Decoding to 2000 CAD as Mediator

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"Propylaea, a gate, an entrance, an antechamber, an area between the inside and the outside, between the sacred and the profane." Goethe 1798

This paper will present examples of current practice in the Design Studio course of the BDE, University of Strathclyde. The paper will demonstrate an integrated approach to teaching design, which includes CAD among other visual communication techniques as a means to exploring design concepts and the presentation of complex information as part of the design process. It will indicate how the theoretical dimension is used to direct the student in their areas of independent study. Projects illustrated will include design precedents that have involved students in the review and assessment of landmarks in the history of design. There will be evidence of how students integrate DTP in the presentation of site analysis, research of appropriate design precedents and presentation of their design solutions. CADET underlines the importance of considering design solutions within the context of both our European cultural context and of assessing the environmental impact of design options, for which CAD is eminently suited. As much as a critical method is essential to the development of the design process, a historical perspective and an appreciation of the sophistication of communicative media will inform the analysis of structural form and meaning in a modern urban context. Conscious of the dynamic of social and historical influences in design practice, the student is enabled "to take a critical stand against the dogmatism of the school"(Gadamer, 1988) that inevitably insinuates itself in learning institutions and professional practice.

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Introduction

In an integrated course of architecture and engineering, time constraints also requires an integration of history, theory and design in the process of developing a wide range of visual information into analytical and intellectual concepts. CADET's experience of an early introduction of CAD to the design process (Wood and Laing, 1993) would concur with Lentz (Lentz, 1994), "With their open minded access to the media, they often try to do things, which are surprising and new. Things which would have been *impossible to think of* without a computer" (our emphasis). Whereas Municio (1993) would recommend that this "has its own place in a more advanced stage of the course".

Municio asserts that "the computer is not something with which one can express himself but, rather, it *is only a bearer of language*" (our emphasis). Assuming a reasonable degree of consistency he also might be expected to assert that a pen or pencil is but a bearer of language. In stronger terms he asserts that "this confusion is brought to the point of absurdity" (in Spain) "by fomenting the introduction of Computer-Aided Design" (at an early stage) "when students do not even know what architecture is nor for what reason can the computer aid them. This has its own place in a more advanced stage of the course." (Municio, 1993) We would agree with Municio that a "realistic computer simulation" is not evidence of knowledge of architecture. But why indict CAD, if not the pen or pencil, the seductive wash or the sensuous pastel?

Municio in fact undermines his own case. When later he exhorts us "not to be influenced by the impressive capabilities of this or that programme" he then later acknowledges that CAD "is geared to developing his 'spatial vision' and mental agility in order to capture the three-dimensionality of space." Clearly he is correct that we, in teaching, are concerned "not simply to form a 'screen-designer'," but "to teach him *how to see and how to imagine*." (Municio, 1993)

It could be argued that our experience of space is four dimensional, including time, in which event is as crucial as a two-dimensional image or three-dimensional model. But more important the concept of imagining, of imagination, is fundamental to the act of representation. To represent is to deal with concepts by the organisation and presentation of signs or symbols - in the language game, to use tools in order to shape those concepts. As stated later "language is a collective art of expression", by its very nature it has a social aspect that demands that we speak the language of our particular community. Architecture does not exist independently of its own current language of expression, and that language is our language not that of some mythical architect. CAD is a part of that reality and, whether we like it or not, IT, virtual reality (if only at the level of games and entertainment), is part of our common culture and 'language'.

Municio is absolutely correct in underlining the priority in teaching design as *how to see and how to imagine*. In thinking "images are our way of trying to render the absent present to ourselves" (Warnock) in representation, where the audience is presumed, images exist only in a material sense 'words as images, sounds, colours as virtual form' - and in all cases *stand for something else for someone else*. To return to our classical past our art, the poetry of design in architecture and engineering, is to describe, not the thing that is, but a kind of thing that might be (Aristotle). In the poetic sense, to distinguish buildings from architecture perhaps? to see and imagine, is to perceive not only what is presented but to identify that change of aspect, that new perception which we attribute to the aesthetic experience. In the pre-selection of the effective learning experience we should not deny the creative and productive potential of CAD out of some mistaken believe that the idea of architecture exists prior to its materiality - in its propositional as well as final form. In the realisation of a pivotal architectural concept of space, such as that outlined by Tschumi (proposal for the School of Architecture at Marne la Vallée), the architect intends that we visualise an 'unprogrammed void'. "This void is a space given over to the students to accommodate and even encourage unanticipated and spontaneous events and also serve as the main system of circulation".(Tschumi, 1997) Given the potential to explore his or her "spatial vision" and "capture the three-dimensionality of space" through CAD, why postpone the use of the appropriate tool until they have mastered an idea of space as a static void generated by a two dimensional plan. Can such a "harmonious play" of our mental faculties (Kant) not enrich the learning experience and underpin the nature of both the creative act and the aesthetic experience at the same time?

CAD allows the student to explore ideas as a means of developing their understanding of architectural space as material, space and time

(Tschumi's event). "The computer animation serves as a better tool to describe the various dynamics at work and, through the interactive station, places the viewer in a situation of choice." (Sakamura and Suzuki, 1997). Hilkka Lehtonen, while acknowledging the "user friendliness, flexibility and openness (and increased) visual possibilities"(Lehtonen, 1987), provided by CAD maintained that "CAD visualisation is so far inadequate for creating a correct impression of the building materials". Clearly, while we have moved on in terms of texture mapping and colour modulation, Lehtonen surely misses the point. CAD is, like other visualising tools working within a system of representation - the reader or viewer is not expecting to be tricked by a slight of hand. The reader enters into a code of practice - design practice that has evolved as new tools and conventions of representation and expression push at the boundaries of communication. CAD, as Lehtonen indicates, increases the possibilities of interactive workstations, which are, via the Internet, not limited by geography. These possibilities for an exchange of ideas as well as collaborative enterprises are a reality and will continue to modify the way in which our future designers work. Lehtonen concludes – "new techniques can increase possibilities for creating fictional worlds and thereby they give a liberating element to planner's own way of thinking. An interactive mind will thus be born." As these fictional worlds emerge from virtual-to-reality itself, the operating codes will of necessity expand. At its root however is a visual communication system as fundamental as the linguistic system that is common to all languages. The great liberating hopes that Lehtonen has are clearly not simply instrumental - solving technical challenges, but also concerns "communication and evaluation from the lay person's point of view." By their nature the lay person is concerned less with the technical and more with the potential for enhancing their environment. The lay person, increasingly, is adopting a position more common to the 18th century where, ideally at least, the aesthetic and moral were inextricably linked. In

our parlance read ethical for moral and we have the emerging ecological perspective. Our students, as potential opinion formers and decision-makers, cannot be circumscribed by an instrumentalist ideology. Their goal must be to comprehend their visual language as part of a wider network of signification - including linguistic, visual and architectural. The content, structure and relationship of discrete parts of a course must facilitate that open and interactive mind which will grasp the significant relationship between the historical, the theoretical and design practices.

In the annual review of the course, we looked to past papers presented at ECAADE conferences over the past decade and more, in order to measure our approach against that of our peers in Europe and beyond. This proved a useful exercise in identifying both the strengths and weaknesses in current practice. We were assured that the major issues have been clearly stated and remain the basis for sound practice. We noted occasions of doubt even among those who are committed to CAD. Doubt as to when such a creative tool might be introduced, defensiveness against the narrow-minded dogmatism that comes with institutional thinking. We began with Glennie's summary: *"Systematic design method can be stated as analysis, synthesis, evaluation"*. (Glennie, 1993) which highlights the question of method - one with clear links to a scientific method that would be appropriate to an integrated course engaging students of engineering and architecture in a common cause. However design has strong roots in the visual arts, somewhat resistant to a scientific method, so caution is needed here. What each approach share is the notion of language - a discursive language with its linearity, and a poetic language motivated by the figurative. Poetry, the function of which being "to describe, not the thing that has happened, but a kind of thing that might" be. (Aristotle). It is at this conjunction that CAD is placed.

The roots of our design 'language' are nourished by a long European tradition - with its strengths and weaknesses being tested in this century with the inevitability of global change through IT. A change in

life style and production methods challenges our concept of a sustainable urban environment in a global context.

The urban, social and ethical contexts

As with the other visual arts, architecture and engineering are cultural constructs and are a contemporary urban phenomenon. The most remotely located engineering icons, from bridge construction to communications infrastructure, are there as a result of the economic machine, the industrial and post-industrial city.

The present generation of students and practicing designers have available a body of writing that deals with environmental issues. They have to deal with both governmental and European legislation and with pressure groups highly motivated and supported by articulate activists. They are required to identify and understand the key concepts and major issues that impact on building design and concepts that support calls for a sustainable urban environment. History has taught us that the worse excesses of the industrial urban environments demonstrated the dangers and injustices of a laisse-faire strategy, which has mobilised those "appalled by the damage (done) by an ethos of heedless anthropocentric individualism". (Farre) The level of toxic waste, and polluted space within urban environments is one legacy for this and future generations. While the concept of planning controls and legislation was slow to appear, it did so in the wake of the clear and present dangers of uncontrolled urban expansion (water and air borne diseases motivating planning rules). Clearly, design practitioners, presently and increasingly in the future, will be required to deal with complex environmental and ecological issues that will impact on the design - from conception to the production and maintenance stages. The design process, which deals with beliefs, actions and consequences rather than merely with matters of taste (luxury commodities in the fine art sense), requires an understanding of concepts such as the social space. These concepts are explored through design studio projects such as a Cancer Care and Information Centre.

Given the pressure on the BDE student's time, the Visual Communications component of the Design Studio must aim for a succinct and coherent delivery of the course content. This, however, is no reason to avoid important issues in the conception, development of the visual concepts demanded by the brief. The student is required to design in context, which includes the wider historical and cultural context. Where the studio dialogue will inevitably touch on current architectural issues, not least the continuing battle of styles, the introductory lectures will point the student in the direction of key stages in the evolution of architectural and design theories. Conventional solutions to visual communications are therefore put in a wider context of design history that enable the student, through independent study, to research these conventions in greater depth. Three-dimensional exercises that precede model making, concept design and applications of software packages (3D Studio) will direct the student to the Bauhaus and beyond into the 18th century to highlight the origins of modern design. Precedent studies support the student's personal research. The Bibliography, a study of a modern designer, and utilising graphic communication and presentation techniques provides a means of bringing together independent study, analysis of precedents and communication techniques in traditional and IT media.

An example of this integrated approach would begin with reference to Heinrich Hubsch (1828) challenge to a narrow doctrinaire approach to architectural design. Hubsch directs the student to the formative factors of "functionality" and "solidity" - to a consideration of material and "technostatic" factors in determining the final form of the building. In his differentiation of function and form from the idiosyncratic decorative elements Hubsch challenges the overtly doctrinaire academic teaching of his time. An analysis of Hubsch own interpretation of classical forms would encourage the student to acknowledge

the gradual abandoning of decorative elements, before its reinvention in the post-modern, in contemporary practice. Hubsch provides an important link between the Romantic, Bauhaus and Modern periods. Behren's AEG factory, the worker house by Gropius and brickwork of Mies van der Rohe's "studied purity relying on the richness of the materials employed" (Banham, 1972) are thus seen as part of a continuum that begins with a constructive challenge to the doctrinaire. "Every architectural element was formed and used in a way consistent with its true purpose" is Hubsch's analysis of classical forms in which, at its best he maintained, "no architectural element was used superfluously".   In Hubsch's insistence on function and material we have an excellent guide to the study of form and style that can be fruitfully applied to modern design as well as to those of the past.

Language and theory in design studio

Students have a clearly identified problem with the concept of language in design studio practice. Problematic also is the diversity of 'language' use in studio and lecture courses. The student, in most cases, comes from a course of study, as well as everyday experience, in which language is very specific. Entering into the specialist domain, moving especially from the 'profane to sacred' - the language of architectural discourse, the student is confronted with a major challenge. CADET, CAD education and training, endeavours to support the student in developing the necessary concepts by underlining the play of language in the formation and use these concepts. However demanding the existing course of study is the pre-selection of the effective learning experience demands that students are made aware of the role of theory in a design course. The danger of theory without practice is that it operates as an ideological obstruction, which will inevitably dull the inquiring and critical thinking required in the design process. The designer, confronted by a complex

situation, requires effective tools - the conceptual tools which direct those which are but extensions of the hand. Language is a tool but also a social activity.

In the introduction to visual communication and in particular the bibliography which engages the students with the work of their chosen designer, they are introduced to a basic theory of language and symbols. In exploring new ideas, it is not "until we own the symbol do we feel that we hold a key to the immediate knowledge and understanding of a concept."(Sapir,1949). Sapir is concerned with language in the linguistic sense but also with its roots in human nature itself. "Every language is a collective art of expression", it is a social act whereby individuals "communicate ideas according to the traditional systems of a particular society". In the apparently unconscious transition from linguistic competence to performance, language is marked by the nature of relationships between the less and more knowing individuals.

Semiotics

From the perspective of 'language', a basic understanding of Semiotics will be necessary in order to make sense of the complex modes of representation that confront the student of design in an information age. It is necessary also to form a sound conceptual base for the production and interpretation of image and text that are necessary in multi-media presentations. It is imperative that students distinguish processes of communications from the "system of signification" and in particular those "cultural territories in which people do not recognise the underlying existence of codes (and especially) the semiotic nature of these codes". In dealing with design interventions in the urban environment the student should appreciate how these functions as signs – "a sign is everything which can be taken as significantly substituting for something else" (Eco).

Language and culture

Goethe, two centuries ago, imagined a people who could "develop a culture that had harmony and continuity, in contrast to our own which seems so fragmented and transitory." If this is to be a possibility we must agree with Goethe: "Communicating with the public at large is also desirable, indeed necessary" then for us it would be a question of going beyond the gate, where the cultural location would be for more than the insider. On such a situation the first task is to identify the system of codes and representation that enable a full participatory process in the design and construction of a transformed environment. Clearly the visual culture of our recent past, in spite of particular utopian visions, has failed to provide access to that wider public. CAD is a significant step when used as a creative, dialogic tool. As the shapers of our urban environment, the engineer and architect set the context in which such a participatory culture may flourish. The basis of their education requires an understanding of those systems of representation, and a mastering of the process of encoding and decoding complex visual data that competes in a rapidly expanding multi-media environment.

The ethos implicit in practices represented in ECAADE supports a programme of design studio teaching that enable students to "see a whole where before we only saw parts with divergent purposes." (Moritz and Todorov) Moritz clearly points towards that reality in which architectural function clearly has much to do with communication - demanded by Goethe. A review of past papers identifies key stages in the application of CAD/IT to the teaching of design studio. Implicit in this emerging philosophy - design with a purpose - is the integrated building design ethos.

Conclusion

The student will achieve a concept of an integrated building design ethos only with an understanding of the world in which they live. To do this they have to construct a working model of their environment.

Rather than a traditional world-view, that separates object from object and the objective from the subjective, the student should look to contemporary science. For the physicist the world "appears as a complicated tissue of events, in which connections of different kinds alternate or overlap or combine and therefore determine the texture of the whole". (Heisenberg, 1962). Far from being a distant and detached world the latter is one that responds to interventions. The creative impulse of the designer does ultimately impact on such a world.

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