498: Integrating Sustainability and Environmental Design in an African Architecture Curriculum: The Case of Uganda

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Abstract

While the majority of Ugandans live in energy poverty, contemporary architecture in the country is for the most part energy inefficient. Progress and development is shown through the inclusion of air-conditioners, while choices made in the construction of buildings ignore concerns about the wider environmental context in which architecture is situated.

Although architects in Uganda are aware of sustainability and environmental issues and the need for strategies to reduce the carbon footprint of buildings, the ability to translate information into built form is limited by the fact that many have not been given the appropriate tools to apply this information in the local context.

The introduction to environmental and sustainable issues for many architects in Uganda has been through the traditional mode, in which environmental issues were presented as 'add-on' courses, delivered by 'specialists', in independent lecture sessions, with little if any attempt made to integrate this knowledge into design projects. The design studio viewed as a place for aesthetic exploration, with technical and environmental issues regarded as an impediment to this.

Introducing Sustainability and Environmental design into the curriculum as an integrated component in the design studio is an important strategy to enabling graduating architects to make decisions concerning sustainability and environmental design as part of the design process, rather than as an add on extra.

Over the past three years, the School of the Built Environment at the Uganda Martyrs University has transformed its curriculum in an effort to make the architecture curriculum more responsive to environmental concerns. The new integrated curriculum sought to make sustainability and environmental design integral to the design studio in an effort to address growing environmental concerns in Uganda. This paper presents outcomes of these studios as well as reporting on feedback from students who have been through the programme.

Keywords: Architecture, Integrated Curriculum, Uganda, Sustainability, Environmental Design

1. Introduction

Sustainability and Environmental Design are significant factors, or at least should be, in the practice of architecture. A review of recent architecture projects in Uganda, however, revels that little if any effort is being made in this area. Further, the energy situation in Uganda today is such that the majority of the population live in energy poverty, while the small proportion of the country (less than 20%) with access to formal (but irregular) electricity supplies, squander this resource in energy inefficient buildings, whilst significant damage is done to the environment by people in search of fuel wood. Yet further, modern buildings have tended to ignore the natural environment, seeking to have nature conform to the built environment, rather than the other way around.

It is contended that this situation is partly a consequence of a lack of awareness of how to integrate environmental design and sustainability into architecture, rather than a lack of awareness of these issues. This may be linked to the fact that environmental design and sustainability issues have seldom been addressed as part of architecture curricula in Uganda. The tendency for the most part has been to treat environmental design and sustainability as separate 'by-the-way' subjects that have to be taught but have no place in the mainstream design studio.

The new curriculum in the Faculty of the Built Environment at Uganda Martyrs University, sought to address these shortcomings, particularly in light of the Rio Declaration on Environment and Development (1992) and the Kyoto protocol (1996). Our assertion was that students would not only have a better understanding and appreciation sustainability and environmental design, but would also know to apply them in architecture designs, if they recognise that it is routine, rather than an exception. As such, these issues should be presented as integral to the design studio, rather than in stand-alone support courses.

This paper reports on the process of integrating the curriculum and how this has been achieved in

the Uganda Martyrs University. It also identifies a number of challenges faced, and are still trying to overcome.

2. Architecture Education in Uganda

Prior to the 1990s, architects working in Uganda had been trained primarily at the University of Nairobi in Kenya, established in 1956 in what was then the Royal Technical College of Nairobi. The programme was originally geared towards educating members of the expatriate community offering instruction for the professional examinations of the Royal Institute of British Architects (RIBA) administered by the local allied society, the East African Institute of Architects (EAIA). [1] Over the years, numerous architects went through this programme, as no programme existed in Uganda.

It was not until 1989 with the establishment of the five-year Bachelor of Architecture programme in the Department of Architecture, based in the Faculty of Technology (Engineering) at Makerere University, that architecture education was established in Uganda. [2]. Over the years, this programme has educated a number of architects to fill the gapping need for architects in Uganda.

While this programme has made great strides in addressing the need for qualified architects, the rapidly changing nature built environment practice has meant that the demand for a new approach to architectural education is needed. The long-established approach, in which the design studio was the main-stay of the curriculum, where students express their creative abilities without being influenced by other courses. Studio projects in this approach, invariably assume beautiful, full of character sites that are flat and without any constraints. [3] This approach to architecture education is now regarded as ineffective, with the consequences evident throughout Uganda with sites being made to suite the building, rather than the other way round.

Fig 1. Housing in Kampala – Cut and Fill

2.1 The Architecture Programme at the Uganda Martyrs University

The Architecture programme at the Uganda Martyrs University was set up in 2000, situated in a newly established Faculty of Building Technology and Architecture. The 3+2 programme, the first in East Africa, had a number of key objectives, with two related to environmental design:

i) give students an understanding of the principles of architecture and building technology, and;
ii) design with respect for the human person and the environment. (Faculty of Building Technology and Architecture, 2000) [4]

To fulfil these objectives, the undergraduate programme, the BSc(BDT) was jam packed with an amalgam of courses, all of them relevant in their own right, but unfortunately more for show, than for applicability. Little effort had been made to integrate or relate the various components with one another or more importantly to the Design Studios, which were separate, almost secretive entities.

Table 1: Course units in the undergraduate programme 2003/04 and 2008/09 [4,5]

B.Sc.(BDT)	2003/04	2008/09
Year I	19	10
Year II	18	6
Year III	14	6

It was evident that students were having difficulty making links between the theoretical subjects and the design studio, and this prompted a major review of the BSc (BDT) programme in 2003. This review was also to rectify a significant shortcoming in the programme, that had virtually all courses - apart from the studio itself - taught as lecture based courses, without tutorials or opportunities to make connections between courses. These were viewed as key factors preventing students, and subsequently practitioners from incorporating environmental design and sustainability in projects.

3. Sustainability and Environmental Design in Architecture Curricula

A principal objective of architectural education specifically, and built environment education in general, is to educate professionals who are capable of creating meaningful environments. [6] For the most part however, architecture is often perceived as being the beautification of a building – the adding of colour and decoration. In this regard, the term ‘design’ itself needs to be re-evaluated - taken in its broader context of being the process rather than only the aesthetic and theoretical dimension of the built environment practice. [7,8] Further, built environment education is viewed as ‘studying about’ rather than ‘participating in’ the development of the profession. In Uganda, the traditional approach to university education, which is for the most part lecture based, has tended to reinforce the student notion that students come to university “to be ‘spoon fed’ all the required information – indisputable facts – that would make them

'experts' in their careers … ." [9] This has the impact of dissuading environmental responsible practices in the design studio, entrenching in students and more alarmingly, into practice the idea that environmental design is not essential to architecture. [8,10,11] This perceived irrelevance is reinforced by the 'division of labour' in the construction industry, where specialists handle different aspects of design and construction; a reality not lost on students, who view this separation as a reason not to take such courses seriously. It was therefore felt necessary that students be shown how environmental and sustainable architecture is applicable in the real world, not using abstract examples, but through a hands on approach, recognising that it is only, " ... when the building of architecture is approached as an organization system that encompasses aesthetics, formal, and practical application, there is the possibility of transcending the common understanding of building technologies and materials acquired by rote mechanics of lecture and evaluated regurgitation." [12]

The thrust to integrate sustainability into the architecture curriculum is derived from a recognition that architects, and architectural education can and should take a leadership role in the custodianship of the environment. [7] How these can be introduced in the architecture curriculum has been the subject of a number of papers, including Wright [13] who identified three approaches:

i. assumes that sustainability is a fundamental component of architecture and must therefore permeate the curriculum by its nature. As such, there is no need to address it outside the normal theory and practice.
ii. Sustainable design instruction develops out of existing environmental control courses, and therefore faculty taking these courses can easily incorporate it into existing courses. It however does not guarantee that this will be integrated into the design studio as the faculty responsible for teaching are not usually responsible for design components.
iii. The third approach to introducing sustainable design in architecture programmes requires a complete review and revision to the curriculum in order to incorporate sustainability into all aspects of the curriculum. This approach includes the entire faculty, ensuring that there is proper integration of sustainability across the curriculum and into the design studio. A big problem, though is there should be a strong desire to change, and a strong leadership to drive the change.

Incorporating environmental and sustainable design into built environment education would be a significant step in making environmental design practice routine rather than the exception.

4. Changing Architecture Education

The major issues discovered during the review caused the faculty to undertake a major review of the programme to better prepare graduates to face the increasing complexity of challenges they were likely to face, particularly in the area of Environmental Design and Sustainability. It was determined that a revised approach was required to better integrate theoretical issues in students work. In effect, changing the existing approach to architectural education in Uganda, to facilitate deep learning and enable students to approach architecture as an holistic entity. This was based on a view that the current architecture pedagogy was an impediment to the understanding of these issues by students, and the continued separation of sustainability and environmental design from the design studio results in an inability of students to resolve these in the real world.

4.1 New Beginnings

In 2008, the Faculty of Building Technology and Architecture changed its name becoming the Faculty of the Built Environment. This was to reflect a revised philosophy, focus and teaching pedagogy. In addition, the name of the undergraduate programme, the Bachelor of Science (Building Design and Technology) programme was also changed, and so was its focus. The new Bachelor of Environmental Design (B.Envi.Des.) is better able to address the current and future needs of built environments in Uganda and beyond, reflecting the integrated approach to design, incorporating environmental design, sustainability and technology in its curriculum. This change was a bold move in the educational context of East Africa and Uganda in particular where the general trend has been to have narrowly focussed programmes that were appealing to students as they could easily identify the content of the programmes from the name. Consequently the changes were met with stiff opposition from Students and the University Council, not because they did not like the change, but because they were used to the old name. Interestingly enough the old name had received a similar response from the public when it was first introduced. It has therefore been important for the Faculty to engage in a public relations exercise to satisfy the public that the change was actually for the better, not to mention the fact that by widening the scope of the programme, the Faculty was not only acknowledging that architecture was more than just buildings, and that built environment professionals had a universal obligation to the environment. It also placed the Faculty in a better position to introduce new paths to graduation for its students.

A second challenge had to do with teaching in the programme. As the entire programme had been overhauled to integrate environmental design and sustainability into all levels of the programme, a major challenge was to get the faculty to deliver the content as required, given the shortage of professionals in the country, and the fact that

most professionals had been educated in programmes that did not have integrated programmes. As such, most instructors were not conversant with integrated teaching and learning, let alone how to incorporate different subjects into design studio courses. However, some success was achieved, as was evident in the subject ENDS-2212 Buildings and the Environment, the first course in which students in the undergraduate programme design a complete building.

4.3 Integrated Studio Project

As the first building design studio in the undergraduate programme, it was thought appropriate to present the course, ENDS-2212 Buildings and the Environment, as an enjoyable experience in which the students learn-by-doing. Rather than working with a predefined brief and an abstract site, students produced a simple brief for the design of a small studio for a fellow student, which was based on a simple questionnaire developed to guide them. This was to give students some sense of control, and the try and break away from the 'rote learning mindset students had been used to at high school, leaving then with a perception that each problem has a single correct answer.

The challenge was to introduce environmental design and sustainability principles into the studio, without appearing to be too technical, which could have overwhelmed students, or on the other hand not being too simplistic, such that it could be taken for granted. As such rather than barrage the students with facts and figures at this stage, students were introduced to the principles of environmental design through a reflective process that looked at their own responses and actions in different scenarios. Their responses to these were used as a basis to explore design solutions. These decisions were then linked to the scientific principles of environmental design and sustainability introduced in lectures and workshops, and reinforced in studio and tutorial sessions. In so doing, making students aware of the benefit of research, and the dangers of using inappropriate data and information, as is the case with thermal comfort data in use in Uganda.

To emphasise the importance of site analysis, the site selected for this design challenge, would not be considered 'ideal'. This was deliberate to demonstrate to students that not all sites offered optimum conditions, but that solutions can be found through a reflection on the issue and how the building related to the specific site.

Fig 2. Student Design Project – Year II

5. Discussion

An integrative approach to architecture education would appear to be an appropriate way of incorporating environmental design and technology into architectural education, particularly in the context of Uganda. However, more has to be done in order to fully implement this into the architecture programme at the Uganda Martyrs University. Using an integrated approach, it is evident that student understanding and application of sustainability and environmental design is better than it was when these were taught in stand-alone courses. Students were also better able to see how decisions they made could have an impact on architecture. This was important in helping students become more reflective in their approaches to design, in that they were able to see and assess the consequences of their actions during the design process. It was also found that students were also more open to seek assistance from the instructors and their peers rather than trying to complete tasks on their own. The fact that they were not all working on similar problems meant that there was no competition, and they could benefit from working together to solve problems. There were of course exceptions, with some students looking at it as space planning exercise. In these cases, students produced a plan what on paper fulfilled all the space requirements, and then proceeded to apply the made additions to fulfil the environmental concerns – unsurprisingly resulting in impractical and less than satisfactory results.

5.1 Challenges

A number of challenges have been, and still are being encountered in quest to integrate environmental design and sustainability into the programmes in the faculty. As has been mentioned previously, resistance came from students and the university itself, resisting the changes, as 'this was not the way it was traditionally done'. The *raison d'entre* for introducing the integrated curriculum was been a major sticking point. Students, who were attuned to rote learning and regurgitation of facts and figures, and seeking to be taught all that they need to know to make them architects, had to contend with the need to justify the decisions they made based on an investigative approach. They

also had to contend with the fact that there were no straight forward answers nor was there a single correct answer. Further, as students generally do not question what they are told, or see, inquiry based instruction proved to be a difficult, reinforced by cultural norms under which decisions by senior members of society are rarely if ever questioned – thus the 'teacher is always right' phenomenon.

A significant challenge has been an ongoing shortage of qualified staff to undertake teaching in environmental design and sustainability. This is a direct consequence of the separation of environmental design from the design studio, and the promotion of the design studio as the most important part of architecture. The result is that most faculty maintain that they are knowledgeable about 'design' but not about environmental design and how it can be integrated in architectural design. [8,14] In addition, available staff had a "laissez-faire" approach to education. Most had come into teaching as a means to make extra money! The lack of a functioning mentoring system for academic staff resulted in instructors using notions gleaned from own educational experiences as the basis for their teaching. [15,16] As such, what was often brought to the classroom was information rehashed from old lecture notes, and delivered in a mode that did not encourage students to be inquisitive or inventive.

6. Conclusion

A principal objective of architectural education is to educate architects capable of creating meaningful environments for the future. [6] An approach to architecture education in which there is a separation of the main components is clearly not practical, particularly in Uganda, where students take most things at face value. Students need to be shown how environmental design and sustainability are applicable in the real world, rather than through the use of abstract examples, which in the context we are in have had the effect of de-emphasising their importance. It is only when " … architecture is approached as an organization system that encompasses aesthetics, formal, and practical application, there is the possibility of transcending the common understanding of building technologies and materials acquired by rote mechanics of lecture and evaluated regurgitation." [12] Through a revised approach to architecture education, the Faculty of the Built Environment at the Uganda Martyrs University, hopes to enable students to appreciate that environmental design and sustainability are integral to architecture. With greater integration of subjects and a more systematic approach to teaching (and with any luck, learning), it will be possible to realise the goals the Faculty has set out to achieve.

Transforming the built environment programmes at the Uganda Martyrs University, is a significant step towards addressing the need for greater integration of environmental design principles in architecture, but it has also been a way to address students' learning deficiencies as a result of their previous education. However, the Uganda Martyrs University faces an uphill task in its quest, particularly as it is the norm to have numerous stand alone courses, and the reason why the BSc(BDT) programme has more than 10 individual courses each semester.

The compartmentalisation of subjects in the teaching of built environment programmes, reinforced not only the perceived lack of relevance to design, but also did not give students the confidence to investigate the implications and consequences of different ideas as they arise in multi-dimensional integrated studios. It has to be acknowledged that architecture is a complex profession, and consequently demands an adoption of a new approach to the education and training of professionals. [17] An integrated approach ensures that environmental design is regarded as being a part of the design process itself, and that this IS design. It is also expected to contribute to a deeper appreciation of environmental design and sustainability issues as they relate not only architecture, but in the day-to-day lives of the students. [18]

In the context of Uganda, and East Africa, what is needed are critical individuals that can reflect on the curriculum and the practice in order to better serve the profession. As it stands there is great resistance to any form of change. Insisting that the status quo most be maintained, regardless of the consequences. However the applicants to the programme tell us that things are beginning to change … for the better.

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