Teach a man to catch a fish

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Abstract.

An international charity outlined the following principle recently in an advertisement. 'Give a man a fish and he will feed himself for a day, teach a man how to catch a fish and he will feed himself for a lifetime.' In education, the same principle may be applied to learning.

To the student of architecture, skills in the use of commercial software may be advantageous in the search for future employment and can prove to be a useful springboard for exploring the potential of CAAD in a broader sense. However, software (and hardware) is continually being upgraded and developed, and it is apparent that such software does not fully meet the need of the designer.

Exploring the possibilities of CAADesigning as an integral part of learning to design will equip the student with the CAAD literacy necessary for working in practice, but more importantly will provide the student with a rich and diverse understanding of design approaches.

Traditionally design tutors have taught (by example) how individual architects design. Providing a library of architects CAADesigning in different ways can be used to establish precedents and examples, demystify the activities to both students and tutors and provide a rich set of methodologies as a working context for students to draw inspiration from.

As part of an ongoing research study, a new direction has been taken gathering, comparing, contrasting and grouping live records of architects CAADesigning. This paper will outline the benefits of recording and creating such a library and will describe examples of recent findings.

1. Introduction

It has been widely suggested that computers may be thought of as a design medium (for example, Glanville [1995]). Those who are unfamiliar to this idea tend to view CAAD as an automated drafting and visualisation tool whose application is somewhat post-design [Lawson 1994]. The student embarking upon an architectural education is an embryonic designer and, with the rapid increase in computer literacy, may feel almost as comfortable with the computer interface as with the pencil. With this in mind there exists great opportunity to exploit the computer medium from the beginning of a designer's education.

At LJMU, the CAAD team consider CAAD as a vehicle for design. Exploring its alternative potential in context with learning to design is felt to be central to developing a broad understanding of design methodologies. CAAD tools are explained by broad definition, for example, transparency of material as an attribute, so that students will be able to explore this

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feature in design and look for similar capabilities in other programs. All CAAD teaching is project based.

2. The case for learning not training

Throughout Higher Education there is strong emphasis on learning, rather than the acquisition of skills through training [MacFarlane 1992] [Kokosalakis 1994], [Kokosalakis and Moorhouse 1995a]. The differences are clear - theory, understanding, concepts, and context rather than skills, facts and process - and the goal within architectural education is the development of designers not the training of technicians.

Within the field of CAAD this distinction is particularly relevant as the student, even if comfortable with computers, is likely to find CAAD a wholly new activity. Further, as CAADesigning is a relatively new phenomenon, it is probable that those with the responsibility of teaching CAAD mastered the ability to design 'traditionally' prior to using computers for this activity - necessitating the development of a new and integrated teaching approach.

The still common, but limited, view that CAAD is mainly a drafting tool, together with the demand from the market place for architects who are skilled in the use of commercial software, creates pressure to train students to be highly skilled in one package. The benefits from such an approach are questionable. Software and hardware usage varies from one practice to another and is continually being developed and upgraded. Take, for example, the upgrading from System 6 to System 7 on the Apple Macintosh or MS-DOS to Windows on the PC. The differences necessitate new learning (or unlearning). It is better for the student to understand how to learn CAAD rather than how to use one package on one platform. In this way any required adaptations may be learnt without the need for extensive retraining.

3. A library of precedents for CAADesigning

Knowledge of how architects design using traditional media is fairly well documented in written or drawn material, especially concerning the design of individual buildings, for example le Corbusier's chapel at Ronchamp [le Corbusier. 1957], F.L. Wright's Fallingwater [Kaufmann 1986]. Analysis of differing approaches and theories of admired and respected architects is traditional learning resource material in the development of students' design ability. From my investigations it appears that there is, as yet, little equivalent learning opportunity for those who wish to understand the potential of computers as a medium for designing.

There exists, therefore, potential value in providing evidence of CAAD activity as it happens, especially when used in an interesting or novel way.

A series of CAAD seminars at LJMU in 1994 (organised by Jen Kokosalakis for Diploma students of architecture and professional CPD) featuring Arthur Collin, Ranulph Glanville, Andrew Herron, Mark Leslie, Ernest Lowinger, Mike Matthews and Stuart Rutter, gave insight into differing approaches to CAADesigning and provided notable inspiration and encouragement to the students.

New research direction from positive outcomes of earlier work, which concentrated on ascertaining the existence of CAADesigning [Kokosalakis and Moorhouse 1995b], concerns the examination, documentation and comparison of how CAADesigning is actually done. From the recorded material it is possible to analyse design moves and protocols, [Goldschmidt 1991],[Akin 1986].

As the number of case studies increase, similarities and differences in approach have become increasingly evident. Amongst new material gathered, the most interesting approach to emerge is that of Richard Dudzicki, Dudzicki Associates, London.

Richard Dudzicki is an architect, CAAD lecturer and CAAD Consultant, and writes on the Internet for the CAD/IT column in Building Design. His approach to CAAD is very much to use the computer as a designing device rather than simply to limit himself to the use of proprietary CAD packages for drafting. Sketches are produced using a digital pen, or are scanned if they have been drawn using traditional media. His design approach encompasses the use of any software that seems 'fit for the purpose' and ranges from manipulating digital images in order to generate ideas, to 3D object modelling through both 'toolboxes' and 'scripting'.

Initial investigation was conducted by telephone and then followed up with a studio discussion to set up the video interview. The interview itself was informal and the interviewee was free to lead. A directive, explicit approach was used to further investigate points of interest. He described a series of projects, recounting and demonstrating the design. The resulting videos capture a reflective, live account of design activity.

A sample project investigated was a VIP lounge for Brixton Academy, London. This was a conceptual design exploring space, form, colour, materials and light. Similar conceptual investigation was described by Clarke[2]. In the interview, Dudzicki recounts and demonstrates how the design develops. Firstly he sketches a preliminary plan in CAD. He then creates 3D objects and changes the thickness of lines to increase depth. A very wide CAD perspective view is then used to create a 3D distorted perspective and the model is further manipulated, he explains:

"bits and pieces are then lifted out of the ground plane to increase the perspective, different things happen and with the 'lens', the idea is exploded."

This differs notably from MacAllister's[3] approach where sketching is mainly 2 dimensional. The image is then plotted and 'tarted-up' with a fibre tip, primarily to seal areas of shape to enable the use of the 'Magic Wand' and 'Paint Bucket' tools in Adobe Photoshop. The sketch is then scanned back into the computer:

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[2] Neil Clarke, Nicholas Grimshaw and Partners, Manchester.

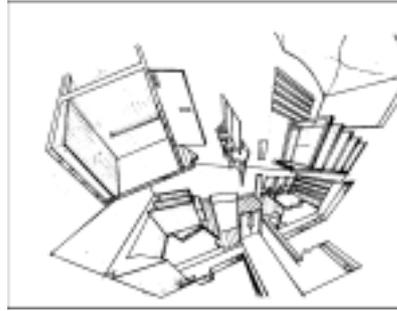[3] Rod MacAllister, King MacAllister, Liverpool.

Figure 1. Scanned and touched up image.

"we've got the perspective up on screen, its only a Line Art BMP, it is changed to RGB so the filters can be used. What was initially a CAD based vector drawing is now BMP so we've totally changed the nature of the image to make it a piece of art."

A digital pen on a pressure sensitive digitising 'Drawing Slate' is used to work up ideas on the image. Changing preferences allows variation in pen pressure to effect line thickness, depth of colour, gradient of fill and burn-out effects. I asked whether at this stage he had any preconceptions about colour or materials. He replied:

" No, I spend hours at the computer experimenting with colour palettes (using a colour calibrated monitor), a colour dimension book, colour swatches, material books & Pantone cards. I look at illustrations, There might be something that interests me. I might be looking at images, I might be looking at Klaus Aldenberg, I might be looking at something out of Post-Human Mondo ... magazines, not necessarily architectural, anything to excite and inspire me, for example, media advertising. If it's in your face and happening now I might take it up and use it. So I'll sit here. Reds and Blues are working for me at the moment. I'll go to swatches. It's good because it limits the colour palette and it's almost exact."

Space, form, textures, materials, colours and light were then explored in Photoshop. In contrast Small[4] describes the frequent use of a pre-determined 'palette' of materials.

"Using the Magic Wand (selection tool), I'll go over and pick up this wall, stick a graduated tint from dark blue to light blue, linear fill to lighter. I like that I'll keep it. The lines from the line drawing give me an idea of texture."
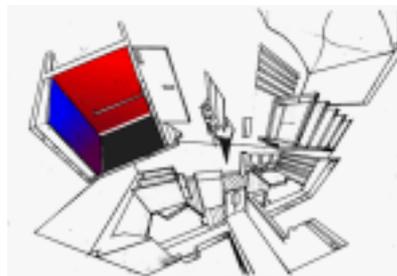

Figure 2. Exploration of colour and texture.

Similar exploration of colour and texture was also described by Clarke[1]. The process continued using filters and effects to simulate curves and transparencies. Kai's Power Tools were used to

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[4] John Small, Sir Norman Foster and Partners, London.

create fills to explore materials, always with catalogues and source books at hand. The concept is completed by the addition of lighting effects.

Insight into the interviewees perception of the potential of CAAD was gained through comments made during the recording. For example:

"Zooming in and out allows me to work on a micro/spatial level, it's very important that the computer gives me an idea of exactly what's going on."

And, after using fractals to generate a copper finish:

"This is a beautiful interface, which is what computers should be really about."

Dudzicki's approach is perhaps most similar to that of Glanville[5] and Collin[6], who make use of the digital processing of images to generate ideas.
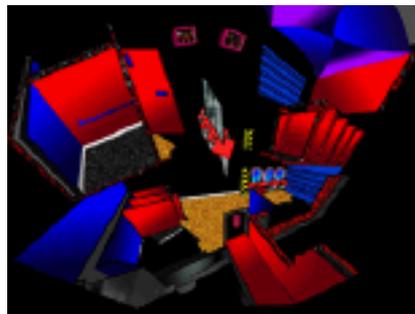
Figure 3. Completed conceptual design.

4. Conclusions

There is great value in learning by example. Chris Abel [1995] has this to say on the matter:

"I do not believe that architecture can be effectively taught by verbal explanation or by abstract principles or theory alone, though these are undoubtedly essential to a full and balanced education. In short, architecture is best learnt by example. "

There is, as yet, little documentary evidence to support the use of the computer as a vehicle for designing. Recording, analysing and evaluating architects designing with the computer will enable us to determine characteristic strategies for the use of computers in design.

Making such material available to the student and teaching them to understand how to learn CAAD is one way in which we can stimulate and encourage the development of individual approaches to CAADesigning.

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[5] Ranulph Glanville, observations from a seminar at LJMU.

[6] Arthur Collin, observations from a seminar at LJMU.

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