Teaching of Transferable Skills in Architectural Education - The Quartet Project.

Andrew Roberts

Welsh School of Architecture

CTI Centre for the Built Environment

Cardiff University

Bute Building

King Edward VII Avenue

Cardiff CF1 3TW

Tel +44 (0) 1222 874602

Email RobertsAS@cf.ac.uk

The quartet project is a four-week programme undertaken by all first year B.Sc Architecture students at the Welsh School of Architecture. It takes place early in the first semester and is designed to encourage students to develop a series of transferable skills. The cohort is divided into four groups, and the groups rotate around four different activities on a weekly basis. One of these activities is CAD/IT and aims to equip students with the necessary understanding of the potential and limitations of using computers as part of their studies, with emphasis on the creative use of the technology. Throughout the week links with the other three activities are heavily stressed and students use computers within all four activities to some extent. Using examples of students' work from the past two years, this paper aims to assess the CAD/IT element of the project, and how it connects with the other activities. It then looks at how the skills developed during the week are utilised by the students during the remainder of their time in the school.

The need for Transferable Skills

The recent report from the UK National Committee of Inquiry into Higher Education (NCIHE 1997) highlighted the need for the development of transferable skills within Higher Education. This adds to a growing debate about what skills graduates should posses as a result of their studies. Whilst there appears to be general agreement that these skills are important, and that there is a place for them within the curriculum, there is less consensus on how these skills are best taught.

The *Transferable Skills Development : Management of Change* project (Nixon 1997), based at the Universities of Newcastle and Hull claim that students of Architecture posses far higher levels of transferable skills than students from other disciplines, especially in the fields of communication, problem solving and project organisation. This

is attributed to the project based approach to teaching adopted by many Architectural Schools. Rather than teaching transferable skills in an explicit manner, through timetabled training sessions, students learn many skills through a process of «osmosis» whilst carrying out project work. Nixon argues that in cases where skills are taught through project work, it is important to make those skills that are to be acquired explicitly known to the students by stating learning outcomes.

At the Welsh School of Architecture, Cardiff, skills are made explicit by the creation of a number of *Common Threads* which run through a series of *Core Projects* and Lecture Modules. During their time at the School, all students are expected to carry out a number of Core Design Projects which cover a range architectural issues of increasing complexity. Whilst the site, brief and building type may change from year to year the principal objectives of each core project remain constant. The *Common Threads*, which currently include literacy, information technology and communication skills are woven through each of the Core Projects and lecture modules so that skills development can be closely integrated with the educational process.

Moon (1997) categorises the transferable skills that may be taught in terms of their role or purpose in a degree. These are :

- **Generic skills** that would generally be expected of any graduate
- **Discipline Specific Skills**
- **Remedial Skills**, where students lack those skills required to persue a degree course
- **Study skills**
- **Student Survival Skills**, that enable students to cope with study for their degree emotionally and practically
- **Professional Skills**, that may be demanded by an employer

These skills can be taught in a number of ways : by holding specialised skilling sessions, through graduate placement, through separate modules or through close integration into existing modules. Table 1 indicates how each of the categories of skill suggested by Moon have been integrated into the curriculum at the Welsh School of Architecture.

Skill Category	Examples	How Taught
Generic Skills	Oral Communication Computer Literacy Literacy	Core projects and lecture modules
Discipline Specific	Computer Aided Design Spatial Awareness Presentation	Quartet Project followed by Core Projects
Remedial Skills	Basic Literacy Basic IT (recently) Language	Additional teaching sessions
Study Skills	Research Methods Library Use Note Taking	Quartet Project Induction Course
Survival Skills	Time Management Relationships	Through studio work
Professional Skills	Design Documentation Computer Aided Drafting	Lecture Module CAD Summer School

Table 1. How skills are integrated into the curriculum at the Welsh School of Architecture

Whilst it may be desirable to integrate as many of these skills into the Core Projects, it is felt that an introduction is required prior to students embarking on any major project work. This is largely done through a four week transferable skills course - the *Quartet Project* following which the skills developed can be used and developed further within design projects and lecture modules.

The Quartet Project

The quartet project is a four week programme undertaken by all first year B. Sc Architecture students. It takes place early in the first semester and is designed to encourage students to develop a series of transferable skills. The cohort is divided into four groups, and the groups rotate around four different activities on a weekly basis. During each week students receive approximately 3 days of formal, project based teaching.

The key activities covered are:

- library and research skills (the Adopt an Architect Project)
- expression and communication skills
- a simple design project (the container project)
- CAD and Information Technology

Whilst this paper is primarily concerned with the CAD/IT aspects of the project it should be noted that each of the four components are closely linked. For instance in the library and research week of the project, students are asked to research a particular building by a twentieth century architect. Students are expected to use the World Wide Web, on line library catalogues and CD ROMs to enhance their search and all submissions must be word processed. A future development, expected to take place in the 1998/9 academic year is the creation of an on-line «map» of the twentieth century, which will include principal historical events, together with developments in Art and Music across the century. Students will then be able to add their own research into this matrix and can begin to understand how their chosen building related to its historical context. The advantage of placing this on-line is that students can view, and criticise the work of their peers, in a way that would not be possible if the essays had simply been submitted to a tutor.

CAD/IT Component

The CAD/IT week aims to equip students with the necessary understanding of the potential and limitations of using computers as part of their studies. The project does not aim to 'train' students in the detailed use of a particular CAD package as there is insufficient time. It is generally felt that the time would be better spent enforcing a number of basic concepts, which can be reapplied to any package at a later stage. Having completed the project students are expected to have developed the following key skills :

- Confidence and Competence in using information technology
- Spatial Awareness and understanding of three dimensional space
- The ability to apply set of techniques to their own work
- An understanding of the relationship between a buildings form and its function
- A comparison of the benefits of computer modelling with physical modelling

It is assumed that at the beginning of the week students have relatively little knowledge of computing (although this is increasingly not the case). The first day consists of a series of introductory computer skills such as logging onto the university network, use of Microsoft Windows, Email, the Internet and responsibilities as a network user. Emphasis is placed on moving data between applications, and trying out different options - key skills which students will require in order to use computers in a creative manner. The day culminates with the students

creating a photomontage, using PhotoShop. By the end of the day, most students have reached a reasonable level of competence and confidence in performing simple tasks on the computer.

The initial skills developed in the first day are developed further in a half day introduction to CAD. Students learn the difference between the "bitmapped" paint packages they have previously used and object based CAD package by drawing and manipulating a series of 2D shapes in MiniCAD. Students learn about using Boolean operations to create more complex shapes using MiniCAD's Clip and Add surface commands. Some students (especially those who have some prior experience of AutoCAD) find the concept of working with shapes rather than individual lines initially difficult, but this is a skill that will become useful at a later stage. The 2D shapes are extruded into 3D and operations such as duplicate, rotate and flip are used to produce a design for a cityscape.

By now the students should have a reasonable understanding of the MiniCAD interface, and a number of the basic shape manipulation tools. As a test, an exercise is set where students have to build a model of a small barn with barrel vaulted roof. This encourages students to think logically, in three dimensions about how they might apply the techniques taught earlier. An analogy is made between building a model on computer and building a physical model out of a series of pieces of cardboard, with holes cut for windows. The initial shapes for each elevation are drawn as a series of 2D shapes, extruded to the thickness of a piece of card and then assembled to form a three dimensional form.

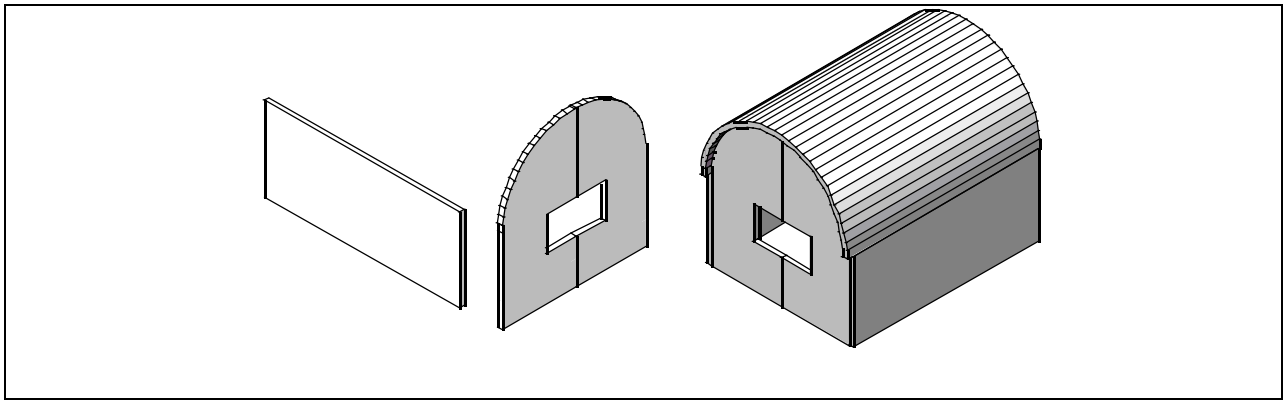

Fig. 1 Students build a small barn in MiniCAD

Initially students are asked to draw roughly, ignoring dimensions and accuracy so that they can grasp the initial concepts. Accuracy is introduced in the third session as a more traditional approach to CAD modelling is used as students use CAD to model their designs from their Container Design week of the Quartet project.

The Container Project

The container project, which forms one of the weeks of the Quartet project, is intended as a basic introduction to the architectural design process. Students are asked to take a standard shipping container (dimensions 3mx3mx9m) and fit it out so that it can be occupied for one of a number of celebrity clients, as a place of work, rest and play. The client list includes Jo Brand, Baby Spice, Andy Goldsworthy, David Bellamy and Bill Gates.

Emphasis is placed on the functional behaviour of the design together with the ambience created in relation to the individual characteristics of the client. Students are encouraged to push their designs beyond the constraints of the standard container. The schemes are modelled in cardboard and in CAD.

During the CAD week students are asked to produce a computer model of their container. This allows them to contrast the benefits of physical modelling with computer modelling. Two methods of modelling are taught. Initially a traditional CAD method is used, whereby MiniCAD's wall tool is used to draw the outline of a basic container, and then a series of window, door and furniture symbols are inserted. This exercise enforces the concepts of Layers and Blocks (or symbols) as present in most modern CAD packages, but tends to prove limiting when producing all but the simplest containers as designs tend to be heavily influenced by the availability of standard symbols.

A second exercise promotes a more design-orientated approach. In this case students build a model of a vertically orientated container, sat on its end. Three floor plates are constructed, but initially no walls are drawn. Holes are cut into the floor to allow for vertical circulation. The floors are stacked vertically and furniture is placed on each floor so that it is possible to establish how that particular space might function. Once this is done walls can be built by extruding a series of rectangles with holes cut out to form openings. Students are encouraged to design the elevations in a way which reflects the internal functions of the building.

On completion of these two exercises it is possible for students to reflect on the benefits and fall backs of two varying ways of constructing a 3D model. They are then in a position to judge which of the two methods is most appropriate to their particular container design and generally take about a day to build a model of their own design in the computer.

Because of the order in which students complete the four components of the Quartet Project, some students will arrive with a completed Cardboard Model, which they will readily translate into computer form, whilst other will arrive with sketchy ideas for their design which are as yet unresolved. The former gain a better understanding of the differences between modelling in Card and modelling in CAD and thus when it is appropriate to use each particular method. The latter group start to realise how the CAD system can influence their design ideas, which are generally at an earlier stage, and therefore more fluid. It is hoped that further research can be carried out into how the order that students carry out their quartet components affects their design ideas.

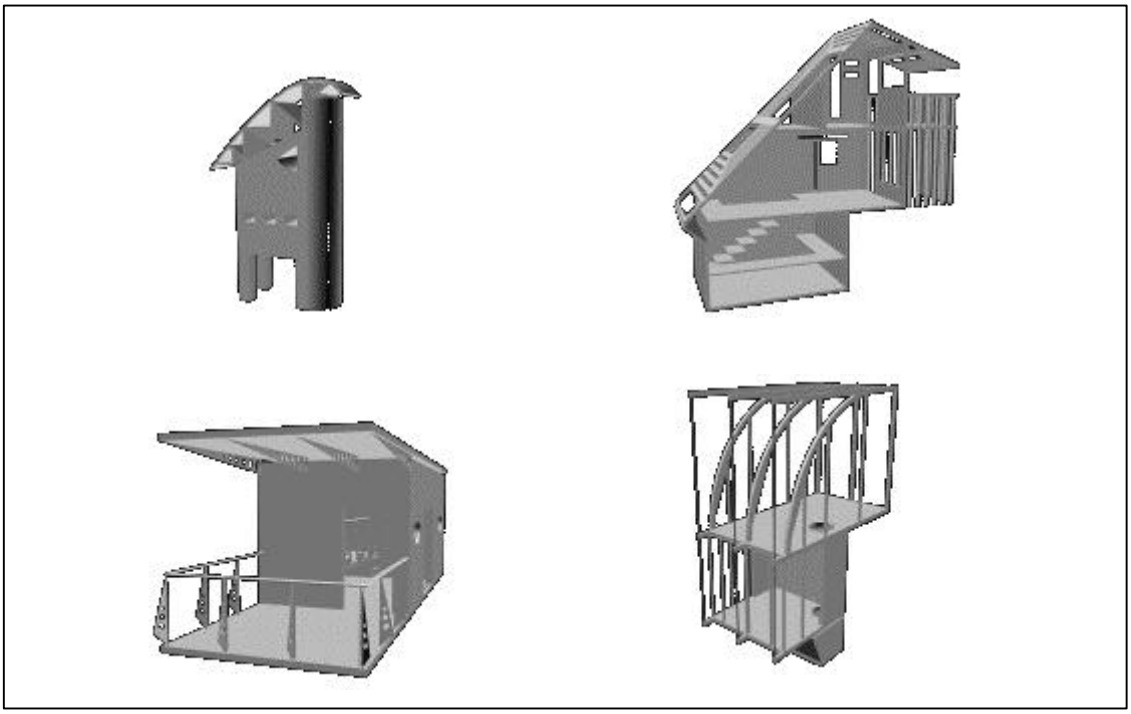

Fig. 2 Examples of students' container projects*

Application of the skills

Following the completion of the Quartet Project students have the opportunity to apply the skills learned to the core design projects. From a CAD/IT perspective, a number of projects have a compulsory IT aspect. These are selected because the use of computer is seen as an appropriate means of enhancing design understanding. For instance students place a block model of their building within a computer generated urban landscape to assess the relationship of their project to its neighbours. These compulsory elements have the joint aim however of re-enforcing the skills developed in the Quartet Project.

One of the aims of the Quartet Project is to provide students with an understanding of the palette of tools that they have available to them to use during their projects and students are encouraged to use those techniques on the computers are located within the design studios. However, creative use of this facility has been limited in recent years. It is possible that students lack an inspiration to use the technology, although it may also be because the staff involved in CAD teaching have little involvement with first year design studio. It could also be argued that

students will not use computers unless there is an element of assessment for that work. The lack of inspiration was also born out by responses to student questionnaires. Students were asked what they felt were the principal learning moments that they had experienced during the projects. Whilst responses were generally positive about the course they claimed that the major learning moment was purely learning to use CAD, and not (as had been hoped) those deeper issues such as the ability or willingness to apply what was taught to other projects.

Conclusions

This paper has outlined the strategy adopted in the Welsh School of Architecture in implementing a transferable skills programme, especially in relation to it introduction of IT skills from within its own staff resources. It has identified how techniques can be taught in a relatively small period of time and by teaching these skills within a project based environment encourages the development of those skills later in the course. Students are given a sound grounding from which they can progress, however it is seen that greater encouragement is required in order for students to realise when the IT aspects taught could be appropriately used as part of their studies

References

NCIHE (1997) Report of the National Committee of Enquiry into Higher Education (The Dearing Report), London, HMSO. (http://www.ncl.ac.uk/ncihe/)

Nixon I (1997) *Reflective Practice In Architectural Education*. University of Newcastle, Internal Project Report (http://www.archit.ncl.ac.uk/research/skills/index.html)

Moon J (1997) *Towards Making Sense of Skills in Higher Education.* Cardiff University, Internal Briefing Paper