Integrating Architectural Approaches in Communication Design Education to Improve Awareness in Affordance Design

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ABSTRACT

The expansion of the range for the design of products in the field of Communication Design (CoD) calls for new teaching strategies to be sought by educational scholars due to the intense experience of digital natives with the digital tools and technology. To equip CoD students with better understanding of the importance of affordance design for developing new tools and applications, this paper proposes an educational model that is based on the concepts of the discipline of architecture. By making use of analogical thinking, the form-based aspects of architectural design are adapted to the virtual aspects of communication design and have been applied in the studio design course that focuses on spatial communication between the years of 2009-2012 with 3 different versions of the design brief. Having based the research on a real-life problem, the outcomes of the course reflect the benefits integrating the architectural knowledge with CoD. This approach can be applied to all design disciplines that require solutions for varying educational needs.

Keywords: communication design, architecture, design education, affordance, analogical thinking, methodological innovation, interdisciplinarity

1. INTRODUCTION

In recent years, alternative modes of communication supported by networking and advanced displaying technologies have changed the interaction of human beings with information from physical levels to direct manipulation of icons in the digital space. The area of Communication Design (CoD), which has a strong focus in developing interactions for varying media, benefits from these technical developments to bring a vision for the design of new products and services and faces the opportunity to lead the development of future technologies.

One of the foremost educational concerns of this area focuses on maintaining the affordance of the designed service or product [1]. For educators, the reason that creates this challenge has many roots. The nature of the CoD educational environment drives the educators to guide students for developing solutions which stem from fictional cases and scenarios that give little reference to physical conditions. With the digital medium being the object of design problem, the process environment itself and the setting of the prototype, CoD students find themselves challenged in maintaining the affordance in their designs. Additionally, for the last 10 years, educators have been teaching the generation called digital natives, who have been growing up with digital technology and are already fully engaged on many different levels [2, 3]. As students begin their CoD educational path, lecturers encounter the loss of communicating locally and synchronously.

The current trend has replaced these alternative modes of communication to being remote and asynchronous, causing the information to be perceived as indifferent from its environment. The discipline of architecture can fulfill these gaps, by introducing physical affordances in the design process. With the examination of both disciplines in the frame of affordance design, structural, organizational, and operational aspects are recognized as common to both disciplines.

The aim of this study is to contribute to the existing knowledge of CoD by proposing an educational model which makes use of physical data, in order to improve student's competence in affordance design and bring instructors an alternative approach. This research paper attempts to structure a design studio course by adapting the concepts of architecture to CoD. In order to reach our aim, we make use of the approach of "learning by doing", with the aim of obtaining research outcomes.

In parallel, this paper investigates how physical data is currently practiced in relation to the discipline of CoD and defines the architectural concepts that were stated above. In continuation, the objectives and methodology for this research will be described. A series of the spatial interaction design courses were developed and tested with different versions in regard to the changes in the architectural quality of the physical working site. The results of these courses have been collected upon students' works between the years of 2009-2012.

Based on the results it is possible to say that this research challenges the traditional rules and mechanisms of CoD education. Furthermore, this research can be used as a tool for educators to integrate design approaches that belong to other disciplines in order to improve affordance design of CoD. The paper provides an insight for ways to benefit from the interdisciplinarity activity stated above. It is our belief that related research and practice based on existing information will also generate new findings and will be valuable for any design discipline.

This manuscript is an updated version of the paper presented previously at 20th World Multi-Conference on Systemics, Cybernetics and Informatics and published in the Proceeding Book [4]. After being selected for the special issue of JSCI, it has been improved in parallel with the comments of the journal reviewers.

2. BACKGROUND

We are examining the intersecting concepts between CoD and architecture which are defined in the frame of affordance. In addition, a research for how physical data is integrated with the

different practice areas under communication design is given in order to develop a teaching method.

2.1 Adaptation of the Concepts of Architecture to Communication Design for Maintaining Affordance

Affordance is a term that is used to imply the stimulus constructed in the environment or in objects indicating their functionality for users [5]. The concept of affordance gained much significance with the rise of information technologies [6]. The focus has shifted from the affordance of industrial tools guided by physical interfaces to more abstract forms controlled by alternative visual and audible representations [7].

A well-established research paper published by Faiola and Matei [8] has been inspirational for addressing the physical constraints in design. Furthermore, the paper highlights the importance of starting the design process from physical representation of tools rather than the abstract function of models. This approach helps students to understand the concept of affordance that is in relation with the objectives of functionality and activity of users.

While the interdisciplinary nature of CoD makes it possible to connect with other design disciplines on different topics [9], it has been stated that the concept of affordance is more fundamental to architecture than others [10]. In parallel with the objectives of this research, the discipline of architecture is being examined with the intention of identifying mutual design concepts shared with CoD and how they can be adapted to support affordance design.

Being inspired by analogical thinking and reasoning, [11] we detect space, form, and function as main concepts for both disciplines. To relate human behavior with the model of cognition, space has become the focus of this research for being content dependent [12]. While it provides an ease for adaptable representation, it is also known to be the main source for structuring, organizing, and interacting with digital information. In accordance, the correspondence between CoD and architecture is formed on the basis of the following issues:

1. Topological connections (structure): As a general description, it is possible to say that both disciplines depend on the relationship between a user and a set of data. This data that is retained by a building or a medium is structured by one specific flowchart [13]. A typical flowchart indicates the physical and logical network of topological diagrams, which serve for the transfer between two data sets through direct passes among virtual data rooms or physical rooms [14].
2. Areas of Activity (organize): As advised by the literature both disciplines refer to the design of actions that take place in physical or virtual boundaries. *Digital media* shapes the user-oriented features of interactive media products for moving within the content through participation [15, 16]. Similarly, the specific function of buildings guides the intended interactions that are organized spatially [17].
3. User Control (interact): It becomes important to understand the relationship between users, tools and environment when designing affordable products [6, 18]. Developing visual, audible and natural user interfaces for manipulating digital tools can be improved by understanding the logic behind the design of solid user interface elements. In architecture, these are windows, doors, knobs, buttons, switches, zips… etc. and referred as spatial transition elements [9, 19].

On the basis of these identified components, we believe that an alternative approach for education can be introduced that will both emphasize interactivity and support the development of innovative designs. We believe that an educational model inspired by physical data will remind students of their natural experiences for space, time, motion, gravity and material.

2.2 Spatial Communication as an Interdisciplinary Area for Research in CoD

In past, CoD has been regarded to grow in parallel with computer technologies and is defined as "the creation of dialogue between a person and a product, service or system" [15, pp.11]. From another point of view, this discipline is defined as "the design of subjective and qualitative aspects of everything that is both digital and interactive" [20, pp. 660]. Briefly, technology plays a significant role within the scope of the discipline of CoD and the area of research has to be in close relationship with and in-depth understanding of the nature of the technological change, in order to create valuable user experiences.

Spatial communication is a kind of nonverbal communication which is learned unconsciously since birth. While it is culturally conditioned, it mainly refers to the spatial separation that human beings naturally maintain. As Hall (1963) implies, distance and territoriality is two broad categories of spatial communication. Distances refer to measurable spaces and territoriality refers to the invisible zones that mark personal space [21]. These categories are practiced in communication design in various ways, as described below.

Being in close relation with ubiquitous computing and a variety of interaction researches, architectural concepts are gaining recognition and importance as physical data gets more integrated in various practice areas of CoD. Being one of them, digital game arena, which is ruled by big companies like Microsoft, Nintendo or Sony involves designing the structure of the game, the stage design and the navigation, which are closely related with the discipline of architecture. Moreover, the design of natural user interface elements also requires the knowledge of human dimensions in interior spaces [22]. Exhibition design is another area that is recognized for making use of architectural strategies in order to stage highly responsive and interactive installations in museums and galleries [23-26]. From the point of industrial product design, spatial interaction plays an important role for the creation of smart objects that are manipulated by tangible user interfaces as manipulating them are related with proximity and distance. The same issue is also recognized for the design of smart places, in which the information is manipulated by various interactive technologies placed on the vertical and horizontal surfaces [27-30]. In parallel with the advancements in technology, the use of architectural organization methods also become beneficial for the functional and spatial transformation of public spaces and buildings to form smart spatial nodes of urban settlements which will strengthen the communicational infrastructure [17, 31]. To conclude, physical data has an important role in the design of digital services, smart tools and environments. Based on the identified aspects in architectural design that are common in CoD, we believe that architectural approaches will be beneficial for the design of cross-channel user experience based on multiuse interaction [32, 33].

All of the practice areas described above is found suitable to be the subject of the studio course. In parallel with the educational purposes in this research, the subject has to cover the organization of the physical space, the structuring of the information and the creation of interaction experience in multiple ways. From this perspective, exhibition design proves to be an ideal concept for CoD education due to the possibility to obtain conceptual and physical design outcomes. We believe that an educational model inspired by physical data will remind students of their natural experiences for space, time, motion, gravity and material.

3. OBJECTIVES

Design education generally aims to bring out creative and innovative solutions to determine problems. The educational curriculum of CoD usually intends to train students to be experts in maintaining the usability and affordance of complicated systems, based on their knowledge concerning the relationship between human beings and tools. Challenges in COD education brought by technological developments is the focus of this research and we propose a solution for this real-life problem by introducing physical aspects to the design environment.

It is a well-known approach in design research to structure design studio courses with the aim of obtaining research outcomes based on the achievements of the proposal [34, 35]. Experimental research methods have been recognized to successfully embrace universal problems of design and to push a technology-independent thinking. As it has roots in interdisciplinary perspectives, this approach is found suitable especially for the disciplines that look for innovative results that trigger creativity. [22, 36].

For the above-mentioned issues and in parallel with the scope of this paper, a design studio was structured with the aim of integrating physical data and spatial conditions within a design brief. The two-step process includes the design of conceptual interactive exhibitions and the physical prototypes for displaying. All is planned in accordance with a physical working site which is the focus of the studio class and it is selected in parallel with its architectural and geometric specifications. In the light of the objectives of this research, two different assignments are shaped as follows:

• Assignment A requires the student to develop a conceptual interactive exhibition for a definite physical space. The primary goal is the formation of an exhibition theme, the spatial organization of activities and the design of interactions. The success of the students depends on the extent of being able to develop a storytelling in parallel with the qualities of the physical space. The duration of this assignment is ten weeks, and students are expected to understand the dynamics of physical space.

• Assignment B focuses both on the design and the installation of an interactive analogue displaying mechanism in one to one scale in a selected physical space. The brief includes handling the dimensions, the gravitational constraints and the human capabilities. The fundamental achievement for this assignment lies on organizing of information and maintaining its affordability. This assignment also holds the responsibility to reflect the learning outcomes of the first assignment. Due to the lack of prototyping, modeling, material use and building experience, students may comprise the end product which to a degree will be overlooked by the supervisor. The time dilemma given for this assignment is five weeks.

The method of this study is based on the above concepts and briefs. Results and discussions include outcomes based on the application of the approach. To conclude, this paper examines and investigates the experiences gained by this process, the contributions to the area of CoD and the possibility to adapt the methodology to other areas.

4. METHOD FOR THE RESEARCH

The method of this paper has been developed in the context of a project design studio course. In parallel with the needs of this research and expectations of the studio design courses, the students have been guided to follow the steps below for both assignments:

1. Background research concerning exhibition design and its relationship with architectural space.
2. Technical review for the analysis of physical interaction tools and technologies, the manipulation techniques and interaction styles.
3. Identification of the theme or the concept of the exhibition.
4. Preliminary sketching to discover interactions and to develop alternative drafts for the combinations of navigation and technology in parallel with the theme.
5. Advanced work for the planning, organization and the lay-out of the activities and interactions.
6. Developing the idea more by detailing the interplay of actions, interactions and controls.
7. Submission of works and evaluation of the presentations by a jury.
8. Assessment of the course from the students through end-term surveys and investigation of their following works for the use of spatial data.

This method was applied between the years of 2009 and 2012, in the Department of CoD in Yildiz Technical University with an average of 10 senior students every semester. Each year, the working site was changed in the first brief, in order to see the effects of different spatial conditions on the student outcomes and to understand CoD students' approaches to work with physical data.

5. RESULTS AND DISCUSSION

With the application of the course structure and the different versions of design briefs, varying success rates and outcomes for the research were obtained.

In the first year of the research (2009 Fall - 2010 Spring), the narrow corridor of the department was chosen to be the working site, with a length of 35 meters, a width of 2.80mts and a height of 6.50m. It had 2 different entrances. The students were encouraged to make use of the height of the space for mezzanine solutions. This physical space was chosen as the working site for the first assignment in order to see how much CoD students would be able to handle this interdisciplinary design problem in terms of understanding the spatial data to support the affordance

In the second year (2010 Fall - 2011 Spring), the design brief for the first assignment was revised. The linear condition in the previous working site was changed in order to enhance the storytelling qualities of the projects and obtain different results in terms of affordance design. The new working site, was a 3-floor self-standing building with 2 different entrances. Each floor, which are connected with a stair, were 16mtsx16mts of long and wide and 2.5 mts high. The students were encouraged to open galleries in the floor and to play with levels in parallel with the needs of thier conceptual projects. No change was made in the brief of second assignment.

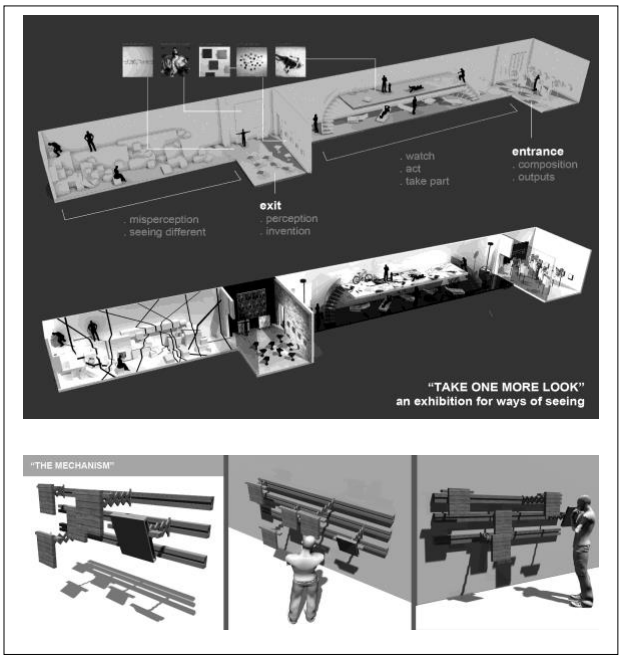

Fig. 1 Two interactive exhibiting projects designed by Cansın Bozoglu, first work named "Take One More Look" that focuses creating a sequence of experiences based on ways of seeing and second named "The Mechanism" that maintains adjustable depth and composition of the displayed print(s) through the movable displays form left to right and setting the distance by forward and back together with vertically changeable square prisms to show the front and the back material.

With the examination of the outcomes, it was recognized that new site had been a challenging design problem for the students to develop a spatial project. They had difficulty to configure the topological layout and organization of the activities which were involved in their projects. The projects, whose themes and interpretations of the subjects had been in harmony of the geometry of the building, were successful in maintaining organizational aspects as well as the proper selection of tools for interaction. Meanwhile, the projects of the second assignment yield much more creative results by taking account of the physical data and the constraints brought by the physical space (Fig2). When compared to the previous year's outcomes, the second years' success rate was lower, but the successful projects' design quality was much higher.

With the examination of the outcomes of the second year, we recognized that natural constraints of physical spaces forced CoD students to perceive the importance of physical data. The first assignment was revised once more in the third year of the research (2011 Fall - 2012 Spring) and the students were asked to develop exhibition designs either for a disabled visitor profile or to create an exhibition in a disabling environment. This approach being one of the main research areas of that department aimed to challenge students with varying obstacles and assist them to produce genuine ideas [37]. We believed that, integrating this approach to the idea of exhibiting would give students more control on the design of affordances. The choice of working site was left upon the decision of the students, being one of the previous two (Figure 3). No change was made in the second assignment.

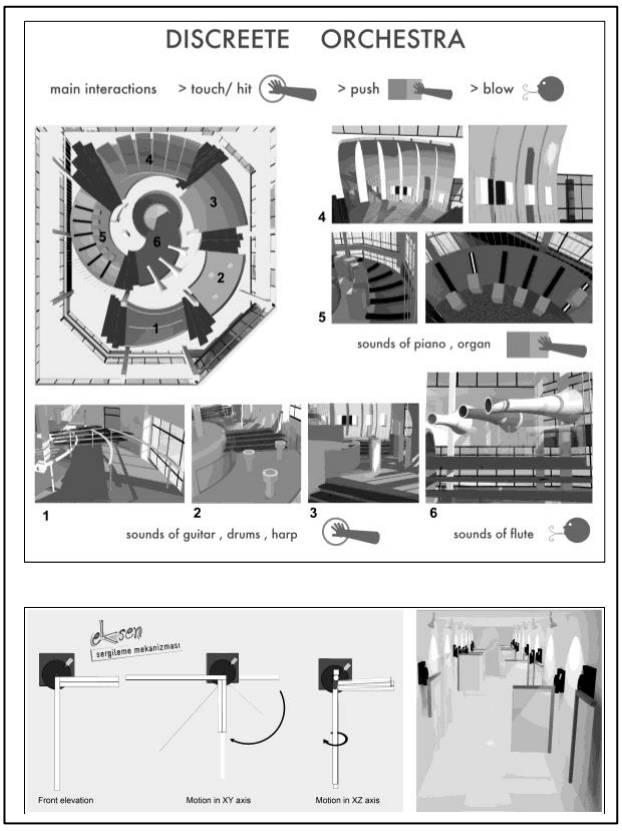

Fig. 2 Two interactive exhibiting projects by Mustafa Ahmet Kara, first work named "Discrete Orchestra" that was developed to create sounds by direct physical manipulations of the tools and to further fill the physical space with a musical piece, and the second work named "Axis", aimed to provide vertical and horizontal displaying and can be revolved 90 degrees with the aim of using both sides for displaying as well as turning them into separators to create privatized areas when needed.

The outcomes for first assignment were developed in parallel with either the decision of bringing a disability to the audience or the environment, both of which were supported by narration. The students' works satisfied the components of affordance, which were determined in section two, and projects yielded proper spatial communication solutions as well as innovative strategies for design. The projects for the second assignment were also resourceful in their spatial quality. The students were able to deal more comfortably with the spatial characteristics as well as physical data.

Apart from the analysis of the works, varying remarks and opinions were obtained from the end-term surveys. Most of the

students indicated that working with physical constraints provided them the opportunity to create and experience interactivity solidly and identified this aspect made all the difference from what and how they used to design in digital environment. Nearly all of them pointed out the difficulty they had with second assignment, due to their limited knowledge of construction and materials. %85 agreed that the course was beneficial in providing a different perspective for design and forcing them to leave their habits gained in the digital environment. Besides, they were satisfied to a degree to see how much they can adapt and make use of their know-how for a different area of design.

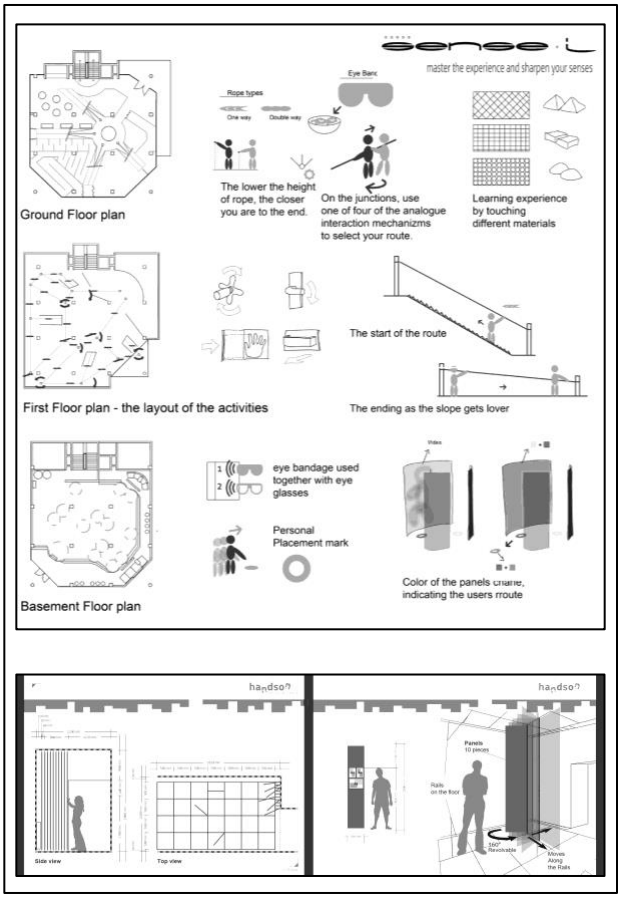

Fig. 3 Two interactive exhibiting projects by Meir Benezra; first work named "Sense-I" that focused on the experience of tactile sensing at the entrance level and aimed the user to manage his route with the use of analogue interfaces in a blind atmosphere at upper level, who traces his route in the lower level with the use of interactive eyeglass. His second work named "Hands On" focused on creating subspaces in one space by moving exhibiting panels on rails, so as to generate varying spatial configurations that would match the needs of the displayed works.

Furthermore, we made observation to see these students' capability to reflect the learning outcomes of this studio course to their graduation projects. There was an increase in the awareness in the choice of the tools and developing interactions. Students developed design problems in which spatial constraints took part. As a result, 80% the works reflected better understanding concerning the essence of the medium and treatment of the affordance of the products.

6. CONCLUSIONS AND FURTHER RESEARCH

The purpose of this study is to propose an educational model for the discipline of CoD that made use of architectural approaches in order to improve students' competence in affordance design. The driving motive for such an attempt lies in the need to fulfil the lack of spatial constraints and physical data in the educational curriculum of CoD, which can be accomplished with the knowledge and practices carried out by the discipline of architecture.

In order to undertake this objective, first of all the concepts of architecture to meet the possible gaps in CoD undergraduate education were identified. Afterwards, the communication design practices that makes use of physical data area were examined so as to discover a suitable case to work on. The subject of exhibition design was selected as the case study as it comprised the development of topological connections, creation of zones for activity and manipulation of the displayed information. On the basis of these concepts, a design studio course that focused on developing interactive exhibitions for specific design briefs was planned and applied for 3 years in the department of Communication Design in Yıldız Technical University, Istanbul. With the sum of the projects that belong to two assignments, a total of 100 student projects that belong to both assignments were analyzed to see the extent of perceiving the physical space as a medium for design through the fulfilment of the following aspects:

1. Developing the narrative structure of the exhibition design in parallel with the architectural qualities of the space to improve organizational aspects.
2. Supporting the theme with suitable spatial communications to maintain perceptual conditions.
3. Providing suitable information access elements to accomplish physical affordance.

Within the research period, the students of CoD worked to accomplish design solutions for varying design briefs of the design studio course and were able to perceive the importance of spatial data and how to make use of physical constraints to achieve more affordable products to some degree. With the changes made in each year's design brief, the students had shown different reactions for their understanding of spatial data. As an overall result, it is possible to say that the integration of the architectural approaches to CoD education is beneficial in leaving the traditional patterns and let the students to expose their natural design impulses, that they gained since birth. With this and similar approaches, students can be more reminded of the importance of depending on their own observations and ordinary experiences, instead of positioning themselves to accept and adapt to speedy technological changes without critical judging.

In order to maintain a sustainable educational approach towards use of physical data in the area of CoD, some improvements in curricula can be recommended as follows:
• Studies on film to give the idea of linear and nonlinear narrative structures.
• Workshops based on role playing exercises to enhance the understanding of the performative aspects of human body with respect to space and time
• Spatial thinking courses to establish the theoretical connection between architecture and information.
• Interdisciplinary seminars that indicate design as a creative social practice and the trigger for innovation.

With the possible support of the above-mentioned academic preparations, this research will continue with an improved course plan, subject and structure and to disseminate the outcomes obtained from the analysis of the projects and surveys. From another perspective, this research may further contribute to the discussions concerning museum and exhibiting studies that are carried out with curators and researchers. Meanwhile, it is also a valuable asset for CoD students to understand the dynamics of physical space and to experience developing spatial communication design projects. We believe that similar approaches that connect different discipline of design will enhance the students' expertise. Lastly, this study can be considered as a supporting joint for the area of spatial communication, which will also guide for the strategies for future technological developments and innovation.

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