# Introducing 2D draughting and 3D CAD modelling into the Information and Library Studies curriculum in response to increasingly complex design requirements of information resources

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**Keywords**

*Information Professional, CAAD, Learning Resource Centre, Open Learning, Information and Library Studies, Curriculum.*

**Abstract**

*This paper describes enhancements to the Information and Library Studies curriculum at the Liverpool John Moores University. In the design process for buildings and space utilised for learning resources informed client involvement is seen as important by the information professional. A new module has been introduced with the aim of providing students with the knowledge and skills to communicate effectively with building design professionals. It is apparent that CAD has a place in this teaching.*

*The programme of study is outlined, including a discussion of significant, relevant examples produced by the CAAD staff of the School of the Built Environment. The teaching methods were drawn from experience in the well established curricula and delivery of CAAD to the architecture and environmental planning students using School of the Built Environment Macintosh hardware and software. From the Aldham Robarts Learning Resource Centre, (presently nearing completion) examples will be shown of animated models, design, organisational and staffing solutions to new technological demands. These include transfer of the Austin - Smith : Lord Intergraph /MicroStation 3D model to Zoom, animation with Electric Image and Theseus and assisting library staff to use ArchiCAD to design and consider shelf planning arrangements for negotiation with the architects.*

*There are interesting lessons to be learned about the advantages of CAD for future client control.*

### The context

Information and Library Studies is taught within the Liverpool Business School at Liverpool John Moores University and aims to equip students with the knowledge and skills necessary to become information workers / librarians able to play a sophisticated role in the 'Information Society'. Two courses are available, a three year undergraduate programme leading to a BA(Hons), or BSc (Hons) and a one year postgraduate programme leading to a Diploma with possible extension to an MA. Information is seen as a valuable commodity and its provision and exploitation as being central to our society.

### Recent trends

Mass participation in Higher Education and equality of access to Higher Education would appear to be a well accepted principle following the 1987 government white paper.
Increase in student numbers over the last 5 years has been significant, yet staffing levels have remained approximately the same. "The academic staff : student ratio" "has moved from 1 : 14 (1989/90) to 1 : 18 (1992/93)." [1] Stating amongst other points that in Higher Education, "the principle of social equity would suggest that" it "should be available to all those who seek it and are able to benefit from it", Sir Christopher Ball discusses the issues and opportunities arising in a number of papers. [2]

### Development of open Learning and Multi Media solutions

The effect on the learning / teaching process could be disastrous without promotion of an Open Learning environment to support these commitments. Recent views are illustrated by the remark, "there is little doubt in my mind that the way ahead is one where the learner takes over from the teacher". [2]

The University has prioritised newly developing learning methods and materials, by establishing an Open Learning Unit in 1991. (This recently became an integral part of Learning Services.) A pilot funding of £200,000 in 1990 increased to £750,000 in 1992. External funding is in excess of £150,000 and partnerships have been established with both IT and publishing houses. The strategy is to encourage and enhance programme based learning innovation, but to ensure that materials grow within standard environments and within the house style. Facilitating the acquisition and operation of these new open learning / multi media packages has become an important feature in the changing role of the information professional working in the academic environment. [3]

### Learning Resource Centre provision concepts in education

The increased use of technology in the provision of information alongside traditional printed materials is also leading to the need for a reevaluation of library building design. The Learning Resource Centre concept, enabling integration of library and computing facilities and expansion of networking and multi media solutions has emerged in response to this new trend.

The Information and Library Studies' curriculum has been modified to take account of these new trends.

**The Aldham Robarts Learning Resource Centre**

Liverpool John Moores University has sought to meet these significant changes in part through an innovatory new building developed to house all information resources. The Aldham Robarts Learning Resources Centre at the University Mount Pleasant site is an example of the integration of information provision, maintaining a specialism in one of the three areas. It reflects the University's policy of integrating traditional and new learning resources and retraining multi discipline staff, (Staff originating in library, computing and multi media professions will be expected to retrain to have a core of basic common ability in all three disciplines, but also an opportunity to supplement this with their own specialisms. Rather than being grouped, located and managed according to original disciplines, staff will be grouped and located in information subject (specialist area) teams, as will the physical resources of pc and Macintosh front ended networked computing, subject appropriate software, library and multi media materials, including video, CD Rom, national and international networked open learning information). The Integrated Learning Support Services staff will be assisting students within their subject area in accessing the learning resources in both printed and multi media form on the selected floor of the building. Students should be unaware of the infrastructure of delivery and enjoy an integrated and flexible learning environment. [4]

**Response to the need for the information professional to understand and communicate in the design process.**

Information and Library Studies students must understand and be involved in the design of Library and Resource Centres including space planning for furniture, resources and movement in circulation areas.

Although some may question the need for the customer to be involved in building design, there is an increasing awareness of 'community architecture', whereby the community for whom the building is intended participates in and helps to direct the design process. The information professional should be aware of the practicalities involved in creating the right environment which will successfully meet the ever increasing expectations of users.

In the main, architects communicate their ideas, concepts and designs, through the medium of the drawing, plan, model, sketch, etc.. It appears that even in thought and speech their communication must of essence he visually based. Librarians do not usually have this visual conceptualisation skill, nor traditionally any plan reading, or hand draughting skills. Yet, to develop a brief for presentation in discussion with the architect involves such demands. Consequently the LJMU, ILS programme team resolved to devise a new module to address this problem.

Probably the most obvious involvement is in space and furnishing planning. It is often difficult to visualise the amount of space available and which layout of shelving, seating, study arrangements and new information resource installations will work the best. Space is always at a premium and it is not possible to keep moving heavy shelving, equipment and furniture once it is in place, particularly, now electricity supplies and networking are more frequently involved.

**Introduction of the module Information and Library Management: Buildings and Equipment' in the degree programme**

Students are introduced to this important topic, 'Information and Library Management: Buildings and Equipment.' in the second year of the undergraduate course.

**The aims of the module are** :
To establish the role of the information professional in the planning and design of library buildings.
To determine the interaction between effective library operations and the planning of library buildings.
To give an awareness of the variety of equipment, its selection, availability, management and exploitation.

**Learning Outcomes**
After completing the module students should be able to:
Understand the role and significance of the information professional vis-a-vis architects, builders and organisation management.
Understand the significance of planning, design and effective use of equipment in relation to library services and operations.
Be able to instigate effective library design and he able to produce a brief and plans.
Be aware of the costs involved.

**Outline Syllabus**
Role of the information professional/architect
Features of library design
Library plans
Financial aspects
Health and safety standards
New buildings/extensions/conversions
Selection, maintenance, use, exploitation of equipment
Movement/transfer of stock and equipment
Planning for automation

**Teaching method** is by formal lecture and tutorial.
**Course work** involves producing a design brief for a library with an area of 557 metres.
The brief should consider the library's functional requirements and be supported by a plan.

**Seeking a CAAD solution to the practical and coursework element**

In order to make students aware of the latest advances in design ILS lecturers were interested in providing them with access to CAD.
A colleague in the School of the Built Environment was approached and asked if it was possible to make the CAAD teaching facility available.
The CAAD, facilities are at present mainly Macintosh based, using the latest version of

ArchiCAD on Macintosh cpu's. These have internal hard disks, a minimum of 8MB ram, maths coprocessors and are ethernetted to the University's Dec Vax system (Details are appended). Core CAAD modules and curricula had been validated and delivery methods well established for BA Architectural Studies and Diploma in Architecture (core modules in all years), HNC Environmental Planning and BA Building Surveying. The intended solution was for induction of the staff to this system to enable use of the facilities and adaption of the tuition and examples appropriate for this module.

**Selection of existing relevant CAAD experience and examples**

Little time was available at that stage of the year to meet this need. It was agreed to run a limited experimental session for the ILS programme. After discussion it was realised that CAAD staff had carried out work of significance in this specific field, namely:

**1. Appraisal of programs suitable for site contextual / photo montaged animation frames**

In supervising technician training through the University's staff development programme (Certificate in Professional Development (Computer applications), the Austin - Smith: Lord 3D Intergraph model of the Aldham, Robarts Learning Resource Centre and its site context of closely related buildings at the Mount Pleasant site had been selected as an ideal project example for testing appropriate CAAD animation software regarding ability to produce site contextual / photo montaged animation frames for visual evaluation of building relationships. Electric Image proved to be the most developed and (training supported at the time) of relevance to our particular future teaching needs. (The intention was to prepare teaching material for part of the new BA3 Architectural Studies module).

File transfer from Intergraph- to Mac DXF format was done professionally to save time. Simultaneous training and building of the model in Zoom and imports into Electric Image and sample/test animation, paths, progressed. Image grabbed video and scanned photographs of the existing buildings and landscaping were
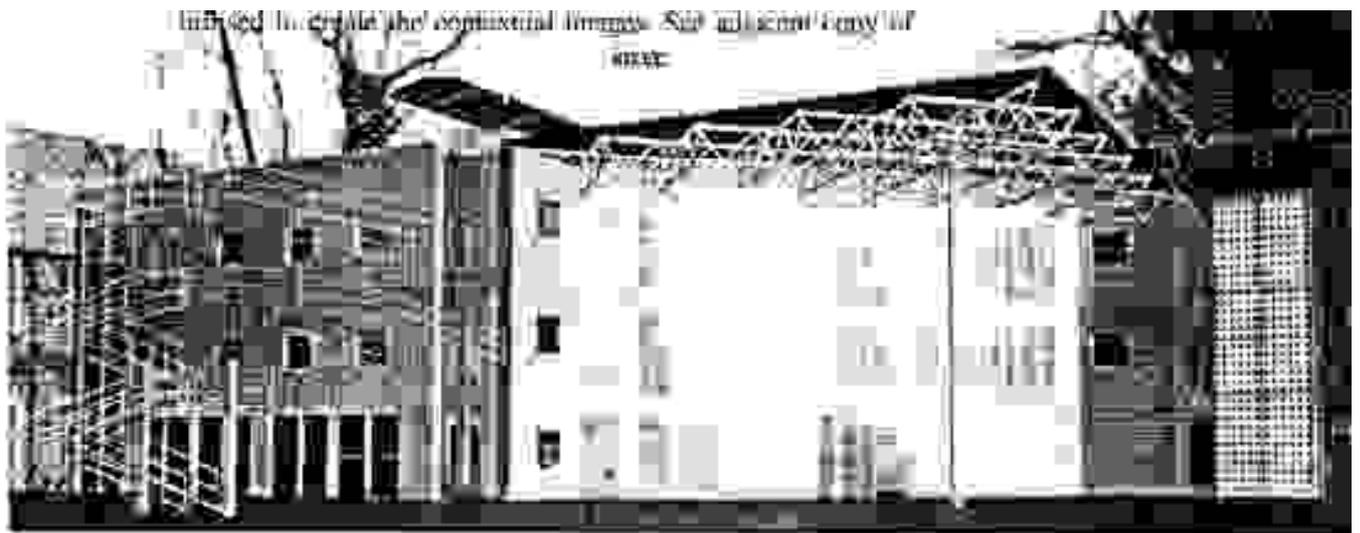


Aldham Robarts Learning Resource Centre, related to adjacent building and landscape, using Electric Image & PhotoShop
Stuart Rutter, Shaun Barry, Jen Kokosalakis                                       Architects - Austin - Smith : Lord

**2. Producing a promotional 'Electric Image' animation of 'Zoom' 3Dmodel output to video**

Simultaneously with this exercise the University had been seeking animation material on the LRC for promotional and sponsorship purposes. The organisation of time and funding for this was supported part by Marketing, School of the Built Environment and Staff Development. A Nu Vista Plus video image grabbing and output card was obtained and used with interesting results. After discussion and comparison of various software house solutions Electric Image appeared to be the most adaptable for the current CAAD system, for generating the images needed for the promotion and for future teaching requirements.

Probably the most exciting steps were the application of scans of the surrounding shrubs and plants trees as reflections on to the massive, spectacular, glazed entrance and being able to position simulated existing landscape both as foreground and background to the new building. Again see adjacent copy of one of the images. (1 and 2 were supported by training from Stuart Rutter of HR Associates.)
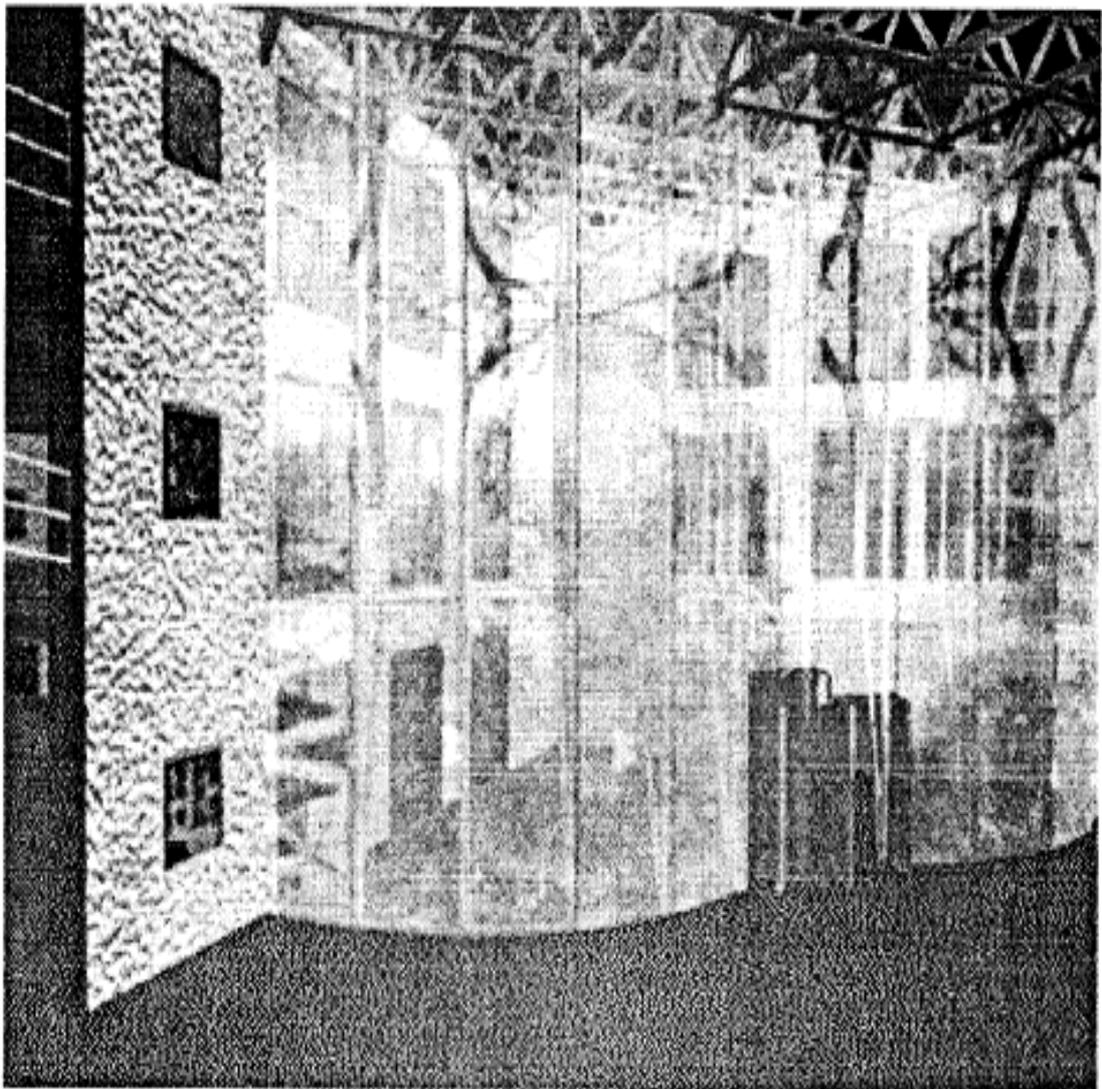


Scanned photographic images of surrounding trees and shrubs mapped on to the glazing of the entrance porch as reflections, using Electric Image.                    S.Rutter, S.Barry, J. Kokosalaki
Architects                                                                                    Austin - Smith: Lord

### 3.     Promotional ( user-friendly ) demo achieved using 'Theseus' by Roy Stringer

This work was completed by the CAAD team in co-operation with Marketing, Open Learning and the author of Theseus, Roy Stringer, who was acting as consultant in Open Learning. He had been appointed to program 'an easy to use move yourself around the building visualisations' presentation. The 3 dimensional high quality rendered images he required from the Electric Image model were set up by the School of the Built Environment's CAAD team and run over a series of days, following which he completed the application of his new program Theseus to the exercise. The resultant work allowed the end user to move a finger pointer (cursor) around either a massive frontal or internal view panning up, down, left and right with the pointer or zooming nearer or farther. This was part of the presentational material at the promotional dinner for the Learning Resource Centre's then potential sponsor Aldham Robarts.

A section of Roy Stringer's Theseus work

### 4. Assistance to the University's own library staff to use ArchiCAD to  design  and  consider alternative shelving and space planning arrangements for negotiation with the architects.

Success with these experiments brought a request from staff due to operate in the building to assist in library shelf and  study space planning in order to establish the most satisfactory arrangement and determine capacity. The University's internal architectural consultant, Geoff Hackman supplied the current working drawings. The site librarian provided information on IFLA library spacing standards. The first  solution was drawn up and plotted for  each floor. Several alternative shelving allocations were produced for discussions, including shelving arrangement by Dewey - Decimal, clockwise, School floor allocation, etc..
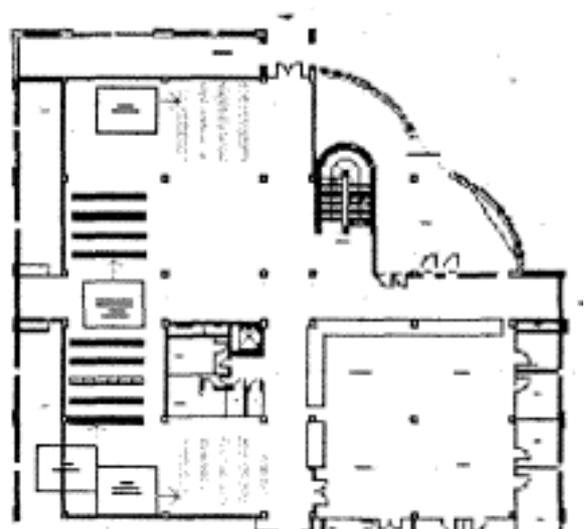
ArchiCAD floor plan  Jen Kokosalakis
Austin - Smith : Lord - design

A preferred solution was selected, which allowed for yet another School's material to be included by extension to and adaptation of an adjacent building.

From all the above material the CAAD lecturer had developed an appreciation of the relevance of CAD as a potential tool in the libararian's role in cooperating with architects. These examples were ideal material for discussion and presentation to the information and library studies students. An introductory training session was set up for ILS staff on the use of ArchiCAD (utilising one floor plan of the Aldham Robarts LRC ArchiCAD model).

**Agreed delivery of the CAD teaching element of the module**

After further discussion it was agreed because of time constraints that a limited presentation and 'hands on' workshop would be delivered by the CAAD lecturer.
Three sessions were held:-
The first included the following:
- the need for preparation of design briefs and designing a 2D layout
- general matters on IFLA spacing standards eg. allowing for two people to bend down simultaneously back to back selecting books from the lowest of two facing shelves
- normal advantages of a computer based approach
- an introduction to the Macintosh icon driven approach
- an introduction on the value of CAAD for:
  neat presentation
  aids to visualisations of plans (in particular the sense of space)
  informed appraisal and easy modification of alternative solutions
  accuracy using automatic associative dimensioning
- the whole class used the Theseus example and
- observed the video of the Electric Image animations
- with reference to the model as seen, features of the Austin - Smith : Lord design were considered such as the sense of space and welcome created by one quadrant being a

porch with three storey high wall of fine buttressed columns supporting frameless glazing panels, - a two storey high perimeter in the other quadrants designed to enable natural lighting of the study spaces.
- clear orientation by the
- entrance to each floor being gained from the central stair case and a cruciforin corridor structure illustrated externally both on the roof and by the project roofs of the stair wings on each elevation,
- the 7.2m modular basis of the design,
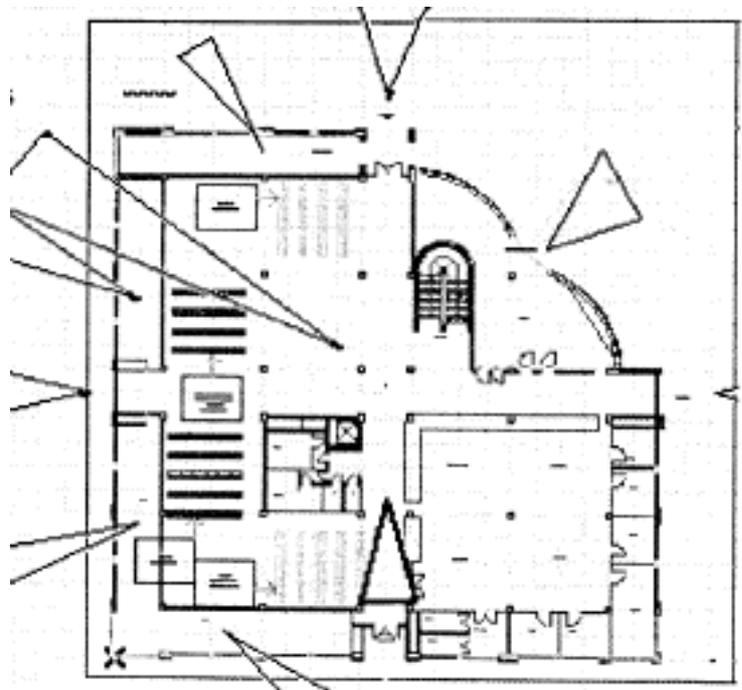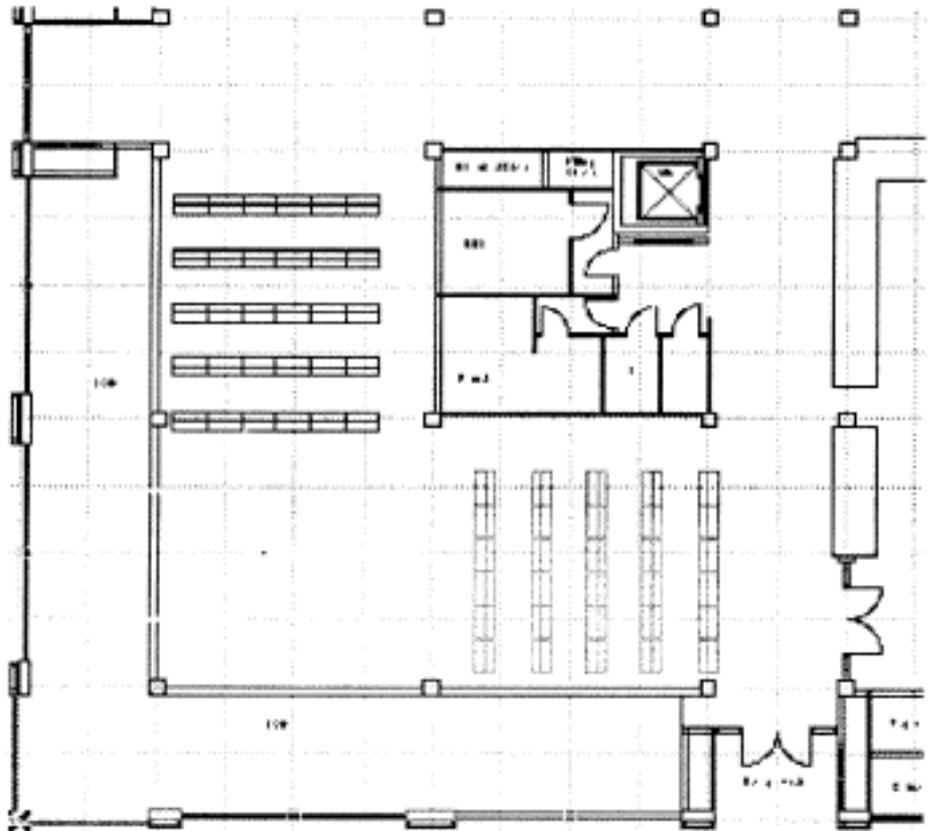
including false floor sections giving freedom within this to service either study spaces, networked computers, electrical equipment, shelving, multi media, etc. theoretically leaving options for future reorganisation.

- a brief overhead interface demo of ArchiCAD, including some explanations of how the shelving plans developed and presentation of one of the files with all four floor plans and some 3D projection of perspective views.

Mention was made of interesting principles learnt in the application of CAAD to planning such buildings eg.

- Almost instant perspective visualisations of changes to the 3D model really help in conceptualising what is planned. Perceived space based on photocopied plans and rough scaling and accurate automatic associatively CAD dimensioned space may be substantially different. The latter is even less prone to error than traditionally trained draughtpersons scaled drawings.

- Use of CAD (or self direction of a CAD technician) by library staff could allow a close control on client / user satisfaction in the design, including designing for known working practices and standards.

For the second and third sessions two shifts then participated in two alternative approaches to training in ArchiCAD.

**Edit** Options   Image   Display

| | |
|---|---|
| Paste | ⌘U |
| Clear | |
| Select All Pitched Roofs | ⌘A |
| | |
| Curved Wall Segments... | |
| Transform to Wall | |
| Fillet-Chamfer Settings... | |
| Fillet Lines | |
| Trim Wall to Roof | |
| | |
| Stretch | ⌘H |
| Drag | ⌘D |
| Rotate | ⌘E |
| Mirror | ⌘M |
| Drag a Copy | ⌘I |
| Rotate a Copy | ⌘J |
| Mirror a Copy | ⌘K |
| Elevate... | |
| Multiply... | ⌘F |
| | |
| Set Undo Queue... | |

a)   Editing the shelving arrangements in a sample of the LRC ArchiCAD model. Utilising the Select, Drag, Rotate, Delete operations followed by visualisations of the resultant model in perspective mode to observe the effect.

and

b)   Using the drawing tools to create a simple 3D model with walls, doors, windows, shelving, tables, chairs.
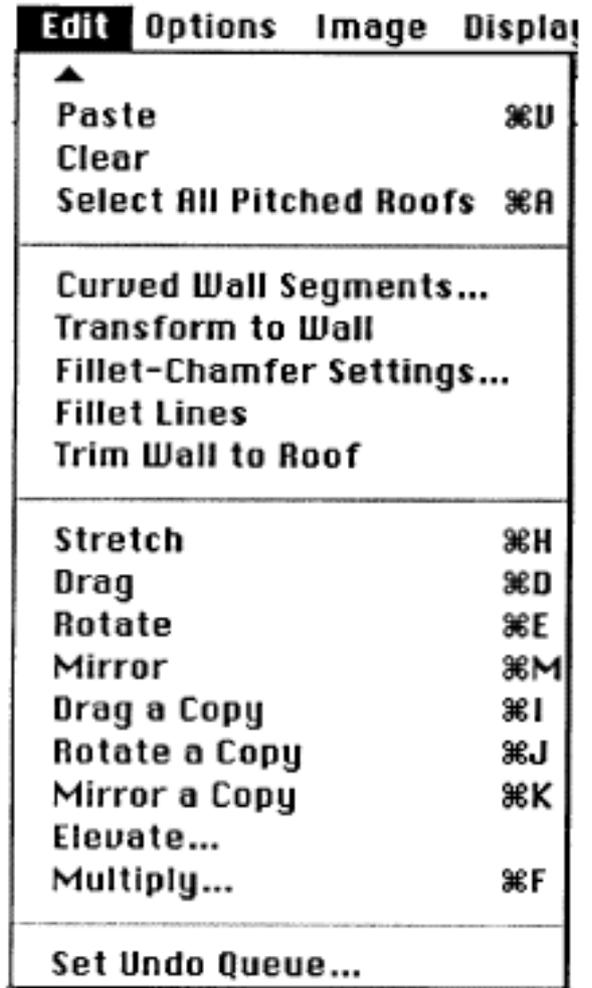
## Conclusions

Feedback from the students was positive and encouraging. The first group had found the editing exercise to be most useful.

Numerous solutions and their 3D views can be generated very quickly even by the new user. This enables more common ground with the architect.

For students who have ideas but not the draughting or 3D visualisation skills CAD provides an interesting way forward in the presentation of their ideas.

It is hoped to start a programme of staff training to enable teaching staff to develop their own skill using appropriate examples for their professional field in order to disseminate the teaching of CAD within the Division.

One of the benefits of the new Aldham Robarts Centre will be the increased number of computers available, including Macintosh with possibly networked copies of ArchiCAD and AutoCAD.

Increased software availability will make CAD a useful tool in the production of coursework assignments for ILS students.

This is a personal paper and does not reflect the views of the University.

Aldham Robarts Learning Resource Centre: porch model created in Zoom by J. Lee and rendered in Electric Image by S. Barry

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Liverpool Polytechnic, 1989

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Tutt, Patricia and Adler, David, The New Metric Handbook: Planning & Design Data, Architectural Press, latest edition

**Equipment and software used:**
16 Apple Macintosh Computers models: Mac II, IIx, IIfx, IIci, IIsi, LC, Quadra
 and LaserWriters,
Lan Works
Ethernet cards
Fibre optic cable
Microtec scanner
Micronet syquest cartridge drive
Oce Graphics 1824 plotter,
Philips portable video recorder
Nu Vista Plus Video Image Grabbing and outputting card
Electric Image, Electric image Incorporated
Photoshop, Adobe
PageMaker, Aldus
Zoom, Abvent
ArchiCAD, Graphisoft


**Data on the Aldham Robarts Learning Resource Centre Project**

| | |
|---|---|
| Architects: | Austin - Smith: Lord, Warrington |
| Builder: | NorWest Holst |
| Mechanical & Electrical consultants: | Ove Arup & Partners |
| Quantity Surveyors: | Walfords, Liverpool |
| University internal architectural consultant: | Geoff Hackman |
| | |
| Acknowledgements and many thanks to: | Apple (UK) Ltd, re donated LaserWriter IINT, |
| Open Learning consultant and author of Theseus: | Roy Stringer |
| Colour prints from Lynne Hayden Hobs Ltd, | |
| Zoom model of ARLRC porch | J. Lee BA Architectural Studies 3 |


Help in training and development of Zoom and Electric Image work from **Stuart Rutter**
**of HR Associates**


**Liverpool John Moores University CAAD team involved in the projects discussed in this paper**

Shaun Barry   technician
Jen Kokosalakis         senior lecturer

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