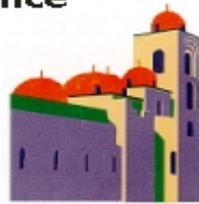


# Multimedia and Architectural Disciplines

The 13th European Conference  
on Education in Computer  
Aided Architectural  
Design in Europe



**A  
DOCUMENTATION  
METHODOLOGY  
FOR MULTIMEDIA  
RECORDING OF  
ARCHITECTS  
COMPUTER  
AIDED  
ARCHITECTURAL  
DESIGNING**

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## **Abstract**

*The focus of this paper is on teaching design through Computer Aided Architectural Design. Our present activity is to prepare Multimedia interviews showing how architects are designing using CAAD. We have for some time had relative success with students learning to design using the CAAD system extensively and creatively for their studio projects. This has led us to consider how best to teach in a way which encourages this creativity to extend and flourish. As with learning, broadly, and specifically with developing design ability, it is important to direct students to relevant established precedents of recent and classic examples of respected architects' approaches to similar design activities, in a body of historical and theoretical background. This tradition in teaching provides rich, invaluable learning material in design approaches and solutions. It appears that most material attempting to fill this role for CAADesign is in the form of written material, finished designs, or animations. Possibly the only way Computer Aided Architectural Designing activity can be understood fully is by documenting it in its own original media, (excepting direct first hand live observation). We are therefore preparing Multimedia records of interviews with architects and their real time computer activity, to build up a rich base of reference material supporting and expanding learning to design through CAAD.*

## **Introduction**

Within this paper we will expand on the above issues and also cover an overview, or taster, introduce the intended Multimedia recordings, the case for these videoed interviews, as CAAD study references, the recording, selection and interview techniques, some descriptive findings, a proposed structure for teaching CAAD using these illustrative resources and conclusions, including a request for collaboration with colleagues.

*For future reference - in this paper we may refer to Designing using Computer Aided Architectural Design systems, as **CAADesigning**, - for conciseness and emphasis.*

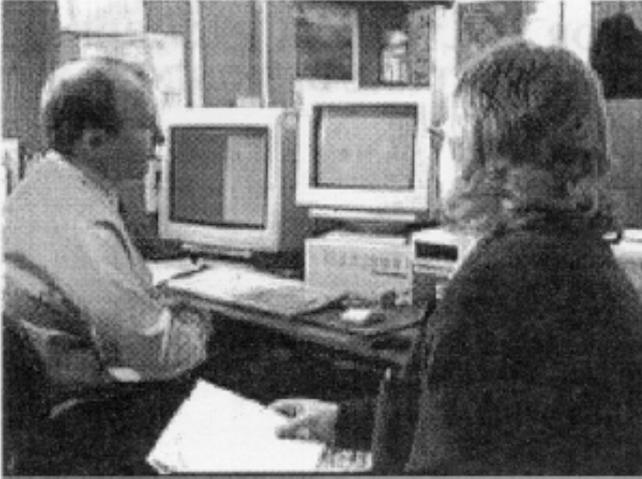


Fig. 1 - Jon's video recording with Rod McAllister



Fig. 2 - Jen's video recording with John Rhodes

In general, written papers seem inappropriate media for the presentation of Multimedia material. However our main interest here, is to present some of our originally videoed interview material on architects involved in their CAADesigning activity. The particular purpose of presenting this Multimedia material to the conference is to seek responses from our European CAAD colleagues and to call for collaboration in developing a comprehensive resource from a wide range of architects working on a variety of design subjects and using various software and hardware. These draft videos and QuickTime movies composed of edited camera shots and direct computer to PAL video material show the potential for describing and illustrating CAADesign activity. For example the expression of pride, interest and enjoyment exhibited by John Rhodes of NBHA (Kokosalakis and Moorhouse 1995) as he confirms that he does virtually all his designing at the computer and hardly ever uses the drawingboard. Rod McAllister shows similar delight in his explanation of almost total reliance by the whole design team of Architects King McAllister on computer based work. The still images here do not show this as successfully as the moving images with associated sound dialogue.

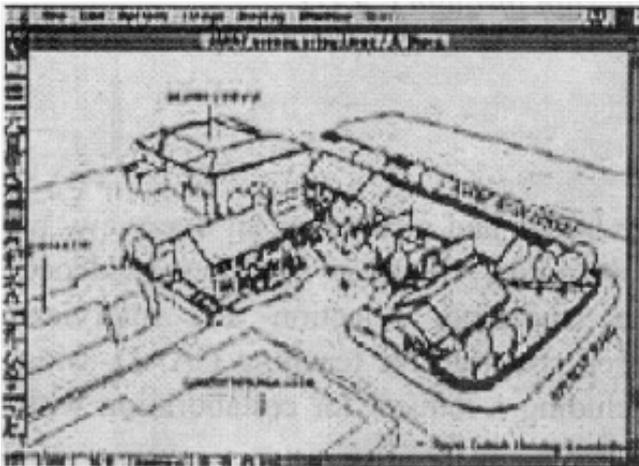


Fig. 3 - Ashby, North British Housing Association

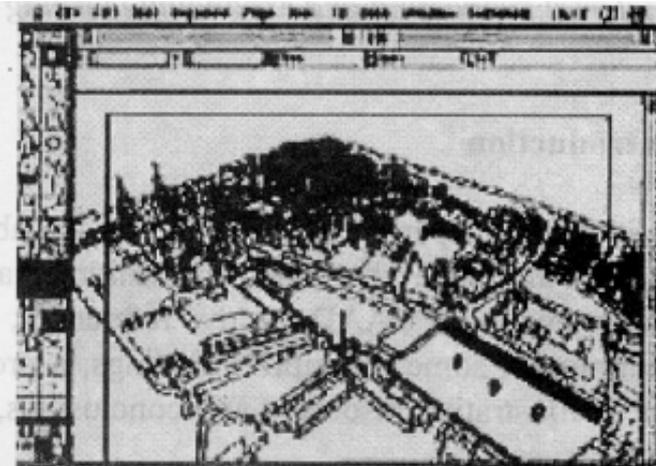


Fig. 4 - Chevasse Park Competition, Arch's King McAllister

### **Beyond the question of the existence of true potential to design at a CAAD system**

What holds architects back from designing with CAAD? Lawson (1993) suggested it is the absence of suitable CAAD systems. Yet many have designed with the existing systems. In fact he seems more convinced now (Lawson 1995). Some architects still do not own, use, design with, or even dare to mention in hushed embarrassed tones - CAAD. It is possible that having been hit particularly hard by economic restraints, the local region may have been particularly disadvantaged regarding funds for CAAD systems and training. Certainly they have had a long spell when they could not recruit new blood CAAD capable graduates, who might leaven the general attitude of the team. Many like to suggest that serious architecture and architects do not involve CAAD. A way to improve the take up in CAAD activity is to accredit and adopt skill, expertise, perception and creativity in CAAD, (which has been long established by the CAAD tutors in the U.K. and elsewhere), first through a broader, fuller background to student learning, then these student skills can percolate through the profession more rapidly to aid the development of CAAD in architectural practices in general.

*Our present interest centres on creating a resource of exemplary CAADesigners' approaches, not generally on teaching design, nor teaching CAAD, not even on setting up studio based projects to encourage students to develop and expand their CAADesigning skills. All of these matters are well in hand and we are confident and pleased about the methods we use to introduce and develop CAAD skills in students. (Kokosalakis, Farrow and Spalton 1993), (Kokosalakis 1994) and (Kokosalakis and Moorhouse 1995). We are not even concentrating here on discussions about whether designing with a CAAD system is possible. Our earlier paper (Kokosalakis and Moorhouse, 1995) considered these matters to some extent and we feel that new work is emerging to confirm the progressive view that many respected architects are designing with CAAD - (Smeltzer 1993), (Maver and Petric 1994), (Lawson 1995) and some are now designing totally at the system. For our investigations, even one valid case of an architect designing with CAAD is sufficiently significant and can be recorded to provide some learning opportunities for architecture students. We have had no difficulty to find subjects - section - 'Networking techniques for the selection of interview subjects.'*

### **Concentrating on illustrating and describing the processes and potential application of design approaches by those who do use CAAD**

Our interest lies in bringing to the whole community the value of being able to understand how others are CAADesigning as a Multimedia learning resource, just as knowledge of how traditional architects designed is fairly well documented in written and drawn material. There is no equivalent opportunity of such value in learning as this unless the developing CAADesign student were able to meet work with or observe such architects as they CAADesign, which is not likely to be available as an opportunity for all. It is difficult to conceptualise how those who can & do - do design, unless witnessed. The difficulty of doing so and the value of using simultaneous video recording of the designer explaining and doing their designing on the system – lies in the fact that there is little written, and lack of general familiarity with this type of work. We need to be broadening available references for students of CAAD, who until now have mainly had to rely on a few articles, papers and books, and conference proceedings, the occasional illustrated lecture or hearsay as a lean bibliography, or reference resource.

We have had some energetic, interesting and imaginative responses in students when we ran a Diploma module 'CAAD in Practice' as a series of live illustrated demonstrations by CAD-using architects. This led to the idea that we should try to 'immortalise' their ideas, approaches, routines, resultant designs. Also Yakeley's video with commentary (1994), illustrates well how she designs. For most people, is not learning to design with CAAD rather like bicycling, in that until you actually cycle, or look closely in detail at how others cycle, watching, techniques movement and muscles, it seems almost impossible.

### **Traditions of theoretical and historical material supporting learning to design**

Could not one say (that as a student) the moment one starts to grasp how one can design is when seeing one's tutor talking and sketching out an alternative design solution. Watching, one sees the relationship of the imagination, the rationale, the balancing of design factors, the illustrative skill, the veritable bonded mind, pencil, paper theory, history, etc.. Teaching by example and by references to alternative approaches seems to have been successful generally in teaching design. Years of hours are spent demonstrating design to the architecture student in the studio briefings, in the tutorials, in reviews and crits.. All of this is done in a solid background of theory of how the masters designed and what they built.

### **The case for video references to support Computer Aided Architectural Designing**

Somehow CAADesign has had a tendency to fall outside this rich learning arena for most students and for professionals following Continuing Professional Development or straight training. Where are the precedents for CAADesigning processes? Development of CAAD skill desperately needs such exemplary, illustrative description showing the designer, the developing design and the computer based activity. What is needed now is not the debate do CAADesigners exist, but the equivalent of a rich library of descriptions to enrich our colleagues' and students' imagination for ways to proceed with their CAADesigning. We prefer to take it as accepted that there is a growing belief that design activity does occur whilst the architect (or generic designer) is seated at the computer. Why is this not widespread? Maybe it is a lack of pioneer spirit, or fear of ridicule. We prefer to think it is because of lack of a body of examples of visual "how we do its" from their peers. Yes there are some papers. Yes there are some interesting books emerging. Most CAAD tutors now know how to show students to design with CAAD. We now wish to help them choose from a rich frame of alternative approaches by emerging and emerged known architects and team practice design activity. The following sections hopefully detail how we envisage this being achieved through researching and learning

material preparation.

### **The Multimedia recording techniques for documenting architects whilst CAADesigning**

Defining the effective method for the interview recordings has been mainly explored through experiment, but quality results have been restrained by limited availability of funds. The technique is relatively simple. - The video camera is set up to view the interviewer and subject or responding architect and the computer screen, Both people are fitted with small lapel microphones. The audio and visual information is recorded to video cassette in the camera. A better quality of image from the computer output being discussed is obtained simultaneously through a mediator box, which is cabled between the computer and monitor to convert the images to PAL for recording to a second super video recorder, to which is run a third microphone, so it is relatively easy to find coincident material on the interview and the computer output video tapes. We hope to have use of better quality kit later. In particular we are considering retaking some of the material once identified by setting up the appropriate software and files, so the architect can repeat some demonstrations to be grabbed by superior devices such as the VideoVision card in Liverpool John Moores University Macs. The video tape editing involves replacing visual sequences of interest on the screen with directly output images from the computer recording. Also where a point is made on the interview tape, which has been illustrated at a different time on the computer output tape this sound can be copied to the appropriate section, or vice versa. Again the results will become more useful, when we are able to use digital editing kit. The VideoVision board has been used for some editing and for creating the QuickTime.

### **Networking techniques for the selection of CAADesigning architects as interview subjects**

To construct a basis for gathering responses firstly, recognised techniques for sifting, random, stratified, quota sampling and postal surveys were considered. As the research aims to explore the existence of architects using CAAD truly for design and to illustrate the ways in which they are designing at the computer; the responses sought should be of an illustrative, qualitative and descriptive, rather than statistical and quantitative nature. It is therefore apparent that the need is to find architects who do practice such activities and assess the manner in which they do this, as opposed to merely compiling statistical data on the number of architects designing in this way. Whether they are representative, or typical is of no importance to either the investigation of whether they really do CAADesign, or to illustrate to students potential uses of CAAD through CAADesigners in practice. It is quite possible, that if formal sampling methods were to be used in this initial investigation, no useful cases would be discovered, because they appear to constitute such a small percentage of the total field.

Time is better spent with relevant interviewees. We have concluded that a direct and informative method is necessary for selecting subjects for interview, i.e. selection by networking - by recommendations from academics, the RIBA, Software Houses, User Groups, professional colleagues and other key figures within the field of CAAD-has been chosen in order to uncover the most relevant potential respondents. In this way we can not only concentrate on those that 'do' rather than those that 'don't', but can gain insight into likely subjects objectively from a third party without directly revealing (in initial interview with the prospective interviewee), the significant, hidden agenda of whether CAADesigning occurs.

North British Housing Association were identified by the ArchiCAD user group, distributors and local consultancies, as using CAADesigning for housing and for residential estate layouts.

Networking and publications, revealed Dave King and Rod McAllister, (the architect's journal 1995), as becoming acclaimed heroes amongst Merseyside architects for their almost totally electronic based architectural practice - King McAllister. A University of Liverpool publication (1995) claims their design of its Student Services Centre to be the first building project in Liverpool to have been solely designed and managed using computers. Whilst increasing numbers of practices have braved this path in the mid 80's. [Mark Leslie spoke and demonstrated his claim at the Low Cost CAD seminars (Brown 1985) also (Leslie 1992)], Merseyside practices have followed later, probably through more severe economic constraints in the declining construction of recent years, (who may be defended as probably having been originally suffered most). This being despite considerable activity and discussion amongst the local academic communities.

### **Techniques for interviewing chosen subjects**

Experimentation and research to ascertain the effectiveness of differing interview methods has involved identifying the range of known techniques and their advantages and disadvantages with respect to the required records of CAADesigning activity. For example whether a formal interview of prepared questions, or one of a more informal nature with minimal prompting, will provide the most relevant information and least biased response and whether participant and non-participant observations may be used. Modes of communication have

been examined-postal, telephone, fax, email, and 'face to face'. With the exception of postal, all have been utilised to some extent. Inevitably we have preferred meeting in person using informal unprompted interviewing and observation methods, wherever possible.

The North British Housing Association research was initiated as an informal telephone interview, followed by 'face to face' and presentation of CAAD material, both recorded by written notes. This was the formative first effort and as such involved some exploratory (unfortunately non videoed) effort. This certainly exposed a desirable response. A script was derived from the records of previous discussion at the subject's offices.

Modifications were accepted; transferring the remarks of the former respondent to the script of the interviewer as a series of apparently leading prompts to material discussed and demonstrated at the computer, making recording on video easier in terms of both editing and achieving quality of appearance.

In pursuit of objective and rigorous research we wished to minimise possible bias by attempting to conduct an interview in which responses on CAADesigning were largely unsolicited. We approached architects King McAllister with this purpose in mind. An initial meeting was set up in order to make contact and to determine what equipment we required. Here, conversation was kept to computing in general. For the recorded informal interview a checklist of subject matter was compiled so that any questions which had not been dealt with in the course of conversation could be posed towards the end. It is as follows:

1. **Set up:** \* What hardware is used? \* What software is used? \* Who uses computers?
2. **How does a job proceed?** \* When are computers used within a job? \*Examples.
3. **To what levels are computers used within the design process?** \* 2D Drawings. \* 3D Modelling in space - at what stage? \* Do designs develop solely in the mind of the designer or is there a 'conversation' between designer and computer? e.g. Visualisations, generations of ideas, prompted by collaboration with others - if so does this contribute to a practice style. \* Is the 3D object orientated database utilised? Are bills of quantities and time schedules, programming, project management, used in conjunction with or linked to drawings? \* Are computers used to communicate with organisations outside the office? \* Examples.
4. **What are the perceived advantages and drawbacks of the system?** \* What limitations are recognised? \* Have the computers been used to generate ideas in any way?
5. **How is the future of computers perceived?**
6. \* Within the office? \* In general for design?
7. **Examples of current and completed projects?**

Responses on CAADesigning did indeed occur in the course of conversation and were almost unsolicited. The resulting recorded material appears natural and convincing. We have employed informal interviewing with minimal prompting to some success although it appears that to 'catch' the architect in the 'act' of CAADesigning we must observe in a non-participant manner over a period of time. This evidence would go hand in hand with the recorded interview, combining both the architect's thoughts and his actions.

### **The recorded observations and activities of interviewees**

Jen Kokosalakis conducted the interviews recordings and multimedia production of **the North British Housing Association in Manchester**. This work was mainly reviewed in VIDEAII conference paper (Kokosalakis and Moorhouse 1995). The QuickTime movie and video material may be published later. The material has been used successfully with staff and students. It supports the existing Multimedia learning materials for the Housing and Planning Courses in the module dealing with housing space standards" draughting interpreting and visualising 3D from 2D plans and understanding design of residential estate layouts by following a project using readymade 3D houses.

The extent to which the architects at NBHA followed almost identical methods in these processes, progressed the idea of the value of our intended study resource of such documented interviews.

A typical excerpt follows:

*Jen Kokosalakis* "I see, so do I have the right impression that you use your CAAD library of standard house types at this stage to think about the positioning of the houses in relationship to each other on the site?"

*John Rhodes* "Yes, we do. The house type symbols... are one simple object... can be moved about at will around the site."...

*John* "We call them standard plans. In fact they are undergoing a process of continual change. John "... changes to complex plans such as this would have meant altering dozens of pieces of paper, working in the old way,

now with just one coordinated file any change you make is automatically fed through on to all the drawings."

The degree to which they use their medium spec Mac system for design is extensive, but not exclusive. Most of the team use the system most of the time for all design processes. The whole transcript of the discussions is also available.

**Liverpool architects King McAllister** have been running a 'drawingboardless office' for over three years. This practice is trying to adhere to the principle of no paper-based designing, or drawing. They limit paperwork to output for letters, drawings and tiny drawing conversation pieces of a few seconds by pencil, where particular speed is advantaged by hand, rather than computer work.

Jon Moorhouse interviewed Rod McAllister in their Lark Lane Studio. The main body of this interview took place at his computer and we were able to simultaneously record the conversation and the computer output, providing a record of both, which could be easily keyed together. They have followed the lines of the early University of Liverpool Low Cost CAD seminars of the mid 1980's, in using very low spec. LC model Macintosh computers as work stations with some enhancements, The main program they use is MiniCAD. They have a networked common file backup database using a Panasonic optical disk system and Retrospect software. Their designs are output through a 'GCC Wideprinter' (A2) bubblejet to obtain the size and quality they require.

What we can say in this text is limited by the printed medium and exemplifies our point that the material we record (through editing and so combining simultaneous computer video grabbing and video interviewing) is uniquely in its Multimedia format. We can discuss the features which we feel indicate how CAADesigning is occurring in this practice and we can show some grabbed stills here to illustrate CAAD at a frozen moment in time. We can show the designers seated at their machines. We can quote their claims of designing at the system, but ultimately we should require the reader to consider the Multimedia evidence as recorded in real time. This establishes the value of the Multimedia basis of the material. The following is part of the original transcript from the interview:

*Jon Moorhouse (Interviewer)* "So at what stage would you begin working with computers after starting a job?"

*Rod McAllister (Interviewee)* "Well we start immediately, there's no stage at which we decide to move on to the computer-In fact Dave (King) over there is working on this competition and I don't think we've done a single drawing that hasn't been done on the computer, in fact these days we're so comfortable we just sketch on them, it doesn't mean we can't sketch if we have to on paper but we actually prefer doing it on the computer. It does give you a lot of other possibilities because you can actually flip things, invert, - all sorts of things that you can't really do with a sketch without redrawing it."



Fig. 5 - Rod of King McAllister demonstrates, "... we're so comfortable we just sketch on them..."

*Jon* "So you would find it perhaps generates ideas, relating between yourself and the monitor as you see things appear?"

*Rod* "Yes because you can actually force accidents to happen, flipping things, distorting things, you can actually try out different approaches that you wouldn't be able to normally."

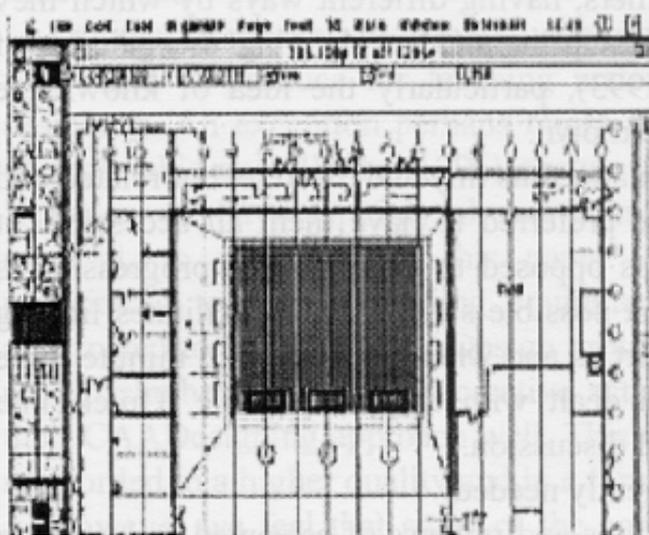


Fig. 6 - Floor Plan - King McAllister's Student Services Centre

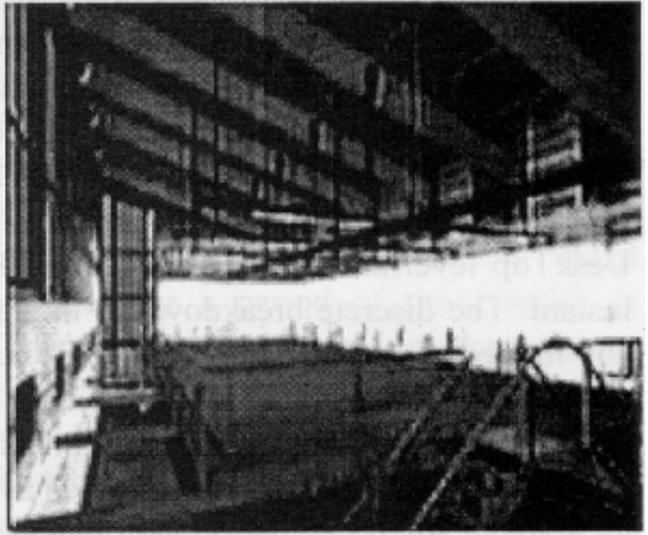


Fig. 7 - Interior Perspective

Such responses are enlightening for us in themselves but to be able to see and hear the two architects involved in this dialogue in context at the computer certainly provides a more credible example to the learner. We feel that this interview in many ways epitomised the response we were aiming to show. The short, uncut video-30 to 40 minutes-captured both the thoughts and actions of the architect in a concise and comprehensible manner. We hope to collect further video records over a longer period of time of these and other architects designing at the computer. The material can be used immediately, but also structured to produce invaluable multi media learning material..

This small practice illustrates our point that CAADesign by students may take on a new virulent initiative when it can be seen to be mirrored as an activity (and so authenticated and accredited) in recognised architectural practices producing award winning designs. This experience needs to be visibly evidenced to students. In the case of architectural students at University of Liverpool; this occurs through student visits to the practice. This surely cannot be available to all students internationally hence our effort to start such experience as a Multimedia record.

### **Structuring new Multimedia records, other learning material and learning processes**

We wish to create a Multimedia structure for CAADesign teaching, structured into appropriate sections and situations with:

1. Example files at various stages of completion - a, b, c, etc.,
2. QuickTime movie tutorials on how to get from a to b, b to c, etc.,
3. The corresponding procedures mirrored by video recordings of esteemed architects in action executing similar activity, actively designing. This should reinforce tutorials.
4. Discussion of this material - printed records of the architects' commentary, discussion of their recorded activity and its application for student designers.

We hope to include in our structuring, consideration of work by Powell (1993) has presented an interesting paper on learning processes and of particular interest he distinguishes between different types of learners, having different ways by which they respond and learn. Also in mind are the best principles in planning the gaining of knowledge discussed by Pask (Glanville 1993), particularly the idea of knowledge developing from two knowns and a related unknown.

The Multimedia items for learning are to be planned as tiny and discrete, but related and hot linked. For reasons of development it is preferred to have them all accessible at DeskTop level and have real training files as opposed to simulated so progression is instant. The discrete breakdown to the lowest possible size of topic, facilitates linking and immediacy in selection of specific support as and when needed. Each minute issue (e.g. dimensioning) should be covered and dealt with as example file, QuickTime tutorial, example from CAAD practioners and discussion.

Three efforts therefore are indicated as urgently needed:

- A major library of interviews, demonstrations and reviews of esteemed architects in action describing as they work at the computer their approach to CAADesigning.

- Continued educational effort to develop CAADesigning by architecture students, with the growing support of this library of precedents to reassure them and their tutors that the methods they are being taught are respectable, legitimate and authenticated.
- An extensive programme of Continuing Professional Development in CAADesigning for architects, who are in practice, in academia and also for those who are at present still unemployed. This programme should introduce the background concepts and potential of CAAD, whilst providing usual learning facilities and support. It is essential again that the programme includes from the start, teaching from the library of CAADesigning architect precedents.

*All of this learning activity should be embraced in a studio based project with specified CAAD learning outcomes and precise CAAD assessment requirements, possibly requiring demonstration of how CAAD was used. Reviews, tutorials and crits should examine with students the way they have used CAAD, (in a probing way to draw out their learning potential).*

## **Conclusions**

At the centre of this work, we seek a series of descriptions of how chosen subjects apply CAAD to design. Resultant Multimedia research will provide Multimedia courseware relevant to teaching design to architects. The teaching value of this is that it illustrates to architects and architecture students real life practical evidence of the Computer Aided Architectural Designing by respected architects, and shows a way forward of actually how they too can design with CAAD.

Quality is not yet mastered. The early videos using the 'Mediator' box and a good but not fully professional video camera and editing from super VHS, is holding back the quality. Mediator has the advantage of ease of portability, since it merely breaks in with cables between the signal from computer to monitor. A high quality video editing system is one of the priorities. Having been privileged to see the Santiago brothers' work (1995) with Betacam equipment, emphasized existing concerns about quality. Wherever we have been able to use the Video Vision card to edit, quality can be improved. Likewise the VideoVision or NuVista+ give improved Mac to video conversions.

Progress at present: to date the videos and QuickTime movies do not yet show what we intend to produce for teaching material i.e. the architect actually in process of designing. An exception perhaps might be the point where John Rhodes from NBHA (Kokosalakis and Rhodes 1995) gestures at the screen how he develops a 2D detail. However we have certainly already witnessed such activity and hope to record such material, to present with this paper. The next experiment will probably entail negotiating to leave recording equipment in place for a period of time, which is anticipated to be rather CAADesign prolific. This could be switchable for the architect should she/he move into an creative activity which she/he feels is likely to illustrate their CAADesigning approach well. This material could then be edited and if necessary rerecorded to a higher quality and in a format best suited for learning.

However we feel that some of the completed, experimental interviews to ascertain the effectiveness of selected techniques evidence the effectiveness of our techniques to document the methods employed by designers who use computers. The results give a documented illustrated description which captures dialogue and images in real time, whilst preserving the moods and expressions of the participants which are often as revealing as the responses themselves.

We hope to reinforce and justify Multimedia CAADesign learning within a newly forming notion of how to structure the learning. Our view is that CAADesigning is best learnt in a structured supported environment where all the ingredients described in previous 'Structuring' section are to hand. Practical designing tasks should be supported by instructional courseware with the learning steps illuminated by illustrations from practice of alternative approaches. The solution may be in reinforcing learning steps with parallel, illustrated material observing architects working at their computers actively engaged in CAADesign. This should provide students and professionals with authentication from their peers. Clear and determined definition of how CAAD may flourish is essential for success amongst a profession which has lagged so far behind in this country. We argue that cascading skills to the design studio team is vital.

Now we have chosen the various techniques we intend to use it to build up a reference resource by continuing to interview architects showing their CAADesigning approach and we actively seek offers to collaborate from CAAD colleagues to build a comprehensive study of value in teaching and reinforcing learning. (MacFarlane, 1992).

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Further transcripts and video from interviews will be documented within Jon Moorhouse's MPhil thesis, scheduled for completion towards the end of 1995.

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NBHA use ArchiCAD, developed by GraphiSoft, distributed in UK by CAD Unlimited Architects King McAllister use MiniCAD developed by Diehl Graphsoft and Strata :both distributed by GoMark. Mediator - contact VideoLogic.

Radius VideoVision Studio is distributed by Computers Unlimited.

NuVista+ by TRUEVISION Indianapolis distributed by Techex.