Old Building Technologies for 21st Century Architectural Technology Students

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Introduction

The purposed of this paper is to briefly explore the experiences of fifteen first year Architectural Technologists and two members of staff in the design and implementation of an architectural project. This live project had strong environmental and sustainability elements which challenged the students to research, design and understand a new material technology. They had to work in teams in the design and build of an office “pod” for an external (non university) client.

They key features for this project were to get the students outside the classroom experiencing real life situations, bonding as a group, and to learn to cope with issues that Architectural Technologists have in real life. Active learning like this needs different teaching approaches beyond lectures and seminars to enthuse students, so we chose to use Problem Based Learning (PBL) for this live project.

Our view is that students should be encouraged to be active learners in order to develop higher levels skills in research, critical thinking, problem solving, team working, communication and reflection. It was also important that our students, whilst learning and practicing these new skills, had the opportunity to engage in “hard fun”.

Module Design

The module was a studio based level four design module and initially conceived as a traditionally studio taught module. Its projects, assessments and teaching over the last three years have developed as direct result of the students’ expectations and the experiences held by the teaching team of their own time within higher education studying on studio taught models. However there has been a conscious shift away from inward facing, individual design projects, structured around weekly individual tutorials and a final critical analysis, to a new outward facing, practical focused set of design problems taught using more varied student centered activities to promote and encourage team work, collaboration and innovation within a practical, supportive and inclusive design culture.

This module is aimed at developing imaginative thinking: from the articulation and conceptualisation of abstract ideas, through the interpretation of the user’s needs and the creative manipulation of materials and designs. Its learning outcomes are structured around three key areas of knowledge and understanding, subject specific skills and employability and personal development. This introduces students to architectural vocabulary, and to environmental and social principles whilst teaching skills in the generation and adaption of architectural ideas in 2D and 3D forms. It begins an understanding of related concepts such as form, materality, construction and build ability.

Problem based learning

PBL was chosen as a teaching and learning pedagogy for this module because it has been shown that this practice develops deeper learning in students. It can also expand students’ competencies in key employability skills such as team working, problem solving, communication, critical thinking and research.

We decided that there would be three PBL aspects we would concentrate on:

- Constructing a real world, live problem that students may have to face in their own professional practice.
- The requirement for students to have to work in small groups and learn to how to work in co-operation with others.
- Students’ learning would have some structure in the shape of three tutorial sessions, but would be largely self-directed through their own research and group work.

We were attracted to PBL because it also encourages students to work hard, but to enjoy their learning. This is encapsulated in the concept of hard fun.
"Hard fun"

If students learn better “by doing” that is through active participation in the learning, then it must be because the learning itself is enjoyable and fun to do.

Fun in the PBL sense is also about the challenge of taking on a difficult problem, the hard work of solving that problem and the creativity and the stimulation that comes from working with people who share that work. “The fun in hard fun is a fun with enjoyment, laughter, freedom, creativity and energy.”

This was an important part of this project. We wanted students to enjoy what they were doing, to be confident in their abilities and to feel “safe” to experiment with their creative ideas for their builds.

We also knew that the work would be very hard and demanding both in the build itself and in the design process to meet the client’s requirements, but hoped that the sense of achievement when it was completed would be high.

Project Design

The students were tasked with designing an energy efficient office pod which would fit into a grade two listed church. They were required to build the pod from straw and, time permitting, to finish this with a lime plaster wash. The design chosen by the client was to be built by the whole group of fifteen students.

The PBL trigger for the whole activity was a client brief set by the company which detailed their requirements; these included the size of the office, its internal height under an imagined mezzanine floor, the ingress points, making the best use of the available natural light and the location of power.

Teaching and Learning Tutorials

Over a period of three weeks and three tutorials held in their studio, the students worked in self chosen groups on their proposals: researching the issues relating to working with straw bales, exploring the materiality and build ability, considered health and safety options such as testing the bales for fire safety and working with the materials in an enclosed space, as well as project planning a build and identifying the resources needed.

Tutorial one: the materials.

The first session focused on the materials that the client has intimated were his first choice. The students looked at other options such as timber and brick to ensure that straw bales were the most appropriate. The students identified a possible list of alternative materials and the prepared a five minute presentation on the advantages and disadvantages of their chosen materials.

The second half of the session was given over to understanding the straw itself and this activity took place in the materials laboratory. Here the students were left to their own devices to discover the properties of the material itself and to physically “get to know” it. A number of bales were supplied with the proviso that student would find it useful to find out at least fifteen things about the bales that they didn’t know already and to share this information later with the rest of the group. Some of the things tried included weighing and manually lifting the bales, assessing their “stackability” and also testing their flammability.

Tutorial two: precedent study and design of the structure

The second session allowed students to explore how other architects and builders had used straw bales in sustainable and environmental construction. This followed a more traditional approach of research, analysis and implementation within the studio, but this was done collectively not individually. The three groups were tasked with collecting information they thought
was relevant from a particular sources: books, the journal collection (physical and digital) and the Internet.

The students were asked to not only look for examples of straw bales structures but also for the advantages and disadvantages of using each source. A round discussion talk was organized an each group presented and discussed its findings. This was a useful exercise to establish what could and couldn’t or could not be done with the materials, but also within a few weeks of the new term to expose students to the various methods and sources of data collection.

In the afternoon some preliminary designs were collected to be sent to the client for feedback. Again, working in their groups the student used a variety of methods. Some students opted to use the CAD laboratory and attempted to design their scheme using Sketchup. Another group sat round a table using pen and paper to refine and work thought their ideas in a more traditional manner, making a simple but effective internal layout of the church and used that to aid their thinking. All the schemes were sent to the client so he could continue to give feedback on them the following week.

Tutorial three: project management

The final session was again split into a morning and afternoon session. In the morning time was set aside to allow the student to rework their schemes using their feedback form the client and tutors. Their finished designs were set off to the client to be judged and a winning design selected.

In the afternoon the student prepared a risk assessment for the trip and the build, put together a specification for the client and prepared a schedule of building activities and an appropriate timescale or the build, ensuring that it could be completed in the two days we had on site.

Project Completion

In October 2011 the students were taken off to the client’s company “Ancient Arts” in Wales for a weekend to build the winning design. During the weekend they learned how to use appropriate tools such as saws, hammers etc. safely as well as lifting and maneuvering straw bales as well as testing the limitations of their own designs. The first attempt at building the pod failed because of the foundation platform chosen did not support the structure at the height required, so the walls become unsafe, and the pod had to be rebuilt - with considerable effort but with lots of practical learning.

The students were also taught some new skills using old technologies, for example how to produce cob and its use as a sustainable and environmentally friendly material. Whilst at the Centre they also examined a reconstructed Iron Age round house, a new building which had been reconstructed to a much older design using material such as cob, thatch and timbers. We wanted them to consider its environmental impact as well as the sophisticated skills needed to build it.

Evaluation

As part of the formal module assessment students were required to present their ideas the group in class and then to submit a group portfolio detailing their build. We also wanted less formal feedback on their experiences (hoping we could use this to help us redesign the module for next year) so students were asked to take part in a short film reflecting on what they had learned from this live project, and what they had particularly enjoyed.

In the review three themes began to emerge. Team working was seen as very important, helping the students to bond, because they were working and relaxing together and supporting each other in many aspects; teaching each other new skills or encouraging each other when the build itself got tougher.

There was a sense of achievement. There had been some mistakes but overall they were pleased to have completed some aspects of the build successfully. It had been fun to get outside the classroom to do some practical work. They had enjoyed working with their clients although they all didn’t necessarily agree the best design had been chosen.

Their replies on whether they would use straw bales or cobbing within their own practice varied. Some students could see the value of cob for instance; others had missed its implications for sustainability. This is something we intend to bring into our review. It is important that students can assess ethical and environmental consequences when deciding on building materials and the design of house or office for example.
As staff we felt that there had been three impacts: evidence of increased student engagement and the development of key employability skills such as communication, research and problem solving, the beginnings of a learning community within the course and an improved student and staff experience.

We felt justified in using the PBL approach although it is more time consuming to design and undertake, and it was extremely important to always manage student and client expectations sensitively and honestly. It made us consider what we want students to “get out” of activities and assessments and also about unexpected learning outcomes that arise from live projects, such as student independence and increased confidence.

Although we have used a new teaching approach within our School, we feel assured that we can expand on this and develop further live “hard fun” projects within the degree course, which will stretch and challenge both the students and, of course, ourselves.

Notes


This can be viewed as a You Tube clip, available on http://www.youtube.com/watch?v=b1PhaMDo4YM&feature=youtu.be.