

Dances with Architects

Interactive performance as a new concept for architectural design studios

Angelika Lückert¹, Volker Koch², Petra von Both³

Karlsruhe Institute of Technology (KIT), Germany

¹http://blm.ieb.kit.edu/135_722.php, ²http://blm.ieb.kit.edu/135_72.php, ³http://blm.ieb.kit.edu/135_44.php

¹angelika.lueckert@kit.edu, ²volker.koch@kit.edu, ³petra.vonboth@kit.edu

Abstract. *This paper proposes a complementary approach for the architectural design studio. By interpreting architecture by means of an interactive (dance) performance as design task it combines architectural theoretical examination with the implementation of new technologies and event realization. This design studio concept integrates scenography, choreography, sound design and event management, providing workshops carried out by external and internal experts to give insight into these disciplines and new tools. The experimental form allows the students to define the specific form within a broad scope, ranging from a dance performance performed by the students themselves to an interactive installation. The focus for the students was on dealing with the diverse input and on the decision-making process and its reflection.*

Keywords. *Interactive; performance; teaching; collaboration; gesture control.*

INTRODUCTION

The prevailing concept of design studios at architecture schools is that of simulating a design process in an architectural office. Consequently, a standard task may consist of designing a building or other objects in the context of the built environment. By contrast in an alternative approach several existing works combine architecture and dance (Bronet and Schumacher, 1999; Pekol, 2011) and served as a starting point for a new design studio concept.

In contrast to established concepts, this design studio has an interdisciplinary setting, using new media, dance and scenographic elements to translate architecture into an interactive performance. A central educational aim of the project described in this paper was to instruct the students to analyse and abstract architecture in order to be able to transfer

the essential characteristics into a different medium.

The concept of this design studio involves a very broad range of topics so as to incite the students' learning process with a task that represents the complexity of the design process in architecture. The project therefore combines elements of architectural theory with an extensive number of efficient tools and basic introduction in choreographic and scenographic acting. As collective project the students involved have to clarify their specific art and technical skills and assemble all competences of the group for a presentable and conclusive stage event.

The future outcome being an interactive performance – instead of (relatively) theoretic drawings of an architectural object – fundamentally transforms the design and working process. Firstly, the students

are introduced to completely new subjects, which are scenography, dance and man-machine interfaces (MMI). Secondly, they have to learn the use of hardware and software tools, and most importantly they need to develop the ability to decide which tools are best suited for their intention.

The project is based on an interdisciplinary cooperation between a department of the faculty of architecture and external specialists from the field of scenography, choreography, programming and visual arts. Accordingly, there are different levels and focuses in this project: the acquisition of expertise in handling the technical tools, the creation of a complex scenographical work, which included the work with dancers, and the organization of the event itself.

The course, which was named “Dances with Architects”, was first offered in summer 2012 and open to advanced students. The students could choose to work on specific aspects of the project.

THE ARCHITECTURAL DESIGN STUDIO

Project-based learning has traditionally been an elementary component of the architectural curriculum with the design project as its centrepiece.

This innovative concept for the design studio aims at opening the narrow concept of learning environment (Webster, 2008) reflected in Schön’s influential works ‘The Reflective Practitioner’ (1984) and ‘Educating the Reflective Practitioner’ (1987). As Webster justifiably assesses, Schön limits everything to the formal one-on-one meeting between design tutor and student. Additionally his understanding of learning and teaching is based on the premise that teachers know the right solutions and that something like a generally shared aesthetic values exist.

Though Donald Schön’s decisive works turned the focus from the accumulation of technical knowledge in architectural education to “reflective practice”, which was defined as “the capacity to reflect on action so as to engage in a process of continuous learning” (Schön, 1983) the understanding of architectural education remains somehow limited (Webster, 2008).

On the basis of the aspects highlighted above and with the awareness that certain pedagogical settings, like tutoring and reviews, limit the students’ possibility to express themselves elements were introduced to create a more informal learning setting. Therefore an essential part of this design studio project was for the students to decide which tools to use and how to convey their ideas, and to continuously reflect their decisions. And the output, i.e. the final ‘product’, was purposely not exactly defined in the preparatory phase.

Instead of defining how to present and represent their ideas the students were asked to define by themselves how and via which medium their proposal should be transported. And based on Schön’s (1983; 1987) assumption that reflection plays an important role in the development of elaborate design expertise we introduced specific tools to facilitate this process, like the documentation book.

The establishment of groups, instead of the usually promoted individual works, pursued several objectives. Opening the narrowed learning environment concept, where the one-on-one tutoring is the central element, the group work takes into account the fact that students can learn as much from their peers as they learn from their teachers. And not only did the students work in small groups, but they had to organise the work of the entire studio and the event itself.

Whereas the basic structure of the design studio was defined beforehand – based on the premises and aims outlined above – some elements partly evolved in the course of the project due to its experimental character. This gave the opportunity to react to the needs and request of the students.

Documentation book

To reinforce and systematize the reflexive process each group was asked to draw up a book that should assemble all information, inspiration, sketches, images, etc. that appeared relevant to the students in forming their decisions. Beyond this rather intuitive collection of material this book should include explanatory texts that described the reasons for de-

Figure 1

Concept Collage: Created by student group working on the Barcelona Pavilion (1929) – upper row: Concept visualisations of interactive projection; lower row: images from the Barcelona Pavilion.



cisions taken in the different phases of the design process.

As explained above one reason was to collect as much design relevant information as possible. Another important aspect – which was communicated to the students – was to enable the students to rethink and if necessary to revoke decisions and go back in to that design phase.

CREATING AN INTERACTIVE DANCE PERFORMANCE

The objective of this project was the realization of an interactive dance performance using tools that would react to the dancer's movements. The project was based on cooperation with a scenographer and a choreographer. In the first phase, the students were presented with four different buildings from accredited architects. The students had to analyse the buildings and detect the main architectural themes. With these themes and metaphors in mind, they were asked to find the adequate form in translating them into a performance (Figure 1). In order to facilitate the students' progress in this new field, we included activities like visiting a final rehearsal at the theatre and a modern dance performance [1]. Furthermore, the students were asked to make improvisation exercises in order to develop a basic understanding of the language used in dance.

The next phase involved introductions to the different hardware and software tools and presentations with related topics. While becoming familiar with the different tools and aspects of this project, the students were given the choice to organise themselves in three different work groups: costume design, music and technology, and stage design. As the work progressed, the students organized all necessary coordination themselves and project management became an important and integral part of this complex work.

The main part started after the students had been introduced to this new area and gotten acquainted with the tools. The learning process still played an important role in the students' work process, and it shaped the ideas of what their work could look like. Not only were the students introduced to some examples of the enormous amount of interactive dance performances [2,3] that are being developed, but they also had to find their individual answer in relation to their abilities and the selected building.

The final performances – which will be explained in more detail below – cover a broad range reflecting the different architecture, which they try to translate. They range from the creation of interactive illusions (Mies) to an interactive installation based on design methodology (Haller) to a provoca-



Figure 2
Selected buildings: Barcelona Pavilion (1929), HTL (1966), Jewish Museum (1999), Rolex Learning Center (2010).

tive theatre play (Libeskind) and a colourful dance performance (SANAA). Some of the works focus on the choreography, others explore the effects, which can be produced on projections via Kinect sensor, and still others play a virtual game creating an augmented reality with the use of markers and specific glasses.

DESIGN STUDIO ORGANIZATION

As the setting and organisation of the design studio is quite complex, it will be explained in detail below. Whereby the emphasis is on the first two phases.

This architectural design studio project involved – to a greater or lesser extent – the following participants: architecture students (20), scenographers (2), dancers (2), choreographer (1), media artist (1), and architecture design tutors (2).

At the beginning the students were presented with a choice of buildings and were asked to work on the “translation” of these buildings in groups of five.

The selected buildings were (Figure 2):

- Mies van der Rohe, Barcelona Pavilion, 1929
- Fritz Haller, HTL, Brugg-Windisch, 1966
- Daniel Libeskind, Jewish Museum, Berlin, 1999
- SANAA, Rolex Learning Center, Lausanne, 2010

It should be pointed out that the students were given great freedom in creating their performance. They were free to decide if their concept would

benefit from dance elements, if the dance elements would be performed by themselves or by dancers, or if the performance would not include any dance elements at all. It was continually made clear to the students that the choice of tools and elements was theirs and that their decisions should be based on their evaluation of the adequacy to support the interpretation of architecture with the language of dance and interactive media.

The following list presents all tasks that were part of the project (Figure 3):

- Creation of a performance based on famous buildings.
- Production of music or music compilation (using Ableton software).
- Event management (organization of dance performance event, including opening speech, catering, designing invitations, stage setting, etc.)

The first phase was a conventional architectural analysis, consisting of research about the history of the building, the architect(s), the most important historic trends and other relevant aspects of that time. As a kick-off, the professor for architectural theory made a presentation in which the buildings were introduced, focusing on the atmosphere.

In addition the students were asked to define the characteristics of the buildings and name three themes and metaphors for each. They were

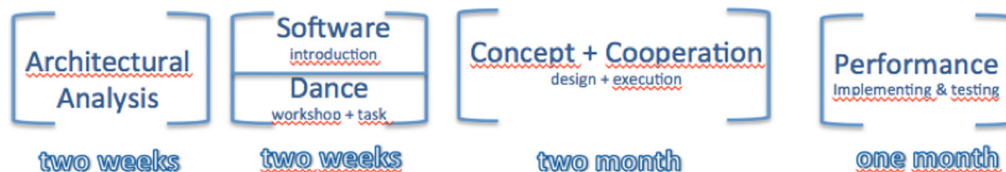


Figure 3
Organisation of Architectural Design Studio.

informed that these themes and metaphors would help them translate the architectural work into another medium.

As outcome of the first phase the groups presented their findings. It became apparent that apart from a thorough architectural analysis, the groups tried to convey the atmosphere of the building by using pictorial metaphors and the like.

The concept of the design studio now foresaw to introduce the students to the language of dance. So the next phase started with a workshop carried out by the choreographer and dancer Patricia Wolf. The theoretical introduction briefly outlined the “*Labanotation*”, a system that analyses and records the human movement developed by Rudolf von Laban (1991).

Based on Laban’s basic explanation of how space is viewed and experienced in dance, the “*Improvisation Technologies*” developed by William Forsythe (1999/2003) were introduced. With the improvisation exercises presented in the related video (and some other improvisation techniques) the students had to create short choreographies within one hour. They either worked with changing rhythms or they used words to create and perform an improvised choreography.

Simultaneously a new task was assigned to the students, which required analysing the building based on movements. The student groups consequently studied the ground plans of the buildings and tried to trace the movements of an imaginary visitor. The students depicted the movements by drawing curved lines for lines of movement and marked spots where the visitors’ attention was attracted so that they came to a halt. This analysis was intended to serve as a base for the design of their future choreography. As we will see later this proved to be true only for some of the student groups.

The students presented the outcome of this analysis at the end of the 2nd phase. The presentation was composed of two parts: the first part was a slide presentation featuring the “movement analysis”; the second part was a live performance or video presentation of a small choreography, which they

had created transferring the movements through the respective building into dance elements.

Concurrently the second phase introduced the students to the new software and tools. This was done through presentation, demonstrations and intense workshop sessions. For this project the main focus was on the interaction between graphics developed with Processing, the Kinect sensor and human movements.

The third phase, *Concept + Cooperation*, follows the normal structure of a design studio, with intense work by students and regular discussions and coaching with the design tutors. And the fourth and final phase consisted of the production of the various elements of the performance and organisation of the event.

APPLICATION OF SOFTWARE AND HARDWARE TOOL

In the course of the project the students had to develop their expertise in the use of different software and hardware tools. In this case: Ableton Live, an audio/music production software, which they used not only to arrange tones, but also to modify music they had produced by analogue means; the video mapping software MadMapper that enables users to define the form of the projection. The open source programming language Processing was selected to use the gestures captured by the Microsoft Kinect sensor to transform projections.

The technical implementation of the performances is based on the integration of gesture capture by the Microsoft Kinect device and their connection with different tools of acoustic and visual output. In detail, the students were basically introduced in the use of the Ableton Live sequencer as a tool for music production, the video mapping software MadMapper and the integrated development environment Processing for interactive graphic presentation. All these tools offer a direct connection to the Kinect sensor and allow immersive conversion of the dancers’ movements by tracking specific parts of the human body.

Table 1
Categorization of (dance) performances.

Created Performances	Dance elements	(Interactive)projection
"MIES in motion"	Yes	Yes
"HALLER interaktiv"	No	Yes
"Decertatio" [Libeskind]	Yes	No
"Colour feelings" [SANAA]	Yes	(Yes)

CREATION OF PARAMETRIC DANCE COSTUMES

The concept of this interdisciplinary project foresaw a development of the dance costumes using parametric design methods. Therefore, a three-day workshop for Rhino and Grashopper was held to provide a profound introduction to the parametric design. In addition to that, a broad range of devices was made available to the students in the department's laboratory. This included a 3D printer and a laser cutter; the latter had been chosen by the students because of its easy handling and suitability for the task.

As the starting point for developing the costume, the students selected a central element of the choreography, which consisted in the idea that the dancers would open the imaginary boundary, the so-called "fourth wall", between themselves and the audience. The opening up was expressed through the dissolution of the costume, which consisted of two layers. The first layer, a simple fabric band wrapped around the dancer, was slowly unwound. The second layer mainly constituted the costume and was produced with the laser cutter. The pattern was created with the use of Rhino and Grashopper on the basis of a parametric design patterns.

INTERACTIVE (DANCE) PERFORMANCES

Due to the experimental form the four student works vary considerably with regard to conception and execution. To expand on this variety with more detail, Table 1 presents a categorization and the following summaries shortly describe the content and differences of the student works.

The "*MIES in motion*" sets its focus on the aspects of materiality and space and perception. Images of the surfaces where projected onto a special screen. The dancer's movement in front of the screen modified the projected graphics. The accompanying mu-

sic or sounds had been created analogue by recording sounds that interpreted the used materials.

The work "*Haller interactive*" was not referring only to the selected building (HTL), but in response to Fritz Haller's universal design method focused on the topics regularity, modularity and order. The students decided that the best representation would be to create an interactive installation resembling a computer game. By playing this interactive game, which was composed of augmented reality and interactive elements, the participants intuitively learned the rules (Figures 4 and 5).

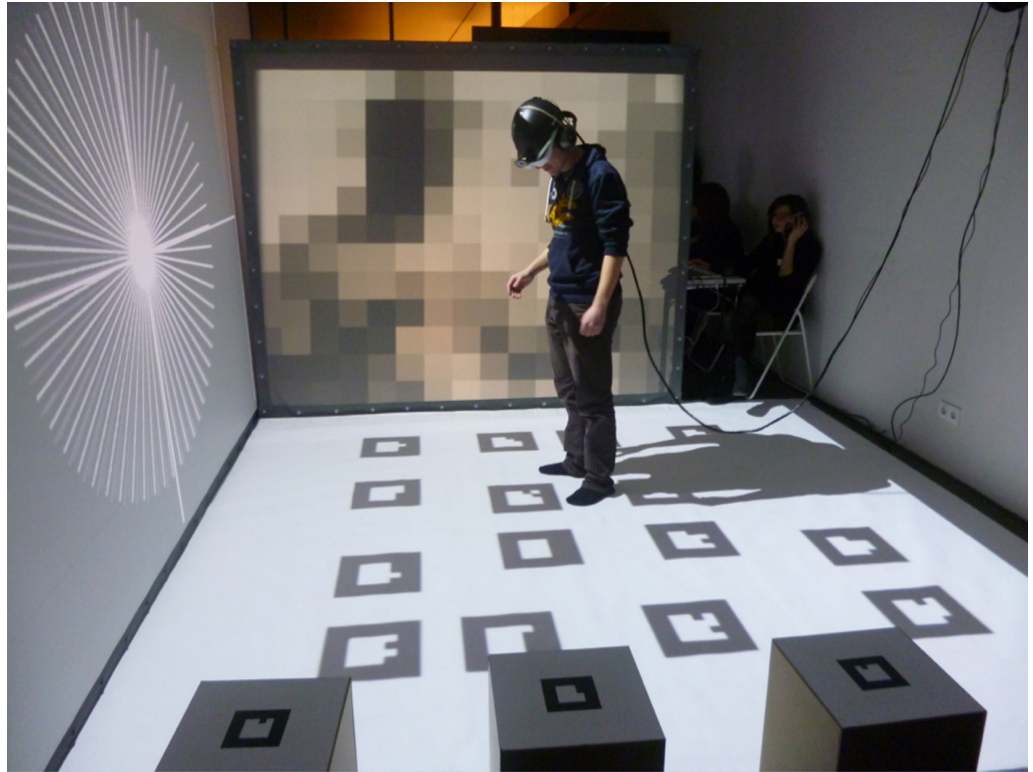
In conformity with the prevalent atmospheric power the work "*Decertatio*" interprets Libeskind's Jewish Museum as a theatrical enactment. In the centre of the production stand disorientation, provocation and conflict. Set in a black box the audience was placed in a square in the centre of which a seemingly lost dancer danced in a spot light, while an actor recited a text that expresses conflicting emotions.

The performance "*Colour Feelings*" enacts SANAA's Rolex Learning Center as dance performance with the students themselves as dancers. Each spatial impression is represented by an own scene characterized by a specific colour and performed by one of the students. Interactive projections that react to the movements reinforce the impression but play a minor role. In each scene one person personifies the visitor, and another person the built environment. The performance ends in a scene where all dancers come together and leave their 'marks' expressed by the specific colours on the surrounding.

CONCLUSION

Related to the complex task of developing an interactive dance performance, the structure of the design studio was equally complex. As a first evalu-

Figure 4
Augmented reality set-up
("Haller interactive").



ation, we can point out that the unexpected combination of theoretical aspects of architecture with the management and organization of a public performance and the integration of modern soft- and hardware applications leads to challenging but also very stimulating tasks for students. Setting up this project therefore activates competences in various ways. On the one hand, it brings students into close, direct and playful contact with software and techniques like rapid prototyping, gesture recognition, sound editing or visual programming. On the other hand, it establishes a strong and intense link to architecture itself and forces students to reduce the intentions of architects and their buildings to very essential statements. Combined with a high motivation of the participants, the management of a

public performance requires cooperation on different levels and functions. In this context, the project supports students' skills in cooperation, time management, budget and the interaction with a group of specialized participants.

REFERENCES

- Bronet, F; Schumacher, J 1999, 'Design of the Movement: The Prospects of Interdisciplinary Design', *Journal of Architectural Education*, 53(2), pp. 97-109.
- Forsythe, W 1999/2003, *Improvisation Technologies: A Tool for the Analytical Dance Eye*, (CD-Rom), ZKM, Karlsruhe.
- Laban, R von 1991, *Choreutik: Grundlagen der Raumharmonielehre des Tanzes*, Noetzel Verlag, Wilhelmshaven.
- Pekol, B 2011, 'BodyCAD: Creative Architectural Design Through Digital Re-Embodiment', *ISEA*, 2011.

Schön, DA 1983, *The Reflective Practitioner: How Professionals Think In Action*, Basic Books Inc, New York.

Schön, DA 1987, *Educating the Reflective Practitioner*, Jossey-Bass, San Francisco.

Webster, HM 2008, 'Professional Education after Schön: Cracks, Blurs, Boundaries and Beyond', *Journal for Education in the Built Environment*, 3(2), pp. 63–74.

[1] <http://www.kulturverein-tempel.de/index.php?id=355/>

[2] <http://anarchydancetheatre.org/en/project/seventh-sense/>

[3] <http://www.wedream.co/interactive-dance-performance-2/>



Figure 5
Video glasses and sound
system for augmented reality
set-up ("Haller interactive")