The Integration of IT within the Early Stage of Architectural Conservation Design

A pedagogical experience

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Abstract. This paper attempts to analyse the results of the multidisciplinary project focused on the holistic approach to education in the field of architectural history and conservation with an extensive use of computer technology. The skills trained usually separately within autonomous courses were brought together to form a “task force” project addressed to the students from two universities in different countries. The increased role of architectural design within a historical context and the need for the corresponding changes in the undergraduate course curricula is also stressed.

What is more, the experiment revealed to be an interesting method of exploitation of the power of the computer as a design tool and, what is more, as a design stimulator in the early stage of the architectural design process. In this way the paper contributes also to the discussion on integration of IT within design studio.

Keywords. Pedagogical strategy; CAAD curriculum; digital design education; integration of IT within design process

Introduction

The pace of change in communications and information technology continues to accelerate, bringing with it both, opportunities and challenges. The education of architects in the field of architectural conservation should, therefore, keep up with new technologies, which open potential innovations in teaching, learning and research.

Recently the widespread discussion on the place of computer technology within curricula has taken place and two major different approaches have been identified (Mark, Martens, Oxman, 2001). These can be accurately defined as follows:

- isolated course focused on computer-based drafting skills;
- integration of computer technology within design studios.

Concurrently the controversial role of IT in the field of architectural conservation has been stressed by some authors (Ashton, 1995). The computer-aided drawings are often being considered by some traditionalists too mechanical and sanitised, and therefore inappropriate for such application. More recently, tremendous success of the Tavenor’s study of Alberti (Tavernor, 1998) with extensive use of 3D modelling, drawing and digital photogrammetry has, however, indicated that history of architecture and architectural conservation benefited from the use of computer technology and so deserve to be taught in conjunction with the use of computing tools (Dumont, Hughes, 2001; Seebohm, 2001). It is of crucial importance as the need for architects trained in the field of architectural conservation is growing.
It is not surprising as it is estimated that restoration works constitute approximately 70 per cent of all building activities in European countries (Tisken et al. 2001). This means that there is a need not only for specialist post-graduate courses in architectural conservation (such as those in Karlsruhe and Bamberg in Germany or Leuven in Belgium). Also undergraduate students should be educated with an increased focus on architectural intervention within a historical context.

The CAAD education and the architectural conservation at the Institute of Architecture and Urban Planning at the Technical University of Lodz

At the Institute of Architecture and Urban Planning at the Technical University of Lodz, Poland, students are taught according to the traditional curriculum, which has not been modified significantly for some twenty years. All courses are compulsory and a number of them is run in parallel during each semester.

For example the third-year students work on architectural conservation design and, concurrently, they have a course of 3D modelling, during which they work on a 3D model of chosen masterpiece of architecture. The both projects are usually elaborate and therefore time-consuming. For instance, the architectural conservation course lasts two semesters and this includes not only a design itself but also the whole range of analyses (historical, urban, functional, structural, etc.). What is more the students dealing with conservation project use CAAD even if tutors do not require it. Unfortunately, the results of application of computer technology are often confused mainly due to the lack of professional guidance. Not surprisingly, the outcomes achieved by students are, thus, not satisfying. The staff from the Architectural Conservation and CAAD units had an idea, therefore, to improve the quality of students’ work within the existing curriculum and to provide students with a comprehensive education. In this way the experiences of tutors from different units were brought together to develop a new vision on the creative use of CAAD. The idea was developed through the conservation project integrated with a corresponding 3D modelling.

The site of Medieval castle in Lubawa was chosen as a design theme. The project followed a “task-force” pattern and, what is more, the brief for the students’ design was given by the real would-be investors. In addition the project at its preliminary stage embraced the site surveying including a participation in archaeological excavations and inventorial measurement done by students. Finally, the project was done in cooperation with the School of Architecture at the Technical University of Mainz, Germany. This enabled an opportunity for the transnational and interdisciplinary comparisons, which was achieved through the exhibition of students’ designs during the international conference in Lubawa summing up the whole project.

Lubawa and its architectural heritage

Lubawa is a small town located in the North-East of Poland. Nowadays Lubawa is a provincial town lacking distinction and image but its history reaches back to 1216 when the Pope Innocent III confirmed ownership of Lubawa land by Prussian bishop Christian. From 1257, Lubawa and its surroundings were owned by the Bishops of Chelm, who made the town one of their permanent residences. The town became important municipal and defensive centre. The development of the town was based on the flourishing trades and crafts.

The most prominent person appearing in the Lubawa history is Copernicus who visited the
town several times during the years 1538-39. What is even more interesting the publication of the Copernicus’ famous work “De revolutionibus orbium celestium” was probably decided here as the major promoter and initiator of this publication was bishop Giese who resided in Lubawa castle at that time.

In 1772 Lubawa became a part of the Prussian Kingdom. The town became the state-owned after the secularisation of ecclesiastical properties by the Prussian government. Since 1920 Lubawa has been included again within the Polish State.

Lubawa, as an old bishop town, has many ecclesiastical monuments with the oldest church dating from the 1330s. Parts of the city walls have been kept and some houses of the Medieval origins have preserved their historical character. Unfortunately the most impressive building of the town, a beautiful bishops castle, have not survived - only the ruins reduced to a basement level have remained.

The castle was first built in the early 14th century on the rectangular plan with a tall tower on one of the corners. The castle was developed substantially in the following centuries. After the fire of 1545 it was extended and rebuilt into a Baroque residence. The castle unfortunate demolition in 1826 was preceded by the another fire of 1813. The castle grounds were transformed into allotments. At present massive defensive walls and a modest Gothic portal once leading to the castle courtyard are the only visible remnants of the bishops residence (Figure 1.).
The project task

The local authorities of Lubawa understand the importance of the local heritage and seek opportunities to unlock its potential. They also understand the problems created by the massive castle ruins occupying large area in the middle of town centre. The regeneration of the site of the bishop castle was brought up for discussion. In the opinion of the local authorities a new municipal building serving local community should be located there.

In 1993 the archaeological works had been launched. The major aim was to discover the castle walls layout. The first stage was done by research staff and students from the University of Lodz. The knowledge about the history of the castle increased significantly but there was not still any clear vision what should be done with the site. The authorities asked, therefore, the Institute of Architecture and Urban Planning at the Technical University of Lodz to produce feasibility study to find the most suitable use of the castle ruins.

This complex task was to be dealt with by the third-year students from the Institute during the academic year 2000/2001. The methodology for the multidisciplinary project was outlined by the academic staff from the Architectural Conservation and CAAD Units What is more, the Institute’s German partner – the School of Architecture at the Technical University of Mainz – was invited to participate in this project.

The project was carried out during the course spanning one semester. Students were expected to form two-person teams, which worked during this project on the architectural proposals of re-use of the castle hill. The first stage of the project included extensive analyses of the history of Lubawa an the castle, the extant state of the site and its surroundings, the level of preservation of the castle ruins, etc. The next stage was to find a new use for the castle hill corresponding to the expectation of the local authorities and allowing maximum of preservation of the ruins with the public access to the most interesting parts (Figure 2).

Another issue was to be solved to fulfil the requirements of the CAAD course. No plans and photographs of the original appearance of the castle have survived. In fact the only source of information on the castle actual shape was an old panoramic view of Lubawa dating from the 17th century and plans derived from the excavation work. Students were, therefore, asked to make 3D models of the castle being hypothetical reconstructions of the original structure (Figure 3.). The project was supervised simultaneously by the tutors from the CAAD and Architectural Conservation units providing students with comprehensive consultations, depending on the nature of the problems.
The whole project program included also corresponding lectures and the coach trip to the site providing students with a more detailed information on the actual state of the ruins and the range of archaeological excavation. Finally there was an opportunity for students to explore the castle hill on their own.

It is necessary to stress here that the whole project followed the competition pattern. The best students’ designs were to be shown to the public during the final exhibition. It was organised during the international conference summing up the whole project with participation of local authorities as well as the staff and students from the universities participating in the Lubawa project (Figure 4).

**Results and conclusions**

The close co-operation of architectural historians, conservators and CAAD tutors throughout the project not only has achieved aimed goals but also it seems to be a good source of lessons for similar projects in future and, furthermore, for educating students of architecture in general. Especially due to the fact that the interdisciplinary activities are seldom offered, at least at the schools of architecture in Poland.

Through the creation of the complex design task students were faced with solving several different aspects simultaneously. What is more, project results revealed that students achieved better knowledge of historical building and deeper understanding of the project task.

**3D Model as an educational tool**

A number of 3D models done at the preliminary stage of the design task required extensive studies: comparative analysis, studies of iconography and architectural historians hypotheses, etc. By modelling digitally students learned more quickly about the building than through the traditional (analogue) drawings such as plans, cross-sections, isometric views, etc. Such 3D modelling can be the medium allowing a number of further educational possibilities particularly with the use of multimedia techniques.

The modelling appeared also to be an excellent tool for the verification of the knowledge gained from other courses. For example during the modelling final stage the problem of textures selection emerged. Some students had difficulties...
with applying proper textures as did not have sufficient knowledge on particular structural aspects. For instance a student used the brick texture for modelling the column capitals. Tutors from the Architectural Conservation Unit could react with providing more information and references on the history of building materials and structural solutions during the course of architectural history.

Computer literacy
Another interesting issue emerged – students’ growing computer literacy. The pace of change is best illustrated by the following example: software being part of the second-year IT course a couple of years ago is included now within the curriculum at the primary school. This reveals that CAAD curricula should change not only in accordance with present and anticipated needs of architectural practice but also should adjust to the pace of change in communications and information technology education – in some countries the CAD skills are established in High School (Vásquez de Velasco, 2002). It is not surprising then that the subject of CAAD curriculum has recently been discussed widely (Mark, Martens, Oxman 2002).

Digital vs. analogue
There was no requirement to employ CAAD or other computer techniques during the architectural conservation part of the project. Some student took the advantage of the close co-operation with the CAAD Unit and deployed new skills gained during the 3D modelling and sometimes even parts of the 3D reconstruction were used in the design stage of the conservation project. Other students continued their work with the use of traditional design communication media. Most of teams mixed both techniques and a number of final project presentations formed interesting assemblages.

The results proved there is no confrontation of digital and traditional “analogue” methods of architectural representation. At least it is clear for the students such a conflict does not exist and they feel confident in the use of both media.

Concluding remarks
The pedagogical approach implied a multidisciplinary work calling on architecture, archaeology and computer science. The students had to make use of information collected and interpreted by archaeologists and then to propose an architectural reconstruction with the advice from architectural historians. The validation of students’ architectural hypotheses was immediate and accurate due to the use of the CAAD tools. Also amassing many levels of information all at once proved to be a powerful and experiential educational tool, which allowed students to develop their capacity for analysis, understanding and conception.

The experiment revealed to be an interesting method of exploitation of the power of the computer as a design tool and, what is more, as a design stimulator in the early stage of the architectural design process. Therefore a particular attention was paid to the development of students’ creativity rather than software learning.

During the project typical CAAD and 3D modelling software was used. This was sufficient for the purposes of the students architectural conservation design. Without doubt, for the professional conservation analyses and reconstruction more powerful software and other computer technologies should be deployed (eg. photogrammetric and restitution tools). This is, however, beyond the scope of undergraduate curriculum in the field of architectural education.
References


Choros, K. and Krzywiecki, L. Multimedia i wirtualna rzeczywistosc w systemie multimedialnej prezentacji zabytkow, Ochrona Zabytkow 4/98, pp. 370-377


Mark, E. Martens, B. Oxman, R. Round Table Session on Theoretical ad Experimental Issues in the preliminary Stages of Learning/Teaching CAAD in Koszewski, K. Wrona, S. (eds.) [design e-ducation]. Connecting the Real and the Virtual (eCAADe conference proceedings), Warsaw: eCAADe, 2002, pp.205-211


Vásquez de Velasco, G. The Computer is to Blame in Koszewski, K. Wrona, S. (eds.) [design e-ducation]. Connecting the Real and the Virtual (eCAADe conference proceedings), Warsaw: eCAADe, 2002, pp. 50-54
