

DESIGN COMPUTING EDUCATION

Developing a post-grad CAAD curriculum based on specific design project

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Abstract. The idea of teaching design computing through design-based approaches has been increasingly adopted over the past 15 years. However, most of the resulting experiments have been limited to specific courses within larger programmes. This approach has rarely affected CAAD curriculum. A glance at the syllabus of some CAAD programmes may reveal their non design-based nature. We describe here a post-graduate programme that has been structured around a specific design project through a set of courses in which the emphasis falls on the needs of the design process rather than on software categories.

1. Introduction

The integration of teaching design computing into the design process is not a new paradigm. Many have been the experiences reported with this objective. (Goldman and Zdepski, 1987; Fuchs and Martinico, 1995; Kalisperis, 1996; Marx, 1998, and just some examples). However, most of those deal with isolated courses within larger programmes. They rarely tackle issues relating the introduction of design computing into programmes involving many courses and several teachers. Only on very rare occasions has this idea been applied at the curriculum level (see Stipech, 2000). Even rarer are the experiences where a particular design project is used to structure an entire curriculum (see Bridges, 1999, as one of the few examples).

2. Context

This paper describes the implementation of a post-grad curriculum in CAAD at the University of Brasilia, Brazil, with the academic support of the University of Strathclyde, UK, and the Pennsylvania State University, USA. We obviously do not claim an innovative premise. As it was said, the general idea has been out there for many years. What we claim is to have made a small contribution by implementing it, at the level of a programme, based on a

specific design project. This programme was organised around courses related with possible applications of computer systems in the architectural design process.

3. Challenges

The first challenge is related to the nature of design process: a teaching programme with well-defined courses tends to induce the observation of well-defined steps and the serialisation of the design process. The fact that the skills become available only progressively through the programme also discourages the students to handle many aspects of design at the same time. They are also discouraged to reverse decisions taken in previous stages of a design project. This is particularly applicable if those decisions took place in different modules or courses or were delivered by different teachers. These trends conflict with general features of design processes as described by Rittel (1972) and later validated by others such as Lawson (1980).

The second challenge is that many students still lack major computer knowledge and skills even at post-grad level. We have undertaken previous attempts to introduce computers straight into the design studio at both course and programme levels. These attempts were not very successful because for many students with no computer background it turned out to be impossible to acquire basic skills while at the same time to develop highly demanding design tasks. A compromising formula needed to be found.

The third challenge is that not all relevant subjects can fit into a particular design project due to the nature of their contents. For example, subjects like "Knowledge-based Management Systems" tend to be useful as a background support for several design projects rather than to fit in a particular one. The learning of this subject will very often involve the implementation of a particular knowledge domain. However, in real life those systems will be useful in a particular design project if specific domains, implemented by specialists, are already available to designers at the outset of the design task.

4. An Implementation of a Specific Design Project Programme

A curriculum composed of three main parts was developed: the first one was dedicated to basic skills and theoretical background such as "introduction to computing", "introduction to computer-aided design" and "design theory and computers". The second was dedicated to the development of a design project. The third part was devoted to advanced topics such as "Knowledge-based Management Systems" and dissertation writing.

This paper concentrates in the second part of the programme mentioned above. In this part, the teaching of concepts and several computer paradigms takes place within the context of conceiving and developing a specific architectural design project. Through a set of courses named as "common theme unit", a design project is developed on a specific theme which acts as a learning catalyst, directing the discussion to the most relevant architectural issues.

The result is a set of courses such as "Conceptual Design", "Visualisation Studies", "Energy Studies", "Design Communication to the Client", "Design Communication to the Construction Site" and "Integrated Digital Studio" in which the emphasis falls on the application in architectural design. We insisted in labelling them with names of design issues rather than with names of software categories. We believe that this helps to keep the focus on design issues rather than on computer paradigms.

Particular attention was given in trying to cope with the problems related to the third set of difficulties identified earlier: the induction to serialisation of the design process and the possibility of providing skills only progressively. The order of the design issues discussed are only relatively important, because once introduced many of them will become recurrent during later stages of the design process. We induced feed back loops in the process by mixing teachers with different design preoccupations and by making all the subjects already introduced assessable at each stage and at the end of the unit.

5. The Common Theme Unit

We briefly describe below the contents of the Common Theme Unit:

1. Conceptual Design: 3D Modelling as a design medium. Design Project. Exploration of design alternatives regarding form, sun lighting, artificial lighting and materials through 3D modelling and rendering.
2. Visualisation Studies 1: Introduction to VRML as a design study medium.
3. Visualisation Studies 2: Introduction to computer animation techniques as a means of design study and presentation.
4. Energy Studies: Introduction to the environmental simulation, analysis and appraisal in architectural design.
5. Design Communication to the Client: Introduction to Web composing and editing for publishing portfolios. Principles of Web design.
6. Design Communication to the Construction Site: Introduction to the documentation of designs in computers. Principles of design documentation in computers. Design Project.
7. Digital Integrated Studio: Conception and development of a specific design project. This is the backbone of the programme and runs in parallel to the modules 1 to 6.

Conclusions

We believe we have made a small contribution by implementing an idea that has been around for quite a while in a particular way, that is, at the level of a programme. We think this strategy is promising and that the next stage would be to implement a more systematic process for assessing its results probably making use of value-added techniques.

References

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