areas, context-related design and resilience of buildings to challenges of changing climatic conditions.

Documents

- JENGA Handbook, containing a selection of teaching instructions, examples and documentation of best practices.
- SFC2016 Conference Proceedings, available in a digital and a printed version in

the libraries of participating and other universities.

Visibility

- Results published at national and international conferences and discussed with practitioners and stakeholders during public workshops.
- Activities advertised at partner and associate universities with posters and T-Shirts, UN Habitat newsletters and through local reports and articles.

↑ Outcomes

- Participants informed about better design for economic and social, political, cultural and environmental contexts.
- Policy makers and practitioners made aware of sustainable building technologies.
- Increased capacity for teaching methods at partner HEIs

🎯 Impacts

Usage

- The ideas and challenges of innovative and practice-oriented education in architecture schools have fostered awareness for energy efficiency and have been taken up by a series of curriculum development workshops organised by UN Habitat.

Policy implications

- SFC2016 conference, held at UN Headquarters in Nairobi, addressed an international audience of academics, professionals and government stakeholders. With a focus on East and South African countries, UN Habitat sessions and JENGA results'

presentations, it promoted regional and local knowledge transfer.

Sustainability

- 2 HEIs involved have shown their ability to implement new teaching methods into existing courses. UMU has continued staff training and successfully started small-scale, locally sustained projects.
- The potential establishment of a East African-German University of Applied Science may be a significant step in upscaling the results and sustainability of the programme.



Design models of all scales were used as part of problem based teaching.



Results were presented to academics, professionals and government stakeholders during public events.



Design build experimental house Kenya.

TESTIMONIAL



Achilles Ahimbisibwe,
Faculty of the Built Environment,
Uganda Martyrs University, Kampala,
Uganda

“The faculty of the Built Environment at Uganda Martyrs University seeks to improve students’ competencies and provide quality and contextually relevant architecture. This process has seen much improvement in the delivery of studio courses, and two specific courses have arisen as a result of the earthen construction training. We continue to review and adjust approaches in other courses to build towards better outcomes in studio projects.”

ACP-EU Co-Operation Programmes in the fields of Higher Education and Science, Technology and Research

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