Teaching/Learning Architectural Design Based on a Virtual Learning Environment

Luisa Dalla Vecchia ¹, Adriane da Silva ², Alice Pereira ³
¹ Universidade do Oeste de Santa Catarina, Brazil, ² Universidade Federal de Pelotas, Brazil, ³ Universidade Federal de Santa Catarina, Brazil
¹ isa_luls@mail.com, ² adribord@hotmail.com, ³ acybis@gmail.com

Abstract. This paper describes an experiment in which a virtual learning environment was used in the context of an architectural design course. The objective was to evaluate the capability of the learning environment used to support the interactions needed, between teacher-student and between students, for the establishment of a process of discussion and development of architectural design. Some limitations imposed either by the virtual learning environment or by the context of the experiment itself were identified and also positive points, such as the possibility to register the whole design process. All this data subsides studies about the process of teaching/learning architectural design validating this experiment and allowing the promotion of new experiments in the different stages of this academic process.

Key words: architectural design; technology in education; virtual learning environment.

Introduction

This research studies alternatives for teaching/learning architectural design seeking ways to make this process more transparent.

As a starting point is the consideration made by Silva (1984) that the design process mustn’t be compared to a black box – a mechanism in which is impossible to see how it works, knowing only the income or the problem, and the outcome or answer – but to a transparent or glass box which is possible to observe how it works. This author points out that if the design is the rational effort to solve a certain problem it must imply some sort of organized knowledge. (SILVA, 1984).

It is up to the educational institution to explicit this process. However, the way architectural design is taught, in the context analyzed, is very similar to that described by Schön (2000) in which there is no effort to make the process explicit. This author describes the usual practice of teaching/learning architectural design as that in which each student must develop their own version of the design, keeping their results in preliminary sketches, studies and models. At the end of the semester there is a meeting in which the students present their designs to the teacher and in some cases a board of evaluating teachers. From time to time during the semester, a revision of the design is carried out with each one of the students who the teacher orient individually. This dynamic in architectural design courses treats the process as a black box. The students don’t share
the different methodologies adopted throughout the process, hardly discuss as a group the decisions made and don't explicit the references used in each moment for the conception of the design. All this could make each one of the processes, established by the students, richer, revealing the design process. It is considered that even the designer has a lot of difficulty in describing the process in details. Rarely in the context of architectural design courses there is an effort to build discourses that justify the decisions made in the design. There is a lack of time, space and experiments systemizing the process.

The technologies of information and communication offer a great possibility, in the educational context, of broadening time and space available for the establishment of collaborative moments between teacher/student and student/student. Learning processes mediated by these technologies demand the register of the discourses thus promoting a systematization and reflection about them. Virtual learning environments incorporate these technologies for their specific use in education enabling to register the teaching/learning process as it develops.

It is considered that the use of a virtual learning environment in architectural design courses could contribute to make the design process more transparent as well as the process of teaching/learning architectural design, making it possible to identify the methods used by the students and when and how the teacher intervenes.

Thus, this research seeks to use a virtual learning environment to observe its validation in an architectural design course.

**Architectural design teaching/learning context**

In this session the traditional development of the architectural design course considered for the experiment is described. The kind of interaction between teacher/student and the kind of documents which register and characterize the teaching/learning process were identified.

The course selected for the experiment was Architectural Design III from the Federal University of Santa Catarina. This course was chosen for being an architectural design course which used the traditional method described above and mainly due to the disposition of the responsible teacher for taking part in the experiment. The main object of study in this course is architectural design of public spaces as an element to configure urban centralities.

This course presents a context very similar to that described by Schön (2000) in which the students learn mainly by doing. It is divided in three main stages, in the first stage the object of study is introduced and the problematic of urban centralities and the use of public spaces are identified.

In this first stage the class is divided in four groups, each group chooses an area for the future development of the design and proposes a theme for the design in that area. At the end of this stage the area for the development of the design and the theme to be used by all the students is elected from among the proposals.

In the second stage the conceptual formulation of the architectural proposal is carried out and the development of an overall urban plan to organize the public space in the urban centrality chosen in the previous stage. For this stage the class is divided into three groups. Initially each group develops a different activity, developing a physical model of the terrain and surrounding area, a digital model of the area and a digital view of the area. Following this, each group develops a proposal to relate the chosen place with its surrounding area, including a volume study for the terrain.

In the third stage each student develops individually their design for the place chosen. The collaborative processes in the architectural design courses are intense between teacher/student in the moments of individual orientation, in which the architectural discussion takes place based on the visual-graphic language. Furthermore, all the examples used as reference, sketches and even the final presentation of the design all depend on this language.
However, it is not always possible to establish collaborative processes between student/student, most of the time due to a lack of time in the classes to talk individually to each student and still establish overall discussions with the class about each of the designs being developed.

Certainly, the group discussion about each one of the designs could promote the students to contribute with ideas for the improvement of the designs, elevating the level of the designs. Furthermore, this practice of discussion about the design contributes for the practice of team work which will be important for the students in their professional lives.

Thus, a virtual learning environment, in order to support architectural design courses should, apart from offering tools that support the use of the graphic language, bring forward the promotion of discussions during the whole development of the design.

The experiment

In this session, initially, the technological resources are specified, such as characteristics of the laboratory available and of the virtual learning environment. Following this, the experiment of using the virtual learning environment in an architectural design course is described.

Technological resources used

The virtual learning environment used was AVA-AD (Virtual Learning Environment on Architecture and Design) (avaad.ufsc.br) which is being developed in the Laboratory of Virtual Learning Environments (Hiperlab), in the Federal University of Santa Catarina. This virtual learning environment has the objective of structuring learning situations specifically for knowledge areas which use the visual-graphic language such as architecture and design. Among the tools available in AVA-AD the following stand out: chat, email, forum, instant messages, shared white board (collaborative 2D environment), shared VRML navigation (collaborative 3D environment), shared text editor, document sharing, registration of users and group creation, shared schedule. AVA-AD is based on the Moodle system (moodle.org).

The use of the virtual environment by the students was not mandatory since some students only had access to computers and the virtual learning environment at the university and the laboratory available for the architectural design activities presented outdated computers and a slow connection to the internet. These characteristics made it impossible to install some plug-ins needed for the correct use of some of the tools in the virtual environment such as the collaborative 2D and 3D environments.

Development of the experiment

For each stage of the course, described above, the use of specific tools of the virtual learning environment were proposed, selected from the observation of the kind of interaction and document sharing which occurred in the traditional classes.

For the first stage, two forums were created for discussions such as the one in Figure 1. The first forum was meant to be used throughout the semester with the objective of clarifying doubts about the use of the learning environment itself. The second forum was created to establish a discussion about the concepts and design methods used in each one of the proposals presented by the students. This forum is characterized as a open space for orientations.

For the development of the idea contest, which is still part of the first stage, a wiki (shared text editor) was created. The proposal was for each group to develop their idea for the location and theme using this tool, an example of wiki can be seen in figure 2.

At the end of the first stage all the students should analyze the ideas of all the groups, for this a new forum was created for the discussion of the different ideas. Finally, two opinion researches were created: one to elect the location for the design and the other to select the theme which everyone would work on. Figure 3 shows the voting screen in AVA-AD and figure 4 shows how the results are visualized.
Webteca e meus arquivos
por Luisa Felix - sexta, 30 março 2007, 11:10

A webteca já deve estar aparecendo abaixo dos arquivos compartilhados e na janela que se abre nos "meus arquivos" já tem barra de rolagem. Vai ficar mais fácil usar os meus arquivos agora.

Re: Webteca e meus arquivos
por Thiama Fagundes - terça, 3 abril 2007, 12:07

Não sei como está a interface para os alunos, mas na minha a webteca que aparece abaixo os arquivos compartilhados ainda não permite acessar os demais links.

Re: Webteca e meus arquivos
por Ivanna Tomasi - terça, 3 abril 2007, 22:14

Luísa, eu não consegui adicionar imagem no wik. Eu já adicionei nos meus arquivos, mas eu não consigo identificar para colocar lá. Aliás, para colocar tem que clicar em adicionar imagens na... Se for assim mesmo, pode hr, dai eu colocar a url que eu coloquei na imagem nos meus arquivos, e não deixei que isso eu acho que não deve ser assim, hehe!! Me ajuda pleaseas!!!
For the second stage all the digital material produced by the groups was made available to everyone in AVA-AD. From the digital model of the location a VRML file was created and made available in the collaborative 3D environment of AVA-AD, for the visualization of the existing volumes around the terrain.

In this stage a wiki was also created for the development of the urban proposal of each group and two forums: one for the discussion about the area and its characteristics and the other for the discussion about the theme chosen for the design.

In the third stage each student developed a three-dimensional digital model of their design. These models were inserted in the model of the area created in stage 2. From each of these a VRML file was created so that the model could be used in the collaborative 3D environment, two of these environments can be seen in figure 5.

All the students could access the designs of the other and circulate simultaneously while talking in the chat space.

It is important to point out that the schedule for the semester was available in the initial page of the course in AVA-AD, all the material and discussion of previous weeks and all the tasks that the groups had completed could be seen by all the students, it was
also possible to see the dates of future deadlines and tasks. Another aspect which is important to point out is that each participant of the course had a space in AVA-AD for keeping their files; these could be shared with any other participant that they chose, making the exchange of documents a lot easier.

It was observed that the use of the collaborative 2D and 3D environments was limited due to the difficulty to insert graphic material in these environments since the material had first to be sent to the administrator of AVA-AD so that he could make it available online.

At the end of the semester the students answered a questionnaire about the use of AVA-AD in the course of architectural design III. The teacher responsible for the course was also interviewed with the purpose of incrementing the data to evaluate the results of the experiment.

**Results and discussion**

In this session the results of the experiment are presented. The students’ answers to the questionnaire, the interview with the teacher, all the material stored in AVA-AD, observations and data collected talking to the participants throughout the semester were all
considered for the analysis.

Regarding the overall participation in AVA-AD it was observed that 46% of the students (six students) took part in less than 50% of the activities 38% (five students) took part in 50% to 70% of the activities and only 16% of the students (two students) took part in more than 70% of the activities in AVA-AD. However, it is important to observe that 54% of the students (seven students) took part in more than 50% of the activities. The lowest participation was in the third stage when they were developing their designs individually.

I was observed that the difficulty to insert graphic material in the collaborative 2D and 3D environments was one of the main aspects that took the students not to want to use these environments to carry out collaborative activities in these environments, since when their graphic representations and models were finally made available by the administrator, the students had already advanced on the design and the material in the collaborative environment was out of date.

However, the students pointed out the following aspects as a contribution of AVA-AD to the course: the possibility to view the schedule of the course, what had been done and what was still to do; the communication which was made easier through AVA-AD and also the file sharing; the possibility to view what the other were doing and the possibility to go back on the discussions and material stored throughout the semester.

Furthermore, all the designs could benefit from the discussions carried out in the forums about the individual designs in which everyone could take part.

Regarding the contribution of AVA-AD in the design solutions it was pointed out by the teacher of the course that the final design of those students that took part in the activities in AVA-AD more actively, 23% of the students (three students), was better than the designs of the students that didn’t take part in most activities in AVA-AD such as forums. In the teacher’s evaluation the design solution presented by these students that took part in most activities were in a higher level compared to the others, she points out that these students explored more options deepening their proposal.

The commentaries made by Pallof and Pratt (2002) make it possible to understand this consideration made by the teacher. These authors point to the possibility of thinking more in the discussions through the forums since the commentaries in a forum can be made when the student desires, giving them time to think more about what their are doing. This allows more reflection and commitment to what they are doing when compared to a live discussion. Even in real time discussions, through a chat tool for example, the written expression could demand more reflection. Moreover, the collaborative 3D environment allowed participants in different places to view and walk through the spaces simultaneously while discussion in the chat space allowing them to advance even more in their designs between one class and the next, solving several aspects in a distance manner.

It is important to point out that all the students had already taken a computing applied to architecture course but even those who found it hard to elaborate 3D digital models could still benefit from using the virtual environment viewing the work of others and taking part in the discussions.

Conclusions

The experiment described demonstrates the possibility transpose to the virtual environment AVA-AD several aspects of the dynamic of the architectural design course analyzed, pointing to several improvements on the quality of interaction between teacher/student and between students.

The problems identified, such as lack of appropriate laboratories for the students’ use which limited the participation to those students who had a computer and internet access at home and the difficulty to insert graphic material which depended on the administrator, can be solved through a technological
approach (improving the virtual environment) and economic approach (improving the laboratories).

In a pedagogical aspect, the experiment demonstrates the possibility of establishing teaching/learning processes of design in the environment. The discussion, which before happened individually between each student and the teacher, are now registered and visible in the environment allowing all the students to question and analyze the designs of the others making the designs richer.

It was observed that the collaborative 2D and 3D environments have a great potential to improve even more this kind of course, however, in the experiment they did not achieve this potential due to the difficulty to insert graphic material in these environments.

It is considered that one of the main contributions of the use of a virtual environment in architectural design courses is the possibility to register the whole process, making the discussions explicit and making it possible to view the interventions made by the teacher in each design. Moreover, the discussions were broadened to the whole group of students.

From these registered data it is possible to develop studies to identify the structures of knowledge which support the education on architectural design and observe in which moments these elements of knowledge are introduced as the students show difficulty throughout the course, contributing, thus, to the systematization of teaching/learning processes on architectural design.

References


Silva, E.: 1984, Uma introdução ao projeto arquitetônico,