CAAD, Curriculum and Controversy

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This paper brings some of the debate within educational theory to bear on CAAD teaching, outlining the contributions of conservatism, critical theory, radical hermeneutics and pragmatism. The paper concludes by recommending that CAAD teaching move away from conservative concepts of teaching, design and technology to integrate it into the studio.

In a highly illuminating book on education theory, Shaun Gallagher (1991) outlines four current views on education that correspond to four major positions in contemporary social theory and philosophy. I will extend these categories to a consideration of attitudes to information technology, and the teaching of computing in architecture. These four positions are conservatism, critical theory, radical hermeneutics, and pragmatism. I will show how certain issues cluster around them, how each position provides the focus of various discursive practices, or intellectual conversations in contemporary thinking, and how information technology is caught up in those conversations.

These four positions are not "cognitive styles," but vigorously argued domains of debate involving writers such as Gadamer, Habermas and Derrida about the theory of interpretation. The field of interpretation is known as *hermeneutics*, which is concerned less with epistemology and knowledge than with *understanding*. Interpretation theory applies to reading texts, interpreting the law, and appreciating art, but also to the application of any practical task, such as making art, drawing, defining and solving problems, and design (Coyne and Snodgrass, 1995). Hermeneutics provides a coherent focus for considering many contemporary issues and many domains of practice. I outline what these positions in education mean in terms of CAAD (computer-aided architectural design) in the curriculum.

Conservatism

Conservatism in education emphasises the conservation and maintenance of knowledge. For example, one school of thought advocates a return to a corpus of "great books"—Shakespeare, the bible, "Pride and Prejudice," etc—as the focus of the high school curriculum. Educational conservatives think that ensuring a grounding in a common culture will foster a society in which there is an efficient distribution of competencies, but also better communication and

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debate. Eric Hirsch (1987) and Allan Bloom (1987) seek to re-instate education as a means of conserving a culture. These ideas are also evident in higher education through the specification of performance standards for the education of the professional, including the architect.

In interpretation theory, according to the *conservative* position, the task is to uncover original meanings placed in a text by the author. Texts serve to conserve meaning. The schools of language theory known as the analytic school and logical positivism can be construed as conservative in that they are concerned with logical consistency, correctness, unambiguous communication, and the idea of sentences as preserving truth (Hospers, 1967). Structuralism is also a party to the conservation of meaning. Ferdinand de Saussure (1983) characterised language in terms of meanings as transmitted from one person to another through systems of reference. Sign systems conserve and transmit meaning. Structuralism also points to the idea of structures that lie behind the surface phenomenon of language, and attempts to uncover such constancies.

Design under the conservative theme is an intervention, a manipulation. It is to convert an undesired situation into a desirable one. It presupposes our ability to declare needs, wants and intentions. Artefacts are the products of creative individuals or teams of individuals. As with the conservative view of interpretation, designs conserve the intentions and meanings of their originators. The conservative view presumes that designers can control and are in control of what they produce. This control can be realised in the activity of designing through method. There is a sequence of steps to take us from the undesired situation to the desired. The conservative view of design also presumes that there are principles underlying design. Design under the conservative regime follows one of two paths. There is the romantic conception of the designer as the creative individual (the genius), battling against opposition, preserving his or her creativity (Rand, 1972). On the other hand there is the systems theoretic view of design that seeks to enlist science and its methods to arrive at objectively valid solutions to problems.

What is the conservative view of information technology? The importance of information technology is thought by some to reside in its role as a medium for the transmission, conservation and increase of data, information and knowledge. Data, information and knowledge are quantifiable entities that can be made to flow through networks, and stored and operated on to produce more of the same. This characterisation is conservative in that it suggests that there is something (data, information or knowledge) to be apportioned and measured in quantity, and conserved. This view provides great impetus for the development of information technology systems—to provide for faster and more ubiquitous transmission, more efficient storage, faster access, and faster and cleverer means of generating more information. Allegiance to the conservative theme is demonstrated by writers such as Herbert Simon (1969) and those in the field of artificial intelligence research that trades in the capture and preservation of human knowledge in machine form.

CAAD and computer studies are implicated in the conservative regime in several ways. It seems that computers are implicated in the development of methods, the "bureaucratisation" of education, the promotion of the conduit metaphor of learning, and information processing models of cognition. Under this regime, computers are sometimes offered as providing a key to

understanding the design process, as in the use of formal design methods, shape grammars, etc, or they are used in arguments justifying formal on-line education.

CAAD may fit within the conservative regime, but it is also a casualty of it. Conservatism trades in the rhetoric of needs, presupposing that the profession and practice of architecture, design and the structure of its organisations and institutions have a pre-given character. For example, on deciding whether to introduce CAAD into the office, conservatism assumes that a firm is able to identify shortcomings in its operations, identify needs, and that it is sufficiently in control to develop plans to meet those needs. The rhetoric of needs draws our attention to goals, methods, plans, optimality, and good practice. This is a privileged discourse in today's corporate world. It provides a certain sense of security, but it ignores the overall character of the matrix into which technologies are introduced and how practices are changing. Under conservativism CAAD is a means to an end, and appears in the architecture curriculum as such, with little recognition of, or interest in, how it is implicated in a raft of changes that are occurring in society and practice. CAAD is presented as merely another skill that has to be taught in the service of practice. Hence there has been a transition over the past ten years from the teaching of CAAD as a maverick enterprise that perhaps met opposition, but that carried the kudos of something new, to an unclaimed service activity.

Conservatism also supports a romantic disposition towards design, practice and technology. Romanticism in the eighteenth and nineteenth century entailed a reaction against rationalism, industrialisation and the dominance of the machine. John Ruskin, William Morris and others of the arts and crafts movement invoked a return to craft skills and a disdain for large scale centralised industry. This tradition, or at least the *rhetoric* of the arts and crafts movement and the contempt for the machine, is still very strong in art and architecture. The romantic position is conservative in that it seems to be against change, but arts and crafts Romanticism is already a highly artificial, unreflective, and hence anti-intellectual, position. It is well known that for all its positive benefits the arts and crafts movement was less a return to authentic making than the creation of a new bourgeois form of production that was parasitic on industrialisation for its impact, as was the wealth of its patrons. There are also various contradictions in expounding an anti-technology position in this age in relation to architecture, while accepting computers in cars, music production, theatre, film, travel, and other objects of consumption. It is interesting how the whole craft legacy is also taken up in the discourse surrounding the culture of computer hacking. Computing is already influenced by the Romantic legacy. The passionate pro- and anti-technology positions are caught up in the same system of thought. According to Heidegger (1977) and other commentators on technology, we are already enframed by technology, since thinking was transformed to instrumental reason in early Greek philosophy, and following the early transition of craft from making to manufacture (poesis to techne). Heidegger and others posit various ways of reflecting on and dealing with this technological

enframing, but none include the heroic, selective, anti-technological rhetoric that is sanctioned in some areas of architecture.

Critical Theory

The critical theme emphasises education as a means of liberation from oppression, and how in education we should instil skills in thinking critically. The schoolroom should foment political and social reform. The critical tradition of educational development has its seeds in early nineteenth century socialism and also Karl Marx. The critical position is also a party to the legacy of Romanticism, and Ruskin and Morris were among the early socialists. The critical enterprise has been radicalised by the Frankfurt School, which started in the 1920s, and its heirs. One of the foremost proponents of the critical theme in education is the South American left-wing theorist Paulo Freire (1972).

The critical view of interpretation seeks to challenge and unsettle claims to community and is suspicious of the power it conceals. To interpret a text is to expose the power and exploitative structures the text conceals. The critical theme has allegiance from Jürgen Habermas (1987) and others of the critical theory school.

What is design under the critical theme? If design is a community enterprise then critical theorists argue that the involvement of communities in design needs to be appropriated and made explicit. Design itself, in so far as it is the imposition of the interests of a few upon the many, is a subject of critical scrutiny in its own right. Under the critical theme design is a political activity. Designers and planners seek to enable others—the users of a housing development for example—to formulate and realise their own expectations, to present a voice amongst those of the developers, financiers, government instrumentalities, professional groups and institutions. In the case of information technology the critical perspective is strong in the rhetoric of those who advocate the ubiquity of computer and communications systems, and who advertise the "grass roots" origins of certain communications system—though many critics, if not designers, are also suspicious of such claims.

The critical position on information technology suggests that its importance resides in its role in a political and social web of control. Information technology is prone to abuse and it also promotes ways of thinking that are to be resisted, or at least treated with caution. The critical theme is advocated by Joseph Weizenbaum (1984) and others who have presented scathing critiques of both the claims of information technology developers and of the technology itself.

CAAD within the regime of critical theory can be seen in two ways. On the one hand critical theorists may regard the computer with suspicion as promoting conservative styles of teaching. On the other hand there are some who see the computer as a means of liberating students from convention, putting students in touch with people in other parts of the world, thereby empowering them, and instilling skills in thinking critically. Much of the rhetoric surrounding the use of the Internet fits within this regime, with its talk of community, freedom, and "anarchy on the net."

Radical Hermeneutics

The radical theme emphasises that education involves a complex play between convention and the undermining of convention. It recognises that even the critical position is subject to constraints. Freedom is elusive. The radical interpretative position treats a text as an endless play of signs. Texts reveal and conceal through the play of difference and contradiction. The radical position has been put forward by Jacques Derrida (1982), and others, radicalising the insights of Saussure's structuralism as *post*structuralism and deconstruction theory. Advocacy of radical educational theory has far less currency than conservatism and critical theory, but what exists is largely inspired by Derrida's writings on the role of the university (Derrida, 1983).

What is design under the *radical* theme? Deconstruction features prominently in design discourse, particularly in architecture. Radical design is subversive of entrenched structures, assumptions and oppositions. Derrida takes an established opposition in philosophical discourse with its in-built priority and shows how that priority is betrayed by the very texts that assert it. The "deconstructive" architectural designer identifies an oppositional priority in some orthodoxy, such as the priority given to the private over the public in standard house design, and seeks to bring the contradictions and tensions within such an opposition into the new design. Critics of this designerly application of deconstruction point out that the design has to be *explained* as a deconstruction in order to operate as such. Much deconstruction in design is an extension of structuralism—treating designs as texts that convey messages and that require reading and interpretation. Deconstruction also becomes a method, a creativity exercise, or a way of loosening up thinking. Whatever the merits of such exercises, they miss the radical edge of Derrida's thinking. Nevertheless, the idea of metaphor, when understood in a radical way as operating through the play of difference, provides an account of design that is pertinent also to computing.

The radical position on information technology attempts to unsettle any claims to the importance of computers by showing that any ideas we develop about the centrality of information technology turn out to demonstrate the opposite. Any sweeping change we may ascribe to the introduction of information technology into our world has already been usurped by something else. The radical position takes what purports to be a progressive position—namely a recognition of the centrality and importance of information technology—and demonstrates the orthodoxy in such a position. On the other hand it demonstrates what is radical in what we commonly take for granted. I have developed these themes at length elsewhere (Coyne, 1995).

Praxis

The pragmatic view of education emphasises learning by doing, and learning as a social activity. This is also the legacy of Deweyan educational liberalism and the philosophical pragmatism of William James and Charles Peirce. Pragmatism takes the usual distinction between theory (theoria) and practice (praxis) and asserts that theory does not underlie practice, but making and applying theories are kinds of practice. What we call "theories"—rules, formulas, principles, methods, and so on—are simply tools, or technologies, amongst many, that we have at our disposal. Skill lies in their application, which is a matter of praxis.

The pragmatic view sees interpretation as a matter of entering into the interpretive norms of a community, making judgements from within a historical context. There is no original meaning to a text. This view is pragmatic in the sense that it assumes a holistic engagements beyond the exercise of some rules or principles for seeking out pre-existing meanings. Allegiance to the pragmatic theme of interpretation is demonstrated by Hans-Georg Gadamer (1975) and other contemporary philosophers who emphasise the historical and communal situation of any interpretive act.

For pragmatism design is not so much addressing needs as projecting expectations. These expectations have less to do with method and individual genius than community. As with the pragmatic view of interpretation, the doing of design and design evaluation are situated within communities. Notions of the individual designer and individual creativity are replaced by considerations of authority, legitimation, responsibility and the interweaving of varying roles, practices and technologies. For pragmatism design is a kind of "reflection in action" (Schön, 1982)—needs are commonly identified in retrospect or during the development of the design rather than at the outset of the design process. Design is an exploration, but it is an exploration that is already in train prior to any particular design situation. Designers and artefacts are already caught up in a world of artefacts and practices, and their history.

For the pragmatic view, the importance of information technology resides in its role as a tool. One of the common characterisations of tools is that they are extensions of the person using them. The tool becomes a part of us and we of it. This position deals in working and doing, and draws attention to the person engaged in a situation, rather than the abstract worlds of data, information and knowledge. The pragmatic theme is advocated by much of Silicon Valley culture which appears driven by notions of engagement between the human and the technology, presented in diverse forms by researchers and developers such as Allan Kay and Terry Winograd, but also philosophers such as Hubert Dreyfus.

As I argue at length elsewhere, the critical and radical positions keep returning us to praxis, though each introduces the indeterminacy of its particular problematic, its intellectual tools, vocabularies, and oppositions, and enlivens the debate (Coyne, 1995).

What is the pragmatic view of computers in practice? Any technology introduced into practice is implicated in various transformations of that practice. Computing amplifies, re-defines, re-orients, brings to light, or generally "discloses" certain aspects of that practice. Practice in turn reveals aspects of computing. As an example, in a recent study of computer-mediated communication (CMC) in practice (Coyne, et al, 1996) we observed how the introduction of CMC into a firm discloses aspects of the firm's operations that were perhaps not regarded as important before. CMC is implicated in the way certain firms are redefining themselves as entrepreneurial enterprises, handlers of texts, collaborators, and players in the global arena.

The notion of disclosure is a concept in phenomenology and fits well within the pragmatic theme. The issue of CAAD often centres around the issue of communication, and the phenomenological view of communication as disclosure brings out some useful ways of thinking about computing. We can consider attitudes to documentation drawings (blueprints or working drawings) as an example. The conservative, needs-oriented way of looking at working drawings is to say that they serve as a means of communicating intentions from the designer to the contractor. This is a valid construct, but, according to the workings of praxis, it is presupposed by the more basic phenomenon of the nature of working drawings to disclose. The drawings do not just disclose the designers wishes to the contractor, but they reveal something about the builder's and the designer's practices. Making, interpreting, checking, and working with contract documents are practices. Designers engage in the practices of designing, and builders are engaged in the practice of building. Through training, experience, and engagement with their various professional communities, these practices are built into their roles as professionals. Builders do not require instructions in order to build. The builder is already caught up in particular ways of doing things when left to his or her own devices. Contract documents are interventions into that practice. Several things happen when the builder interprets these drawings. Every interpretation involves coming to a text, or drawing in this case, with certain expectations. Interpretation involves an indeterminate and cyclical play of expectation and revision. In the process, the drawings disclose aspects of the builder's practice, what is different about the builder's construction practice. Whereas the builder would extend the roof to form an eaves, the drawings indicate something different—the continuation of the wall above the eaves line to form a parapet. The drawings both reveal and also, hopefully, are implicated in the builder's action, though it is not simply the drawings that accomplish this but the various practices that the builder, the trades, the designer and the drawings are already caught up in.

According to this view, CAAD drawings and models of buildings appear in a particular light. As long as we see CAAD models as primarily meeting communication needs then we tend to focus on the accurate transfer of information—an elusive quest. The view of CAAD models and drawings as disclosive directs our attention to the changing practices in which those models operate, including new emerging practices such as managing CAD databases, using the Internet, developing web-based client services, "virtual studios," and so on.

As I have explored elsewhere (Coyne, et al, 1994; Coyne, 1996), the concept of metaphor is also useful in understanding the role of computers in the design studio, and fits within the theme of

praxis, while appropriating certain ideas from within radical hermeneutics. We recently ran a short project for the design of a cybercafe. Trading in notions of cyberspace, the cybercafe provides opportunities for invoking the hermeneutical notion of strangeness and distance. The cybercafe is already a potent juxtaposition, a metaphor, of café and computer facility. In the process of this juxtaposition the notion of the café receives a particular definition, appearing as a place where people exchange information, read magazines and books, browse, watch the world go by, converse, look at posters, and so on. Perhaps these features of cafés have always been present, but the idea of the cybercafe brings them to the fore. It is also clear that under this metaphor the conventional notion of a computer facility moves away from the idea of a laboratory and closer to something like a media centre or an information kiosk. Design involves the exploration of such metaphors understood in terms of oppositions. In this case we observed the play of oppositions such as the stationary and the mobile, the real versus the virtual, place and space, near and far, transparency and opacity, public and private, comfort and discomfort, and so on. Computer technologies seem to influence the design process and design products through the metaphors that they are caught up in. Then it is not through the imposition of a single metaphor and its entailments but many metaphors, and the oppositions that they set up. Any metaphor is never far from its negation. Design that is lively and provocative is often that which identifies, transgresses and exploits the contradictions within such oppositions. Design projects that involve computers have the potential to contribute to this unsettling process, as long as they are seen as more than just tools for three dimensional modelling and documentation. It is here that inventive design teachers can exploit the intrusion of an alien technology and its incongruities into the sacred preserve of the atelier.

Conclusion

The conservative regime seems to present CAAD in the studio as a problem, particularly where those deciding the studio curriculum hold to an anti-technological Romanticism and CAAD teachers affirm a methods oriented rationalism. I have shown that there are other conceptions of education, interpretation, technology and CAAD that move away from the conservative Romantic/rationalist divide. Studio culture is not always well versed in critical theory, poststructuralism or the rhetoric of praxis, but in my experience these issues resonate with those concerned with the realities of current design practice. At its worst, the rhetoric of the studio may do little more than assert the Romantic tenets of originality and genius, but in spite of this undercurrent of anti-intellectualism (where it exists), the studio is always avidly concerned with praxis, which fits within a series of highly respectable and provocative intellectual discourses. On the other hand the conservative rationalist rhetoric of needs, methods, rules, and formal shape manipulation, accompanied by an uncritical zeal for computers and the rhetoric of technological progress have diminishing value in the studio economy. Of course, some teachers may also attempt to marginalise CAAD not because it is alien to the studio, but because it presents something

that is all too familiar. Like a mirror, conservative computing exposes conservatism to the Romantics for what it is, and such a bald self-exposure is unattractive.

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