me, Architect

Formal Representation and Self-Expression of Semantic Ideas as a Tool for Teaching Computer Techniques

Krzysztof Koszewski¹, Stefan Wrona²
Faculty of Architecture, Warsaw University of Technology, Warsaw, Poland
http://www.arch.pw.edu.pl/zpawk
¹krzysztof.koszewski@arch.pw.edu.pl, ²wrona@arch.pw.edu.pl

The paper is focused on selected issues of preliminary education of computer techniques as part of first semester curriculum at a school of architecture. Teaching methods based on previously known research are tested and explored in a situation of clearly defined constraints: lack of architecture-specific knowledge of the novices and varying levels of their computer skills. The paper is based on three-year experience.

Although we are all in the mood of saying: we do not teach software any more, we still have to think how to encourage students to develop their skills in computer techniques to the level that can liberate them from tool-dependence. The aim is to direct them towards task rather than tool oriented actions. Learning while designing causes the design process to be less important than representation. On the other hand, classic software courses are a thing of the far past and are not suited for design-oriented curriculum. There is a need to find alternative ways more suitable for a preliminary architecture IT course.

Keywords: Architectural design education; design process; curriculum; pedagogical strategy.

Introduction

The paper describes preliminary computer techniques course, which took place at the Faculty School of Architecture, Warsaw University of Technology for past three years. It represents a report of pedagogical observations gathered during practice rather than a systematic research conducted on a regular basis. The foundation for the course was laid by analyzing current reports from the field of architectural education (see bibliography) and some constraints of contemporary pedagogy. The issue of big importance was also students’ participation and self-involvement in the process. Although all the classes took place in a laboratory, e-learning system was engaged as a support form for all the course activities.
Pedagogy approach

The pedagogical approach to the course was formed taking into account certain elements of constructivist learning theory. Being aware of the criticism of both cognitive and social constructivism (i.e. possibility of leading to epistemological relativism - Philips, 1995) we have chosen some basic aspects of the theory, which can be potentially fruitful for building the architectural curriculum. Emphasis which was put on the nature of the knowledge acquiring process as based on already possessed skills led us to the usage of abstract, but well recognised terms as the foundation for the exercise. These notions, chosen by students as a basis for their work, rely on common understanding and personal experience drawn upon already gained knowledge. They do not require any specialised architectural knowledge. The analysis of chosen examples, however, lead to different kinds of expression and is based on certain directives. These directives may take into account, for example, conducting commonly recognised thinking processes (as expressed by Bochenski, 1956). On the other hand, the learner-centered and discovery-oriented process of learning, as stated in cognitive constructivism approach, resulted in part of the work focused on self-expression and usage of oneself as a medium for communicating ideas.

The curriculum approach

The course for the first semester students is a part of the entire complex architectural design curriculum and in this way should be relevant to the observations about computer techniques used during later architects’ education process. There are some well known aspects of the freshmen performance coming to an architecture school, like varying level of computer skills (but still growing on a year-by-year basis), bad habits formed by intuitively chosen tools, and a strong ability for self-development of computer skills, to name only some of them (Mark, Martens, Oxman et al., 2002). They were taken into consideration and are discussed in later chapters. Previously made observations about later parts of architectural curricula also define some constraints. These observations include pros and cons of hands-on learning of computer techniques in design studio (like increased time spent on preparing presentations, Iordanova, De Paoli 2004) or lack of self-expression during the design process. There is also an important issue already mentioned in previous research reports that students not well prepared for an efficient computer use have difficulties with expressing semantic ideas (Iordanova, De Paoli 2004).

Another issue is the tradition continuity in the frame of approach developed in the School of Architecture at WUT (discussed in Koszewski, Wrona et al., 2002). The presented philosophy tends to be more concentrated on tasks, not tools. This approach, however, does require effective and proficient tool use.

Methodology of course definition

Merging the development of computer and design skills during the first IT course at the university requires careful selection and definition of the exercise task. Comparison of the characteristics of knowledge use by novice students and by experts, the first of them divided into parallel, faintly coordinated actions and the second clearly structured and well organised (Gero 2002) has led us to simplifying the design task, thus facilitating its nature recognition. This was achieved by reducing it to a single aspect of the design activity. The design activity is, by its nature, too multifactorial to be introduced to novices in its whole complexity. The aspect that was chosen for the exercise was strongly connected with the semiotics of architecture or more particularly – architectural forms. From among the three aspects of semiotics: semantics, syntactics and pragmatics (treated as meaning expressed in some code, forming complex statements from simple signs, and the use of this representation in practice by agents, respectively; Bochenski 1956) we have chosen the
semantics. The task was reduced to the expression of semantic ideas, represented in language by abstract terms. The expression had to be developed by use of various means of communication, mentioned later in more detail. This single aspect, simple yet inspiring enough, was the axis of the exercise.

Course description

The goals
The goals of the course were clear: to equip students with computer skills advanced enough to use them freely later in architectural design process. This could be achieved effectively by creating circumstances promoting self-involvement in the process. The goals and the constraints, discussed in previous chapters, formed the course programme.

The biggest issue while preparing the programme was to create design task, which is simple yet exciting enough for students. This would encourage them to seek different ways of expression. The use of software is rather a consequence of this process and meant to facilitate clear communication of the idea. Simplifying the design task allows stressing the representation process, as more software-dependent and thus related to the aim of the course (computer techniques).

Teaching programme
The programme for one semester (30 hours curriculum in 15 weekly meetings) deals with communicating an abstract semantic idea using different ways of expression, including 3D virtual space representation.

At the beginning students choose an abstract term they are going to deal with. The choice is accepted and commented by the teacher. Examples of the terms could be: space, dream, life, justice, and contradiction. Next, they are directed to perform several exercises with the chosen notion:

• detailed semantic analysis of the term with outlining its characteristics and most form-generative aspects.
• 2D interpretation of the idea.
• 3D representation of the idea.
• sound/music illustration of the idea, chosen by student, later used in the multimedia presentation
• idea representation using oneself as a medium – special kind of self-portrait expressing the term.

Various means of expressing the same idea encourage and promote flexibility and creativity while observing the appropriate media-specific language and rules. At the basic level, this assures the use of various software and assembling the results together, resulting in the need for smooth workflow definition.

Semantic analysis
Students are asked to perform detailed semantic analysis of the chosen term. This is a step that introduces conscious thinking process as a very important part of the design process, even if simplified to the basic task. Finding dictionary definition, if applicable, the language analysis (like the word’s origin and original meaning), outlining different aspects and possible meanings of the term and specifying personal attitude to the term are all parts of the thinking process. Bearing in mind the aim of the analysis performed, the students are asked to outline the most sign- or form-generative aspects of the term, retaining a freedom to choose its aspect for further development. The results are to be presented in the form of A4 page, formatted according to a predefined template and saved in PDF format. The “technical” part of the exercise – formatting and saving the file - is an experience not to be underestimated, as the editors of this book probably may confirm.

2D representation
This task is to create a graphic sign for the chosen term. Since most of students lack basic graphic design skills and usually mix these skills with the proficient usage of graphics editing software, this exercise is done in the context of understanding basic relationships of simple graphic elements on the plane (they are briefly explained to students
on the basis of Kandinski’s work, Kandinski 1979). To facilitate the clarity of expression, certain limitations are defined: the sign should be contained in a square and created by using a maximum of three solid colours.

3D representation
This part of the course relies on creating a 3D virtual form, which expresses the meaning of the term in space. The analysis performed in the first step is used here extensively. Due to the complexity of the matter, students are asked to concentrate on only one of the possible concepts connected with the term. Building the 3D model is preceded with freehand sketches and preliminary models. Selection of the tool used is up to the students, usually 3DStudio, Cinema4D, Rhino or Sketchup. The resulting 3D form has to be presented as two renderings, with the camera views chosen to show the most of the idea and the animation of minimum length of 8 seconds (25 fps). There is also a preliminary stage for preparing the animation – a storyboard, showing action keyframes for it. Students should direct this animation as a short form, introducing, if possible, some elements of story telling.

Sound
The sound used as a part of multimedia presentation – the final phase of the course – should be chosen by students as suitable for the idea illustration. This part of the exercise encourages students to explore the potential of multimedia tools.

Self-expression – self-portrait
During this phase, students use themselves as a medium of communication. They are asked to create self-portrait expressing the chosen idea. Using oneself as a medium, demands quite different and conscious attitude to the problem. It gives the expression a very personal bias, which aims at facilitating the design expression in the future.

There are several aspects of this task. The first is the mentioned self-expression. Architects, by nature of their profession, are usually somehow hidden behind their creations. This task puts the problem in the opposite way. The second aspect is the technical problem of taking a good picture. In the era of digital photography this issue is often underestimated, since taking pictures seems to be an obvious and a nearly automatic task. Problems like composition, lighting, exposure etc. are often underestimated. Another important aspect of using themselves as media for expression is that students put themselves in the chain of signs or icons, therefore becoming a part of today’s pictorial civilization (Mitchell 1994, check also the website of corresponding project – no-name www.noname.art.pl).

Students are allowed to edit their photographs, but only in a non-destructive way, without interfering with the picture structure. This presents another challenge of careful and conscious use of image editing tools, without fascination with seemingly endless, but superficial possibilities of image manipulation.

Figure 1
The 3D form illustration for the term “harmony” and the preliminary sketches of it
Presentation
The final phase is a preparation of a presentation scenario, showing all the means of expression of the selected term. Students are also encouraged to show their sketches and non-finished proposals to document their thinking process. At the end of the course, all presentations are shown in the classroom along with the authors’ comments. This is the occasion to use the potential of multimedia in an efficient way, clearly defining key concepts that have driven the creative steps.

Multimedia presentation is accompanied with a graphic presentation in printed form. It consists of a small square board, which presents the course outcome as graphic composition and a CD wallet designed as complementary work package.

E-learning
As it was already mentioned at the beginning, the e-learning system was used as a support for the course. In this case, it was an open source system called moodle (www.moodle.org). The most extensively used support areas of the system were communication tools (both synchronous and asynchronous), file-upload features and feedback activities. The system was also used for continuous grade collection and final grading.

Observations
At the beginning of the course students were surveyed about their computer skills. The results pointed at some issues, like:

- As anticipated, students coming to school know graphics editing programs much better than CAD software, although interestingly, 97% of them declare acquaintance with Photoshop.
- Among the graphics software known to students there is a significant dominance of raster-editing over vector-editing programs.
- Half of the novice students claim to know CAD software with varying levels of proficiency (AutoCAD, ArchiCAD), but only 12% of them described their skills as expert or very good, while 25% of them did so for the graphics editing programs.
- Over 40% of students were familiar with 3D editing software like 3D studio, but mainly as a tool for creating animations.

We observed during later education most of the students rarely use dedicated programs or software capable of vector editing. They rather use Photoshop for assembling architectural design printed presentations which results in files larger than 1 GB. We therefore concluded that they simply use software they learned earlier in other situations, which is not well suited for the given task.

The students were allowed to use a technique of their choice for preliminary sketches; the only condition was to upload it in a digital form using e-learning system. Most of them felt much more comfortable with freehand sketching than using software.

Students, who were less advanced with 2D or 3D editing software, were not hindered by this limitation and usually lack of these skills were supplemented with a deeper analysis and thoughtful presentation of the process at the end. On the other hand, some very computer proficient students tried to replace the intellectual potential of the task with seductive nature of renderings and animations, not necessarily justified in the thinking process.
Figure 3
Students’ works: illustration of 10 chosen terms; left – 3D form, right – graphic compositions including self-portrait and the form
The idea of using self-portrait and oneself as a medium gave a personal touch to the students’ work. For many of the students it was the first time they tried to treat them as an object or even to take a photograph of them self. Some reported significant difficulty in the process, but nearly everyone admitted that this was an attractive part of the task and an interesting reversal of the thinking perspective.

**Conclusions**

Based on this educational experience concerning basic course of computer techniques for beginner students at the faculty school of architecture we can draw several conclusions:

- Already possessed computer skills do not obviously facilitate the communication of the idea. Increasing number of students come with technical proficiency in certain programs, although they do not use them in an efficient way. It appears that while in the 90’s we used to teach students how to use the computer (or software), we now increasingly teach them how (or when) not to use it (like the case of raster editing programs used for assembling large printed presentations).
- Basic computer skills have to be introduced during the preliminary course, but they have to be treated more as a step to reaching the goal rather than the goal itself. Giving students a simplified, reduced design task that requires searching for ways of expressing an idea makes it possible.
- The diversity of methods for expression of a single term promotes the use of a variety of software. Assembling the results in different forms of presentation (multimedia or printed) underlines the value of developing a smooth workflow.
- Students’ feedback leads to the conclusion that such kind of exploring abstract semantic ideas, analysis and searching for different codes for various expression methods is very inspiring. Introducing the personal aspects (self-expression) inspires more engaged and personal attitude.
- The use of e-learning system, apart from its internal advantages, is well-suited to the habits of the information-era students. Certain students even prefer such form of contact to face-to-face meeting.
- Introducing such humanistic approach (detailed semantic analysis, self expression) in the course that is expected to be purely technical suits the architectural curriculum and, in a broader sense, the nature of the architect’s profession.

**References**


