# TO CAAD OR NOT TO CAAD?

**Wolfgang Dokonal**
Department for Urban Design, University of Technology, Graz, Austria
dokonal@stdb.tu-graz.ac.at


**Michael W Knight**
School of Architecture, University of Liverpool, Liverpool, UK
M.W.Knight@liverpool.ac.uk


**Andre GP Brown**
School of Architecture, University of Liverpool, Liverpool, UK
andygpb@liverpool.ac.uk

**Abstract**

*This paper reports a design experiment with first year's students in two European countries .It reviews the role that computers can play in the early design stages and considers how far recent developments in commercial software have enabled designers to improve their design performance using CAAD systems. The authors are teaching architectural design in first and forth year in two European countries and are also involved in teaching Computer Aided Architectural Design. The starting point for our experiment was the fact that we realized that most of the students in our faculties still start their design with pen and paper. Although they introduce the computer quite early in the design process now their first design ideas were mainly visualized in sketches. Is this because of the often stated limitations of hard and software or because we start to teach them to sketch when we do design? This paper attempts to address some of the issues and find some answers.*

## 1. Introduction

Experiments, reported some years ago, that looked at using the computer early in the design process frequently reported on substantial constraining effects because of the restrictions of the available (and affordable) hardware and software (Richens, 1988, 1992). Roel (1991) stated that "Sketching plays a manifold role in design and design education now as much as it did in the computerless days. Design sketching seems to be indispensable during the early phases of the architectural design process." Accordingly many attempts have been made to find an equivalent of early design sketches that would allow a designer to transfer his method of design into the digital world. There have been interesting studies in this field like the "Electronic Cocktail Napkin" (Gross, Do 1996) or "Digital Clay" (Schweikardt, Gross 1998). However, all of these programs try to give traditionally educated designers (pen and paper) tools to use their way of design with the help of computers. This paper looks at the application of contemporary design software in a contemporary design environment.

## 2. Introduction

If we ask architects and design educators alike (at least in Europe) what they are doing with computers, idea sketching is the least mentioned answer, if not left out entirely. It would appear that computers are still not offering an adequate environment for design sketching, although this picture has started to change with recent software developments. But the question is "why do we always have to sketch when we start thinking of a design?" Is it because it's the "natural" thing to do?

Or is on of the reasons for that the fact that we have been trained to design with pen and paper? At the moment there are still many architectural schools in Europe that introduce the computer only in second year, and those schools that introduce the computer in first year are in general not using the computer in early design phases. This brings us to the question what happens if we start to teach our students to start their design wholly with the computer. Will this increase their design abilities or might it even hinder their ideas because it might reduce their ability to sketch? Should it not be the case that design education should naturally start with the computer at a period of time where the computer is omnipresent in every aspect of work? Ubiquitous computing is one of the keywords of the era so quite naturally it should also become a factor when it comes to generating architecture form.

## 3. The project

With this paper we want to report some results from an academic experience we did with First Year students from Austria and England. Because this first workshop was initially not intended to be a research program, it was not structured rigorously enough to evaluate the results scientifically. However, this "first run" had some very interesting results and led to the organisation of a much more structured workshop which will be held at TUG Graz in February 2005.

We were interested to see whether designing wholly on the computer would produce substantially different results to those produced via a more traditional design process. Rauhala, (2003) stated that "It seems impossible to use computers as a creative

adviser or as a generator of totally new design solutions. Likewise using computers for generating new and creative associations seems to be in principle infeasible." With our workshop we wanted to challenge this assertion.

The initial exercise involved two groups of first year architectural students working on a common site and design problem, one working wholly in CAAD, the other working wholly manually or traditionally.

### 3.1. The Brief

The Brief was a house for an artist on a small urban corner site in Graz. We did not establish a detailed brief - the artist should be able to live, work and present his work in his house. The students could choose their artist (client) and describe his needs first and develop their own brief in discussion with the tutors.

The site was adjacent to a parting wall and consisted of a small slope and a significant tree, so it was quite a demanding task for our inexperienced students.

### 3.2. The digital group

We had 36 Austrian students from first year in the workshop who had to do their first major design task with the help of a program they did not know (SketchUp) in a foreign language (English). We decided to keep English as the main tutorial language because our SketchUp expert came from Liverpool through the Socrates Exchange program. In total there were two tutors and two student tutors involved in the project.

The students worked in pairs on one computer in an intensive studio starting with introductory tutorials on SketchUp, a visit to the site and culminating five days later in wholly computer based presentations. In the first two and a half days they had to develop together two different designs for their brief. On Wednesday they had to present their designs and had to choose after the presentation on which of the two designs they would work on to the final presentation on Friday. Students worked intensively every day on the project. They were encouraged to experiment with the program using mistakes and unintentional events as design generators rather than using the program 'correctly'.

There were some interesting aspects which arose during the initial phase of the workshop.

Firstly, some of the students resented starting from scratch with the computer; they started to use every piece of paper available in the room to sketch their first ideas. We found out that these were mainly the students who already gained some design experience earlier in their previous education.

The second interesting thing was that the students who had experience in other more traditional CAD packages such as AutoCAD, had significant problems using SketchUp. They were trained to do precise CAD drawings and always tried to work in a similar way with the program. This turned out to be clearly the wrong way to find interesting design solutions. These students exemplify the problems that Richens found in his studies.

In general the students that took the task in a playful and serendipitous way had the most surprising and rewarding results.

One interesting design emerged out of a group who did their initial two designs on two different layers in the program and in the end found out that the most interesting design was a merging of the two layers.
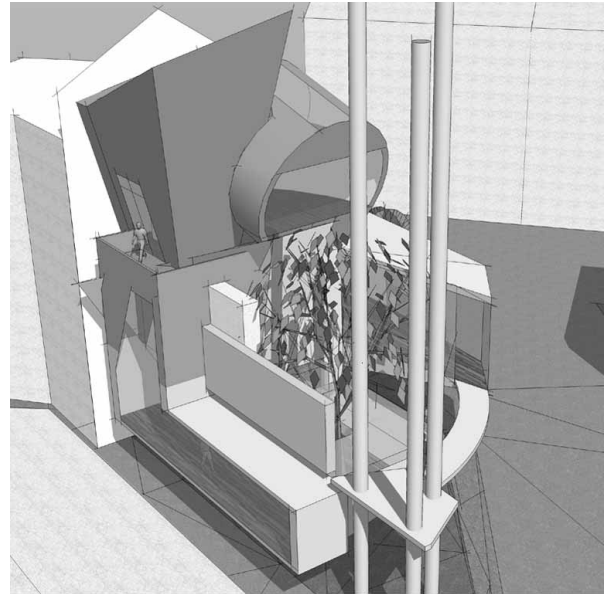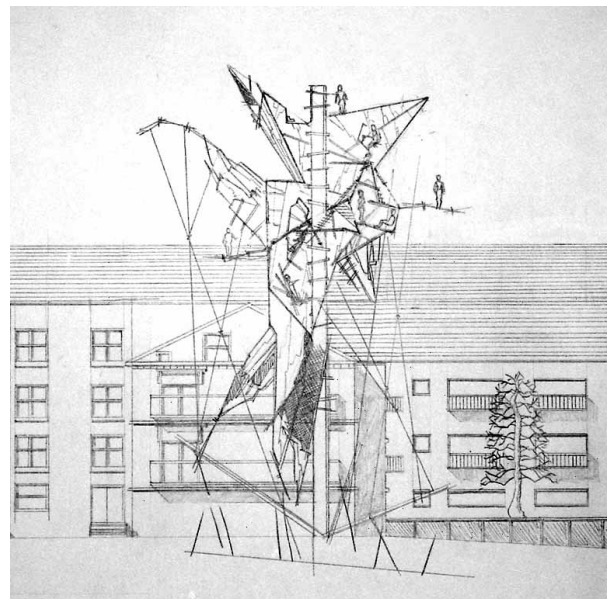


Figure 1 example of a digital design solution.



Figure 2 example of an analogue design solution.

### 3.3. The analogue group

The students working traditionally worked in a slightly different way with a study tour introducing the city and the site. The project was of five weeks duration, but with only two studio days per week. Students worked traditionally through sketches, drawings and models, but a SketchUp model was a prerequisite of the final

presentation. The compuêter was not used as a design generator in, but as a modelling tool at the end of the process.

Whilst it was not possible to have identical presentation requirements in both groups, to demonstrate an understanding of the resulting internal spaces, the 'analogue' students were required to create a serial vision walkthrough from the street through to the major space in the design.

## 4. Conclusions

As we mentioned before, the project started mainly as a teaching experience with no special research intention. Therefore, the results of this first workshop are mainly the basis for a much more rigorous study which we will describe below.

It is, however, possible to make some general observations from the initial study. It would appear that the stronger CAAD based students produced designs which they might not have been capable of working through a wholly traditional design methodology and that the CAAD students had a better grasp of the quality of internal spaces. Some of these students managed to create interesting designs but did not really understand them. So in a way, hat they created was in advance of the capabilities and they needed a Tutor to reflect on their design. The stronger students who were working traditionally produced designs which would have been very difficult or impossible to produce with their limited CAAD knowledge. But all in all, even the weakest CAAD based design was, from an architectural point of view, more interesting then the weakest traditional designs.

## 5. Outlook

The results of this first attempt are interesting enough to encourage us to work on two areas of research in this field.

The first of these is the workshop itself where we will establish a much more rigorous structure using two groups of students working on the same problem and site in an environment that will allow a more controlled analysis. The intention is to have 16 students in a digital group and 16 students in an analogue group working on the same design task. Both groups are equally divided into Austrian and English students and they will work intensively for one week with the same tutors. The digital group will not be allowed to use any analogue means in the initial design phase and the analogue group is not allowed to use the computer. After this first week both groups have to present and

discuss their work. After this presentation they have five more weeks to finish the project. In this period they will be allowed to use whatever tool they wish to further their design objectives.

The second field of research will be a research among established architects in Austria and England about the design methods used in their practices. The primary objective will be at which stage, to which extent and with which methods the computer is involved in the design process.

It is intended to further develop this work with some larger scale workshops through a European Community funded programme which would involve a total of five universities.

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