CAAD Restarted

Some Experiences in Improvement of CAAD Education

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In our faculty a new CAAD group has been started recently after a period of virtual non-existence of CAAD education. The responsibility of the group is twofold: to provide students with a basic competence in CAAD, and to develop a high standard of experimental studio work combined with research. In our philosophy, we aim to reach the first goal by giving a wide offer of basic skills teaching in many different CAAD softwares. Building on that, we offer more specialised classes for advanced modelling and integrate skills with design work in the design studio.

Due to limited means, and a small staff, we develop this program step by step. Our preliminary scope therefore, is very modest, and mostly limited to the first years of CAAD education in the Bachelor studies. In this paper we summarise our goals and preliminary results. We monitor the progression of our educational program with an enquiry that was distributed among 200 students. In that way we can assess student response to our efforts. We report on the findings from the enquiry and formulate improvements and possible directions for our teaching.

Keywords: CAAD education; pedagogy.

Introduction

Education in CAAD has undergone substantial changes during its lifetime. There have been changes on three aspects: the technology (what is taught), the pedagogical framework (how it is taught), and the computer literacy of the students (who is learning). Changes in technology have led in a shift from basic CAAD commands and computer graphics via programming, expert systems, modelling and visualisation to collaborative design, fabrication, and virtual reality. Changes in the pedagogical framework have led from classroom teaching via digital design studios to internet-based learning and the general appearance of the computer in all classes and studios. The computer literacy of the student has shifted from non-existent to daily use of internet, email, and several kinds of authoring tools.

Within the CAAD community, there have been regular discussions about the ideal CAAD curriculum (Mark et al. 2001, 2002). The common understanding today is away from a specialised focus on the software as such, but to view CAAD rather more as a medium which affords unexpected new means of
exploration. This exploration finds a parallel in practice where many young architects are experimenting with new design methods.

In our faculty, a new CAAD group has been started in the beginning of 2006 after a period of virtual non-existence of CAAD education. Our educational strategy builds on two tracks: first, to provide students with a basic competence in CAAD, and second, to develop a high standard of experimental studio work combined with research. In order to achieve our first goal, we offer basic skills teaching in a wide range of CAAD softwares (AutoCAD, ArchiCAD, Revit, 3Dstudio Max, Allplan, and Cinema). Students should become comfortable using the tools that suit them the best, and be aware that they are not “stuck” with one software only. Building on these basic skills, we offer more specialised classes for advanced modelling (3Dstudio Max separately and combined with scripting) and integrate skills with design work in the design studio.

Due to limited means, and a small staff, we have to develop this program step by step. Our preliminary scope therefore, is very modest. We monitor the progression of our educational program with an enquiry that was distributed among 200 students. In that way we can assess student response to our efforts. Methodologically speaking, measuring improvements in education is quite hard, and this applies as well to assessment of the CAAD education (Roberts 2004). Attention has shifted from quantitative measurements to qualitative in-depth interviews. Our preliminary focus in the enquiry is to assess the basic computer literacy of the students, and to gain insight in the strongest and weakest points of our current curriculum. In this paper we report on the findings from the enquiry and formulate improvements and possible directions for our teaching.

The CAAD student past and now

Before the start of our new group, much of CAAD education at the faculty relied on routine tutorials and practice in CAAD lectures (similar probably to most routine CAAD education in schools that did not have a further aim than instructing the use of a software). In such an approach, the computer is viewed as a secondary phenomenon which can be instructed after or at best parallel when the student has learned what architectural design is. This rather classical way of teaching CAAD worked without too many problems for the Czech generation of the 80’s and early 90’s (and in other countries also; viz. Pentilla 2002). They worked mostly in this systematic way, and had to understand the principles of the software from “the top” before applying it to architectural design. This generation worked with computers since the 90’s. As most of them were involved in the building & construction boom of the Czech Republic to catch up with the rest of Europe, they missed the period to use computers as entertainment. There was no space for fun or games.

As we have stated above, the computer literacy of students has changed in the past years. We conducted a small enquiry among our first year students to assess this. We suppose that the findings are not dissimilar to those of surrounding countries (table 1).

We also asked about the availability of the computer to the student. It turns out that a majority of student has access to their own computer (table 2).

<table>
<thead>
<tr>
<th>Since x years</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Since primary school (age 6-14)</td>
<td>13.5</td>
</tr>
<tr>
<td>Since study at secondary school (15-18)</td>
<td>48</td>
</tr>
<tr>
<td>Since study at university (19-)</td>
<td>38.5</td>
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<table>
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<tr>
<th>Students work on computers</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>His/her own</td>
<td>84</td>
</tr>
<tr>
<td>One computer in whole family</td>
<td>12.7</td>
</tr>
<tr>
<td>Only at school in computer room</td>
<td>3.3</td>
</tr>
</tbody>
</table>

Table 1
Time of experience with computers by students

Table 2
Availability of computer to students
In terms of what the students were using before entering their studies at the university, we asked about computer games (table 3) and the use of CAAD software (table 4). Obviously, as also noted by Pentilla (2003: 604), students also have a large amount of “invisible” IT experience with email, writing, and web-browsing. We may distinguish between consumption-based computer activity (gaming, web browsing, chatting, etc.) and authoring-based computer activity (creating new content by means of software tools).

We may conclude, that the current day students are more computer literature than the older generations. For the most part however, this concerns mainly consumption-based experience. In our view, this influences the students’ attitude towards CAAD in two ways. Firstly, in terms of working with software, they are not used to assess their results in a “designerly way,” by setting some standard and aiming to keep to this. Very often, any result produced at first seems satisfying. Secondly, students are used to simply start a program and get running, without bothering too much about manuals. For most consumption software this is fine, but with the high learning curve required by CAAD software, this is not an effective attitude. It may result in aborted attempts to work with CAAD, or acquiring downright wrong or laborious work methods.

Our goal as teachers is to both show students designerly ways how to use CAAD, and to involve them in the proper ways of working with CAAD. We should not ignore however, the basic tendency of students just to get started with the software. In our pedagogical approach therefore, we try to take account of this fact.

### Pedagogical approach

CAAD software is a comprehensive set of tools with a wide range of complexity. For the education in the Bachelor’s programme however, we do not want to overwhelm the students with the technicalities and potential of CAAD. A more in-depth exposition of CAAD, architecture, and design is taught in the Master programme and through the projects in the design studio. In the first years, we want to show the students that computer design is an amazing adventure. The software is less important than the results. At the end, the students should not be aware of the

<table>
<thead>
<tr>
<th>How often do you play computer games</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Very often</td>
<td>2</td>
</tr>
<tr>
<td>Often</td>
<td>51</td>
</tr>
<tr>
<td>Rarely</td>
<td>45</td>
</tr>
<tr>
<td>Never</td>
<td>2</td>
</tr>
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<table>
<thead>
<tr>
<th>Contact with CAAD before studying</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No contact at all</td>
<td>72</td>
</tr>
<tr>
<td>Knowledge of CAD from secondary school</td>
<td>10</td>
</tr>
<tr>
<td>Skills of own study, own initiative</td>
<td>18</td>
</tr>
</tbody>
</table>

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**Figure 1**

Structure of the course
software as a “problem” or “hindrance” to the design process. Starting in 3D seems to be the most appropriate way to get students started. It connects the closest to their everyday experience, in particular for first year students.

**Moodle e-learning system**
All material to the courses (ocw.cvut.cz/moodle/; 29.5.2007) is available via the Moodle e-learning environment (moodle.org: 29.5.2007). Students register for a course, can get materials and assignments, and can upload their exercises to the Moodle system. We have introduced Moodle from the beginning in 2006. In the first semester courses that we ran, we had about 30 students. Currently, one and a half year later, there are more than 1800 registered students and we offer material for 18 courses and the design studio.

**Build up of course**
A lecture in the course consists of a short tutorial, which introduces the exercise, then there is more extensive material about specific commands and procedures, followed by a short demonstration of the exercise. We aim to keep the introductory time limited to 10 percent of the teaching time, leaving 90 percent for the students to work and practice their skills (see figure 1).

**Advanced tutorials and fanclubs**
More advanced students were asked to prepare tutorials on specific techniques, in which these techniques are explained for beginner students. Advanced students rarely accept that this type of studying is good for them. By asking them to create tutorials, we managed to establish small fan clubs of CAAD, which proved to be very activating for both advanced and beginner students.

**Preliminary results**
In this section we want to show in more detail the results of the first exercise of two courses that teach different softwares. The general build-up is the same for most of the courses that we teach in the group.
Initials in 3D – AutoCAD
In this first exercise, students were asked to create their initials by means of volumetric 3D modelling in AutoCAD. As described above, they were given a starting tutorial … The examples are the result after first 90 minutes of working with AutoCAD.

Composition in 3D by changing initial shape – 3DStudio Max
In this first exercise, students had to create five basic objects which would be deformed by means of the editing commands of 3DStudio Max. The examples are the result after first 90 minutes of working with 3Dstudio Max.

Conclusions
Our small group is starting a new period of CAAD education at the Faculty of Architecture. We feel it is very important to be in touch with other technical universities and teachers, so that we can learn from each other and implement experiences of other teachers in CAAD. This will help us to faster evolve the use of computers in teaching. We hope to accelerate in Czech republic in short time the same development which has passed in whole Europe.

While doing so, we continue our small enquiry about relationships between students and computers and CAAD, to assess the effectiveness of our effort. Currently, we are in the finishing stages to build up CAAD education in the Bachelors' programme and we are preparing the new position of CAAD in the Master programme. Each part of schedule must be defined separately, with different direction. In the Master programme, we focus on advanced architectural design in the computer studio.

References