The New Studio : CAD and the Workstation

STATE OF THE ART

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This presentation draws on three main sources:

i reportage of the ATHENA project at MIT
ii the experience of the author as a Professor of CAAD
iii the work of the eCAADe on the social impacts of CAAD

Project ATHENA was introduced to MIT in May 1983 as an experiment in the potential uses of advanced computer technology throughout the University curriculum. By the end of the project a network of about 2000 high performance graphics workstations - supplied mainly by IBM and DEC - will have been installed; about half of MIT's $20 million investment is being devoted to the development of new applications software for teaching across almost all the academic Departments, including Architecture.

Balkovich, Lerman and Parmelee [1] identify the eight main categories of academic use of the computer. Where appropriate these will be illustrated in the Forum presentation by work produced by students at the University of Strathclyde.

- Computer as a Simulator of Complex Systems: Appropriate software to model the multi-variate behaviour of buildings can help students understand the cause and effect of design decision-making, eg what is the effect on life cycle costs of changing the pattern of fenestration on the south facade.

- Computer as a Laboratory Instrument: Real time computer systems can be used to monitor, and/or control a range of technical building components - solar panels, elevators, blinds, etc.

- Computer as a Virtual Laboratory: Software models of particular phenomena, eg energy flow, can be run parametrically to facilitate systematic identification of key design parameters, their range and sensitivity.

- Computer as a Tutor: We are moving from the early phase of computer aided instruction (CAI) into a phase of computer aided learning (CAL) in which the student is the primary agent in the dialogue with the computer offering increasingly detailed comments about what is wrong with the student's proposed solution.

- Computer as a Textbook/Blackboard: The major advantage of computer-generated images of three-dimensional form over pictures on the printed page or blackboard, is that students can manipulate them - by scaling and animation. The capability to 'move-through' space or simulate the sequence of construction is very effective in architectural education.

- Computer as a Special Purpose Learning Environment: Advances in colour graphics now allow true 'experiential' appraisal of architectural space in a way which has hitherto been impossible; equally all can provide direct experience of the acoustics of spaces.

- Computer as a Communication Medium: Already we have computerised access to library catalogues and electronic mail and newsletters. The videodisc will make conventional slide collections redundant and will provide, as in the UK Domesday project, a highly interactive text and graphics information base.

- Computer as a Mediator: Networked computers offer the prospect of multi-person role-playing games to explore the complex human interactions which take place within the design team and with planners, developers, clients, conservationists, etc.

In 1985 the eCAADe - an association of some 60 European Schools of Architecture - was commissioned by the Commission of the European Communities to prepare a report on the social impacts of CAAD. The Report [2] offers an authoritative view on the implications of IT on architectural practice, education and training, clients and users, and research and development; a scenario of the future was generated and is summarised in the following Table.

Table 1. Time-scales for actions and outcomes in CAAD

	Immediate (now)	Short-term (5 years)	Mid-term (5–10 years)	Long-term (10+ years)
Technology	Micros Drafting system Performance models	Supermicros Partially integrated systems Early expert systems	Worldwide networking Expert systems Fully integrated systems	Computer ubiquity AI and natural language systems
Applications	Spread of use of computers in offices Drafting	3-D modelling for visualisation Regulation revision	Performance specification Solid modelling for appraisal	Participation Client-oriented CAAD systems
Impacts	Expense/time to implement Job differentiation; losses and gains	Shortage of qualified people Shift from private to public sector Demise of medium size practices	De-skilling Responsibility and liabilities Breakdown of professional boundaries	Improved building performance Higher grade professionalism De-professionalisation
Education	Architectural students awareness and familiarisation System evaluation Teacher education	In-service training and re-education Clients awareness Undergraduate CAAD systems	Post-graduate and mid-career CAAD education Undergraduate syllabus changes	Computer-assisted learning in design
Research	Monitoring of spread of CAAD Evaluation of CAAD education experiments Validation of existing programs	Human-centred CAD systems Kernel and shells for integrated CAD Interfaces and knowledge bases	Systems for naive designers Computer-assisted learning systems	Optimisation in design Non-traditional ways of communicating with computers

[1] Balkovich, Lerman and Parmelee. Computing in Higher Education - The Athena Experience. Communications of the ACM, 28,11, Nov 1985

[2] Maver. Social Impacts of Computer Aided Architectural Design. Design Studies, 7,4, Oct 1986.