CAAD - integrated with the first steps into Architecture

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How and when should CAAD be introduced in the curriculum of the School of Architecture?

This paper begins with some arguments for starting CAAD education at the very beginning.

At the School of Architecture in Lund teachers in the first year courses have tried to integrate CAAD with the introduction to architectural concepts and techniques. Traditionally the first year is divided by several subjects running courses separately without any contact for coordination. From the academic year 96/97 the teachers of Aplied aestetics, Building Science, Architectural design and CAAD have decided to colaborate as much as possible to make the role of our different fields as clear as possible to the students. Therefore integrating CAAD was a natural step in the academic year 98/99.

The computer techniques were taught one step in advance so that the students can practise their understanding of the programs in their tasks in the other subjects.

The results were surprisingly good! The students have quickly learned to mix the manual and computer techniques to make expressive and interesting visual presentations of their ideas. Some students with antipaty to computers have overcome this handicap.

Some interesting observations are discussed.

Keywords*: curriculum, first year studies, integration, CAAD, modelling*

Introduction

The debate about the order in which different aspects of architecture should be taught is continuous. As CAAD entered the arena it was thought of as another of all thoose aspects. Without going deeper into the discussion as such let us just notice the wide range of opinions from introducing CAAD in the first year to not doing it at all.

Two arguments for starting CAAD education in the First Year.

All research and practise so far supports *digital* storing and handling of large information blocks. Most building projects are just that - huge masses of information - which have to be handeled in digital form. As architects are interested in creating and influencing a great amount of this information they will have to make it digital themselves - that's to say - work in a digital environment.
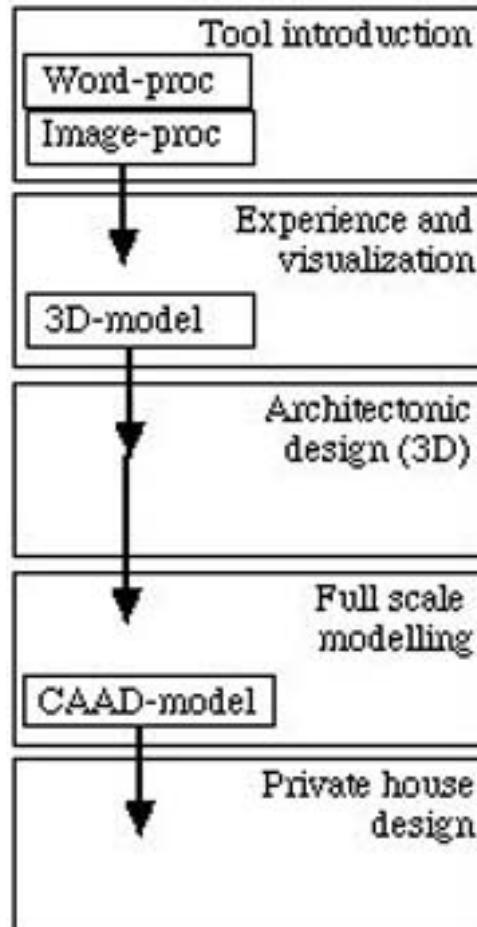
If you do not master your media you are a slave under its limitations. Traditionally an architect is proud of her skills in using the necessary media and the computer must be no exception. Students have to be able to use the full period of their studies to reach a resonable level of skill.

Traditional Curriculum of the first year in the School of Architecture in Lund

Each division of the School of Architecture in Lund is responsible for a "subject". In the basic curriculum divisions give courses of a specified length. The tradition has been that each division can create their course independently of all the others. After student complaints about the lacking of coordination and continuity certain *projects* were established which are to guid the teachers of the courses. As in many other schools CAAD has been looked upon as something which is too technical to be involved in creative design.

Integration.

Planning for the academic year 96/97 and inspired by Krister Wiberg, the new professor in Architecture, Moa Haga, the teacher of Applied aestetics, Lars Sentler of Building Science, David Sim of Architecture, and Jonas af Klercker of CAAD, together decided to collaborate as much as possible within the *projects*. The purpose was mainly to meet the students demands for more continuation and focus on one project at a time. Planning for the academic year 98/99 the development continued. By making some changes in the timetable integrating CAAD was possible.

Timetable

The idea is to follow a "logistic" timetable, starting from experience and visualisation towards analysis of three dimensional design and further on by full scale construction to analysis and design of a private house.

Through out the whole timetable the students learned how to use manual as well as computer tools.

Therefore the computer program courses were held just before the programs were going to be used in the "practising" projects (arrows in figure). There were 65 students and the Computer lab has some 30 computers, so the students had to be divided into two groups.

Teachers of the respective subjects (with some exceptions) structured their teaching for the timetable and teachers of Aplied aestetics, CAAD and Architecture collaborated in planning and running the exercises. The other subjects were not coordinated in the timetable but by keeping contact with the projects some support was given and the teachers could attache in their lecturing to some extent.

Introducing the tools and media.

The term started with an introduction of all the facilities of the school and how to use them. In particular the introduction to the studios, the workshops, the computer lab and the library were also used for some simple projects. In the computer lab the introduction was combined with giving everyone an network identity and instruction on how to use it, the network and a single computer. Teachers also tried to survey the student's individual skills to locate the "weak" points, something they managed to hide to a great extent.

In the same period the CAAD teachers introduced image processing with Adobe PhotoShop. This is a complex program which was taught by using an experimental attitude - in the same manner for instance as manual tools are used.

"Through the wall" - from a text to visualisation of a movement in an environment

The subject of teaching of how to go from tool introduction to visualization is worth a paper of its own! One of the ideas was to show that architecture can be experienced as a course of events. Emphasis is put on experiences, imagination, ideas and communication.

Space, time and movement was the theme and it was was examined by the collaborating teachers together. The students were to work in pairs and to illustrate each other's text. They were encouraged to examine the texts together. The illustration was to be presented in a sequence of images and a model.

At this stage students still expressed not only their visual sences but also particularly smell and sound, which in some cases were even exemplified. The audial impressions are especially interesting because of the possibilities offered by computers!

The idea of mixing computer techniques with manual ones was widely used - a fact which satisfied the teacher team very much. They believe that this made the students create more interesting and elegant images than those experienced in previous years.

Students had also been taught how to use the web format to present their images using Dreamweaver by MacroMedia. The task was to use the old and more practised paper method and using computer presentation was voluntary. However the time was too short to make students risk anything by using a new technique.

## "The Culture Kiosk" - designing 3-dimensional models

The step from two dimensions to three was taken by the exercise to design a movable and multipurpose stand for the "Night of Cultural Events" which is held annually in the city of Lund. This project was made in collaboration with the local Authorities of the City of Lund, who were concerned about the poor standard and uninteresting design of the stands so far used in the event. What they expected was a design of a stand 2 x 2 meters which could be easily taken apart and stored away between events.

The work could be undertaken individually or in small groups. A crit was made after two weeks and the final examination was made another two weeks later. The result was presented in a scale model 1:20 and illustrated with images showing a series of stands
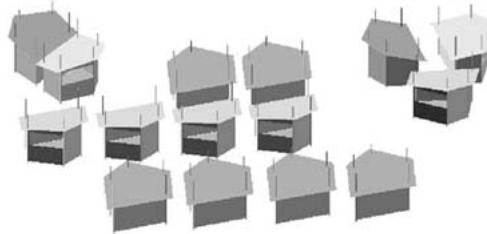
at the Main Square. The models were made in clay, wood, metal, paper etc. as well as in the computer. In most cases the computer modells were used to make perspective views of the stands on the Square.

Much to the pleasure of the teachers there was a considerable variety in the interpretation of the brief. It was obvious that this called for some extra activities of "public relations" and an exhibition in the City Art Centre was prepared.

For geometric 3D-modelling the students were taught to use ZOOM by Abvent. Objects modelled in ZOOM can easily be saved as library objects in ArchiCad by Graphisoft, which is used for CAAD. The interface though created some difficulties for some of the students and even teachers.

"4 m2 - small spaces for great culture activites" - full-scale models exhibited.

The possibility of making a public exhibition opened the way for getting sponsors to make more than the usual 2-3 models to be built in full-scale. So the teachers could select 12 of the models to be built in full-scale. Another 4 of the models were chosen to be

modelled in the computer to be studied in full-scale in the CAVE-lab. The students were organised in work groups around the designers of the models and a hectic hunt for sponsors started.

The response was very positive and the whole school was invaded by work groups occupying every free space to store material and put it together. A special group was responsible for the arrangements at the exhibition and to make a "catalogue".

"The computer group" made a computermodel of the "Main Square" of Lund to create the space for the studies in the CAVE1 . This model was also used by the other groups to make image overviews of their installations of stands in the Main Square.

A CAVE installation consists of a screen arrangement projecting on three walls and the floor of a cubic space. A Sillicon Graphics computer produces 4 stereoscopic views at a speed of 24 fps of a model making the impression for the spectator to stand inside with a horisontal sight angle of 270°.

The examination of the full scale models was made on the "building sites" when most of the models were almost completed. The computer models were examined in the CAVE and the occasion was used to let all students share the experience.

One of the resulting observations is that it is rather obvious that the manual and this special computer technique have their advantages but they have to be used in a complementary way. Environmental aspects

can be shown in the CAVE and technical details can be better explored in the full-scale model.

The exhibition was made at the end of term, was visited by a large and interested public and was also reported in the regional press. The computer models were presented in a series of "fly throughs" running continuously on a computer.

Kitchen design

The *private house theme* was introduced by a course in Building Function Analysis. Quite spontaniously a one day exercise in kitchen design in the course could be made collaboratively. This meant that the students could choose different tools to do a one day design exercise. The project was to change one of two different kitchen layouts. The kitchens were build up in the full-scale lab at the school, where the students could get a view to compair with the drawings. One group of students got the possibility to experiment in the full-scale lab and another could actually build their design there. The others could and about 50% did choose to use the CAAD program in which a computer modell had been prepared.

The results were unexpectedly inventive and interesting considering that they were done by students of the First Year. At least the teachers were impressed and content with the results.

Hansa-house - designing a private house

The last stage was to design a small private house on a 5 x 30 meter property. The reference is the merchant house from the Hanseatic times.

In the design process the students had to make a computer model of their design but were free to use it in any way they liked. The design was to be presented with the traditional drawings of plans, elevations, sections, illustrations, text and model. The paper model could be exchanged for a computer one, which could be presented on paper or with a computer projector.

A half time crit was held in small groups around a table. Especially when problems occured which should be surveyed in 3D, the students were encouraged to take the opportunity to use the computer model.

The final examination was made by Professor Krister Wiberg assisted by the CAAD teacher and design tutors from the field of Architecture. The students were in 8 groups with 8 students in a four hour session, which gave everyone a fair chance to get individual attention. Each student at a time put her material on the wall and the model on the table in front of her and presented her project orally.

Some 70% of the students had used the computer model to support their paper presentation, having the projected views directly printed out or manually traced. Only a few students choose to present the computer model instead of a paper model, but many did both. A few students had not made any computer model at all blaming it on their lack of time and various troubles with computing.

The amazing thing was again the rich variations of the theme - in spite of the constraints. The drawing material was, even when copied from A2 to A4 format with a few exeptions, clear and readable. Many projects were richly illustrated with perspective views from interesting positions in a way that would have been unthinkable without a computer model.

What do the students think?

At half term the students had discussions in groups and put together some comments on the different subjects so far. Naturally the comments were both positive and negative. Here some "key issues":

- The efforts to collaborate was highly appreciated, though it had its shortcomings in communication between all the teachers.
- The intergration of CAAD and in the first year was stressed as very important.
- The CAAD teaching was too intense - due to very short time.

- The teachers were critisised for their vague knowledge of the programs - which was intentional but obviously not clearly explained, which is going to be discussed below.

As in many experimental situations the ending was short of time and therefore rather caotic. This meant that no real final inquiry was made. But the impressions during the last examination were discussed in the teacher team and some observations can be put together.

What about the curriculum of next term?

Inspired by the the success the teacher team has formulated a draft for a new curriculum for the First Year. It is a development and adjusted version of the timetable used. The intention is to have all subjects coordinated to the timetable. The only drawback is that the teacher of Building Technology refuses to cooperate, so to change this will take another year. It is quite crucial as the experiences so far are all pointing in the direction that this should be the final theme of the First Year.

Discussion of some observations.

There are some observations which have to be exploited and discussed further:

Imaging

Mixed techniques for creating images seems to stimulate to more expressivness and to some extent simplifying the production.

Computer modelling in design process

There must be a difference in how to introduce the computer in design in a school situation and how it could be used at the drawing board in an office. Tutor consultation, cits and examinations are the situations when the computer models can be used for communication with the teachers. At the moment the computer environment is not so well adopted to these situations. 3D modelling seems to support the students understanding of the geometry. Models based on the first sketches brings the design of facades and sections to visability much earlier than in manual work in a plan projection.

Intuitive attitude towards computer programs

The students with experience of the "always right solution school" ask for the accurate method to do a certain operation on the computer. What she does
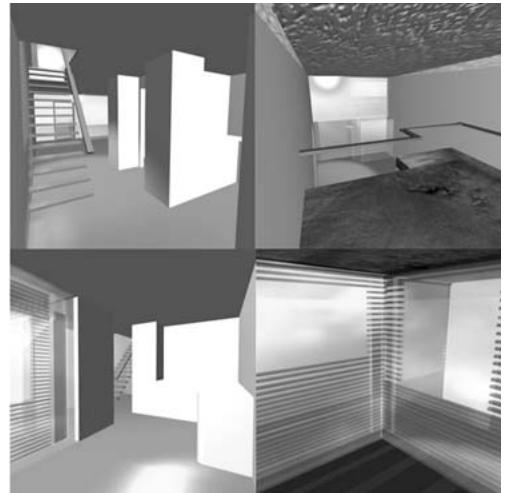
not know is that programs change so quickly that with this attitude an architect would spend a lot of time learning the news every time there is a new version of the programs she uses. As an alternative the teachers of CAAD in Lund try to introduce an intuitive method to always find out how to do the operations without knowing on beforehand how to do it.

The students not motivated to computing

It is quite obvious that a well planned, instructive computer course saves time for the student compared to the experimental learning alone with the manual. If we mean that computing is an essential skill for an architect this means that the problems of individuals with difficulties have to be given special attention. Personal encouragement is very important especially for students who are not motivated to computing.

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