Charcoal, Bits and Balsa: Cross media tactics in the foundation design studio

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This paper investigates the space between the computer and traditional design media. The focus is the identification of strategies for extending creativity in the foundation year design studio via tactics of cross media working. The integration of computers into the design studio are described within a particular drawing culture at the University of Auckland. Creativity is related to a pedagogy of 'pattern' developed by M. Linzey. The cross media tactics are based on practical adaptation of the advantages of computing to the context of the foundation design studio (12 weeks / 80 students / 24 computers)

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Introduction

> *"CAAD educators face the dilemma of becoming obsolete – once new software becomes powerful and user - friendly enough – or of invading the domain of design teachers. The latter is inevitable if the advantages of computing in design are to be taught professionally and convincingly."*
> (Schmitt and Oechslin,1991)

Nine years after the above warning shot the situation is as anticipated but with a decisive shift – design teachers have pre-empted the invasion by grasping the 'weapon' and using it to their own ends. While some of these new users are naïve, the CAAD fraternity cannot ignore the current situation or decades of research – "the advantages of computing" – will not be built upon. Nor can it be assumed that there are not lessons to be learned from the intuitive moves of the 'uninitiated'.

Auckland: Computing within a drawing culture.

"Charcoal, Bits and Balsa" was the culmination of attempts to integrate two core first year papers - Introduction to Architectural Computing and Design 1 (both 90 students). Like most schools of architecture faced with large classes Auckland had coped in the past with teaching computing via software demonstrations in the lecture room. Students were then expected to use the software in the faculty computer laboratory to design a small building using the software. Apart from the odd exception students treated the course as separate from their design studio activities. In retrospect this was predictable given the physical separation of the computers and the particular 'drawing culture' of the Auckland School. The separation issue will be familiar to most - the sterile laboratory a hangover from the early days of computing - but explanation of the drawing culture of the Auckland school is necessary as it has had a strong influence on the way in which the studio evolved.

Auckland has established itself among the top 5 design schools in Australasia with our students frequent prize winners in prestigious international competitions. Reviews by accrediting agencies often make comment on the excellence and innovation students demonstrate in drawing and model making. In my view this is due to the emphasis placed by most design studios on the close relationship between representation and the development of design ideas. The "mark interpret mark cycle" articulated by Daniel Herbert in relation to freehand sketching is extended within the school to include the exploration of innovative graphics and physical modeling. (Herbert, 1993) While not a certainty, our experience has shown that innovative representation generally produces innovative and sophisticated architectural projects.

In this culture of drawing excellence the use of computers was isolated and tended to attract students who were more interested in mastering every last software command than using the computer to develop their design projects. The hunched figure of the 'computer geek' loomed large in both staff and student perception. However there was recognition that the school needed to extend the use of computers to the studio and to this end "Charcoal, Bits and Balsa" was planned as a first year foundation design studio with 88 students and 22 computers distributed throughout one open plan floor.

Foundation Studio Pedagogy

At this point in time there are many schools of architecture where the design studios are thematic rather than problem based as per a pedagogy of "analysis - synthesis" or "hypothesis - test" (Ledewitz, 1985). The Auckland School offers both problem based and thematic studios. One of the primary tasks of our foundation studio is to equip students with strategies for generating 'hypothesis' in relation to problems or first 'moves' in relation to a thematic studio. The pedagogy to achieve this has for the last few years been based around a theory of design as articulated by my teaching colleague Michael Linzey.

"The foundation studio pedagogy is directed towards discovering and constructing architecturally meaningful patterns between already familiar things. The idea is to help students to think about architecture in terms of intuitively meaningful relationships, patterned relationships in the realm between inanimate things, places and people. When students are asked to find or invent a pattern as the basis for a design they are not overwhelmed by the apparent magnitude of the task (as one is naturally overwhelmed for example, when asked to invent an idea, a form, a metaphor a geometry or a space). Architecture immediately becomes a creative production in the sense of personal creativity. By the same token students do not cling to a concept or an idea sometimes long after it has been shown to be of no use to them." (Linzey,1999)

The creativity we aimed to foster was the creative adoption of patterns - in a dream, in a film, and a work of art - as the basis for conceiving the architecture for - a holiday house, a cinema foyer and a dwelling for themselves and an artist. The creative moment(s) was the reading of the pattern and the transformation from graphic diagram to three-dimensional form, material and space. Creativity lay in the ability to see a *range* of patterns and the *architectural permutations* that various patterns may allow. Research from psychology has indicated the above emphasis to be consistent with creativity in architecture (Schoon, 1992)

Cross media Working

A mental picture of a pattern may exist, this may be articulated with words but to communicate and develop this pattern a student must bring it into the world of architecture. Typically this has involved freehand sketching, an activity which in the twentieth century has acquired almost mythical status. After Le Corbusier the sketch is seen as a 'divine' moment of creation marking the spontaneous birth of the architecture, a mysterious ability that some have and some do not. Hence the 'table napkin' doodles (pre

Figure 1 (top left)

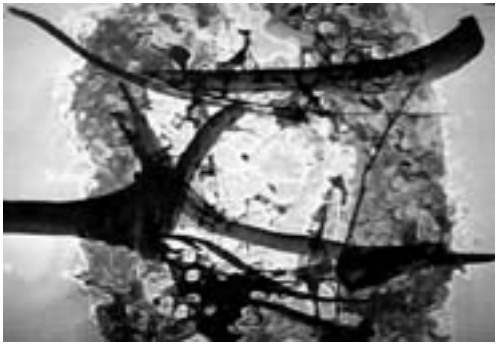


Figure 2 (far bottom left)

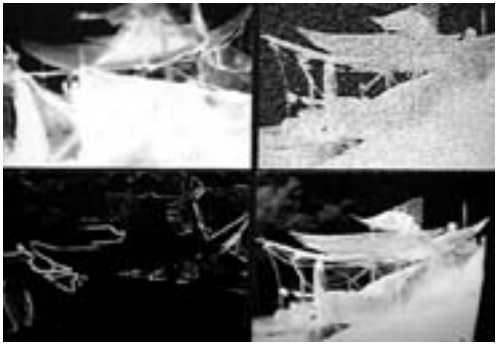
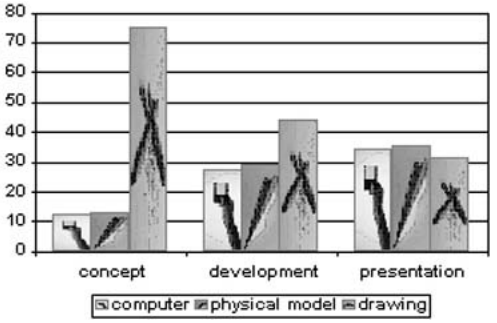


Figure 3. (bottom left)

or post natal) which inevitably accompany the documentation of an architectural project. There is no doubt sketching is a most convenient and natural method of notation. An activity, which allows the most direct eye- hand-, mind co- ordination that, is seen by many as integral to architectural creation. However I would argue that an over emphasis on any one technique – be it sketching, physical modeling or computing - does not allow for valuable ' cross fertilization' between media. As itemised in figure 1, developing architecture on a 2D surface, or with a physical or digital model allow different and complimentary explorations. By encouraging students to generate and explore their patterns within the full range we aim to maximise the opportunity for creative 'leaps' between media.

In short the objective was to 'normalize' the use of the computer by placing the resource in the studio directly alongside the drawing board and the modeling bench. In order to achieve this there was close integration of the core computing paper and the design studio. Each week students attended a 1 hour theory lecture. This was followed by a 3 hour workshop which was related directly to current design projects and conducted in the studio. Our aim in the workshops was to give students an immediate sense of accomplishment. There was little structured teaching of software packages - students were deliberately shown just basic techniques with subsequent one to one tutorials extending skill levels as required to pursue individual design directions - the emphasis was on a 'need to know' basis.

Table 1 (right). Student Survey



The Advantages of Computing (for the design studio)

Robin Evans in his publication "The Projective Cast" traces the relationship between projective geometry and the generation of architectural form. (Evans, 1997) In this work he proposes that the historical development of architecture has been limited by the ability to describe form on paper, and hence related to the drafting tools and techniques available at any given period. In an earlier paper I used Evans' historical perspective to propose alternate strategies facilitated or made possible by the use of digital technology (Moloney 1998) These were catagorized as *emergent form* (using generative techniques such as cellular automata, shape grammar or genetic algorithms), *immersive editing* (the editing of architecture within virtual environments) and *computer aided construction* (the automated construction of architecture using CNC machines). These three strategies are to my mind the advantages of computing for design (as opposed to advantages in communication and documentation. These advantages are usually presented in education as isolated paperless studios or separate postgraduate courses. This separatism continues in professional practice with the likes of Eisenman, Gehry and Lynn being instances of architects using computers as an integral part of concept formation and development. It would seem the advantages of computing for design remain isolated research activities within institutions or specialist practitioners.

The 'emerge / immerse / construct' framework was used to shape the first year Introduction to Architectural Computing lectures. Given our objective to relate such theory and example to practice in the design studio, the obvious challenge was the modest means at our disposal. We do not have access to virtual reality equipment or CNC machines. Nor was it appropriate to introduce first year design students to computer programming or scripting. However, we can introduce students to similar ideas at a level appropriate to first year, and within the limits of standard software - a low tech approach to engaging with the advantages of computing. To this end the following 'cross media tactics' were outlined to the class in relation to the final project.

Some ideas for using computers for your art house project…

(1) **Graphic Emergence:** Translation from artwork to pattern. Scan in your chosen art work and 'translate' via 'series working' techniques. The aim is to use the generative capacity of the available software (Photoshop and Flash) to make many versions of the artwork, then locate translations you think are successful and use these as the basis for further series. Obviously you can print out at any stage and draw over to make a mixed media version of the above. Try introducing chance elements such as dice throws.

(2) **3D Emergence:** Treat the translation from 2D image to 3D form as another series. Import your image into ArchiCad and experiment with plan and section extrusions. Use the displacement map tool in Form Z to automatically create 3D form. Again work quickly. Do not pre judge these experiments.

(3) **Immersive Editing:** Take the various computer models and evaluate / edit from the point of view of occupation. Experiment with different viewpoints and lighting techniques. In this way make decisions based on interior

spatial qualities as well as the 'object' qualities of the external appearance.

(4) **CAD model to Physical model:** Use your CAD model to generate scaled drawing from which you can realize a physical model. Experiment with printing out sections on transparency). Assemble as a physical wire frame and gradually flesh out to produce a hybrid drawing / model.

Observations on Student work:

The studio was successful in the twin objectives of 'normalising' the use of the computer in the design studio and allowing students to engage in low tech versions of the advantages of computing. This was confirmed both by the work on display and by a student survey conducted on completion. (Table 1)

In this survey students were asked to identify relative activity in media during the three design stages: first conceptual moves, concept development, and presentation. Few students indicated they used the computer at the initial concept stage with a majority preferring to draw. This may be partly explained by the observation that in general students formulated their first ideas away from the design studio (and the computers). Activity during concept development was more or less spread between computers, physical models and drawing. Drawings were often scanned in and a range of options were quickly developed in Photoshop as in figure 2. In a similar fashion physical models were captured with digital cameras. Often this translation from 3D physical model to 2D graphic allowed students to reinterpret and propose new physical models. (figure 3) 3D computer models were most often used to explore and edit internal spaces and lighting effects (figure 4).

The final presentation stage involved wonderfully inventive hybrids: Computer printouts were collaged with photos of models or drawn over by hand; the 'built wire frame' appeared as a low tech application of 'CAD CAM' (figure 5); physical models concentrated on tactile qualities to supplement slide shows or animations. Often the traditional pre-immanence ascribed to plan drawings was challenged by convincing perspective explorations -the 'experience' of the interior was powerful enough to allow hardened critics to overlook graphically clumsy plans.

During the school review of grading there was general agreement among staff that the studio was an outstanding success with 35 % of the students graded A - or above. The school will phase in computer integrated studios throughout all year groups partly as a result of the success of "Charcoal, Bits and Balsa".

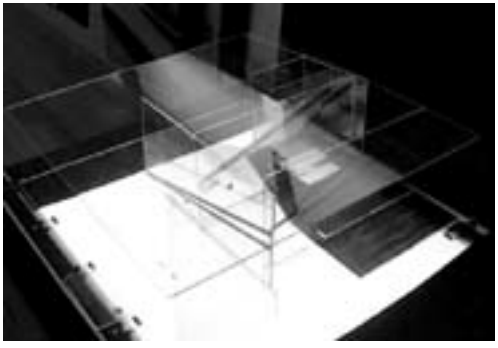


Figure 4 (far right)

Figure 5 (right)

Acknowledgements

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