

THE LEARNING SPACE: UPSETTING ORDER

Raheem Sewaid¹, Khuloud Moumani², Mervat El Shafie³

^{1,2,3}College of Architecture and Design, Effat University, Qasr Khuzam St., Kilo.2, Old Mecca Road. P.O.BOX 34689, Jeddah 21478, Saudi Arabia

E-mail: rsewaid@effatuniversity.edu.sa, kmoumani@effatuniversity.edu.sa, melshafie@effatuniversity.edu.sa

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Abstract

Geometric order and chaos are the basic components of the composition of architectural and urban structures. Coexistence of these components in architectonic space is very natural. In general, geometric order is a result of design and planning, and chaos is created by self-organizing processes. This study proposed an education and learning space design to better understand the relationships between the built spaces and the journeys undergone within it. As a result, a conceptual approach is perceived to better investigate the effect of chaos within those spaces and measures its ability to withstand it. The space program of this study consists of three main elements namely controlling chaos, inside outside library and learning house. The selection site based on the site criteria evaluation is located at Ash Shati, Jeddah, Saudi Arabia. This proposed project design subscribes to the architecture contains chaos and order elements, and the distinguished pieces of architecture thought and work were discovered.

Keywords-- Geometric Order, Chaos, Architectural, Composition, Architectonic Space

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INTRODUCTION

The objectives that are to be met by this proposed learning space is to mainly initiate and mark a starting point for a contemporary expression in architecture at the city of Jeddah and in such an environment. This would as a result promote architecture awareness and eliminate the standardized design amongst architects and the public members as well. In addition to creating a better and enhanced learning and teaching environment for the design, the architecture community could also act as an attraction point. This enhanced learning space would pursue learning through the experience. However, one of the most critical objectives would be creating an inspirational building philosophically and emotionally to the occupants on all levels.

The space designed should be able to integrate architecture and design students from different levels (freshman's, sophomores, juniors, seniors, and graduates) better [1, 2]. It would also be used as a referable building for architecture purposes such as spatial arrangement, experimental approach and the implementation of construction techniques, design techniques, structure, and building materials to fit with the concept.

As stated by Cassar, Eric (2008), "Chaos could be defined as a state of things in which chance is supreme, especially the confused unorganized state of primordial matter before the creation of distinct forms, opposite to the "cosmos". It is distinctly obvious that "chaos" consists of confused elements which contribute a great deal of space for innovation and creative thinking. It helps to the works of utilizing the qualities of fantasy to probe physical realities and expand the potentialities of new knowledge." [3]

Order on the other hand, the terminology of order carries the same meaning as arrange, organize, systemize, marshal and methodize, It means to put things into proper places in relation to each other. Order suggests a straightening out so as to eliminate confusions; arrange implies a setting in sequence, relationship, or adjustment; it suggests gathering and arranging in preparation for a particular operation or effective use; organize implies arranging so that the whole aggregate works as a unit with each element having a proper function; systemize implies arranging according to a predetermined scheme [4, 5].

During the process of architecture studies, the most significant foundation is the ability to generate and explore ideas. The chaotic and orderly natures of ideas are taking into consideration in order to create architecture. The problems of logics, mathematical calculations, technology, spatial organizations, forms, light, proportion, scale, rhythm, and so on will be solved during the process.

CASE STUDIES

This study included three learning and research centers from France, US state and Saudi Arabia for case study. All selected learning and research centers are uniqueness and they are:

- i. Nantes School of Architecture, France
- ii. S.R. Crown Hall ,IIT, Illinois, US State
- iii. King Abdullah Petroleum Studies & Research Center, Saudi Arabia

Nantes School of Architecture, France

Nantes School of Architecture, France is designed by Lacaton & Vassal (Figure 1) [6]. This school is a curious example of a building that generously lays itself open to unpredictable spatial demands. The complex which at first sight looks like a kind of renovated factory with a semi-transparent façade, has enclosed sections within it that are defined by a separate double-glaze den closure [6]. The architectonic elaboration of the Nantes School of Architecture is such that interventions by new users will add to and not subtract from the image that the building radiates inwardly and outwardly. Instead of the remoteness of the traditional architectonic ideal, emphasis is placed on the message of appropriation that architecture can and should evoke.

In between the concrete floor plates, Lacaton & Vassal inserted a light steel structure that redefined the height of the main levels. Easily assembled and disassembled, this filigree structure accommodates specific programs on all three levels of the school. Linked to the single level classrooms, research facilities, studio spaces, administrative offices, and library are double-height volumes, which help regulate the school's interior temperature. The floor-to ceiling glass sliding doors that divide these two types of space establish an unobstructed visual relationship among spaces inside the school, in contrast to the blurred visual

boundary between the school and its immediate surroundings that is provided by the building's polycarbonate façade [6].

S.R. Crown Hall, IIT, Illinois, US state

S.R. Crown Hall, IIT located at Illinois, US state, designed by Ludwig Mies Van Der Rohe and Pace Associates (Figure 2) [7]. Crown Hall represents the first large-scale realization of Mies van der Rohe's concept for a clear-span/universal-space building. The space is subdivided by low freestanding wall and two non-structural service shafts into student work areas, a central exhibition space and administration corral [7]. The hall is raised 6 ft. above the ground in order to provide natural light and ventilation for the workshops and lecture rooms located on the floor below.

The constructive chaos is not only restricted to interfering with geometrical order and exterior elements. In this example, the nature of the designed interior space (open-plan) space allows chaos to practice itself within a rectangular geometrical form. The project promotes active, creative and social learning (Crown hall) through an open plan learning space where students and faculty can interact. The non-load-bearing partitions can subdivide the uniform space into different learning spaces without disconnecting them. The project allows achieving visual interaction. As the bottom eight feet of the perimeter glazing is translucent, views of the exterior are limited to the sky. The learning spaces are therefore introverted.

King Abdullah Petroleum Studies & Research Center, Saudi Arabia

King Abdullah Petroleum Studies & Research Center designed by Zaha Hadid Architects (Figure 3) [8]. This center is committed to energy and environmental exploration, production, and analysis. Its construction employs a verity of sustainable building techniques and advanced technologies to mix with the dry-land ecosystem. The whole complex is LEED platinum rated. The main mission of this complex is to create futures values and prosperities to maximize societal benefit [8].

It is mainly dedicated to bridge the gap and find effective solutions for productive use of energy to enrich the economic sector and allow social progress across the globe. Mainly, the complex has two main aspects which are the research development and social progress.

The architectural vision for this complex is mainly focused on technical and environmental concerns. The organic form structural system is capable of continual expansion and transformation, allowing a visual and functional integration between the site and the building [8]. The complex consists of a network of three dimensional six-sided cells with many junctions and bonds. Following the concept of connections, an adaptive modular set of buildings were connected through shaded outdoor spaces, meeting areas, indoor gardens, corridors, underground tunnels, roof terrace and courtyard [8].

The idea of semi-separation between functions can allow different uses and groups and the same time. Changing the users experience through their journey from one cell to another will make them feels connected and add an element of dynamism since the exterior environment condition are not stable. In addition, it will give the user the sense of time in case they will experience the complex in both day and night.

The three dimensional shape six-sided form of the cell resulted in a complex exterior which gave a sense of connection between the exterior and its form and the interior. This will add a conceptual depth and new dimension for the user to experience within the space. Treatment of the facade gave a unified sense to the entire project and solved the issue of penetrations.



Figure 1. Nantes School of Architecture, France [6]



Figure 2. S.R. Crown Hall, IIT, Illinois [7]



Figure 3. King Abdullah Petroleum Studies & Research Center [8]

SPACE PROGRAM

The proposed project expected to fit in about 800 occupants. The building has two floors and 600 number of parking. The three main elements of the space program are Controlling Chaos, Inside outside Library and Learning House. The controlling chaos consists of several zones namely the order, research offices, dining, staff office, services, reprographics, terrace, and storage. The space program for inside and outside the library that considered are exhibition, auditorium, multimedia, workspace, fabrication shop, bridge, services, storage/ locker, and outdoor. The sub-zones that considered for the learning house are studios, the living room, the balcony, wood workshop, entrance hall, library, tunnel, and services. The space program of the Controlling Chaos, Inside outside Library and Learning House is tabulated in Table 1, Table 2 and Table 3 respectively. The total gross floor area of these three elements is 25000 sqm.

Table 1. The space program of the Controlling Chaos

Space	Percentage (%)	GFA (m ²)	NFA (m ²)
The order	15	750	400
Research Offices	25	1250	1000
Dining	25	1250	1000
Staff Office	12	600	480
Services	6	300	240
Reprographics	4	200	160
Terrace	8	400	320
Storage	5	250	200
Total	100	5000	3800



Figure 4. Site 1

Table 2. The space program of the Inside outside Library

Space	Percentage (%)	GFA (m ²)	NFA (m ²)
Exhibition	20	1800	1440
Auditorium	20	1800	1440
Multimedia	9	810	648
Workspace	13	1170	936
Fabrication Shop	11	990	792
Bridge	12	1080	864
Services	5	450	360
Storage/ locker	5	450	360
Outdoor	5	450	360
Total	100	9000	7200



Figure 5. Site 2

Table 3. The space program of the Learning House

Space	Percentage (%)	GFA (m ²)	NFA (m ²)
Studios	50	5500	4400
The living room	10	1100	880
The balcony	8	860	704
Wood workshop	5	560	440
Entrance Hall	6	660	528
Library	13	1430	1144
Tunnel	3	330	264
Services	5	560	440
Total	100	11000	8800

Table 4. Site Evaluation

Site criteria	Weight Factor	Site 1	Site 2
Capacity	3	12	15
Shape/ proportional	3	12	15
Topography	2	8	6
Access/ traffic	3	12	12
Noise levels	2	4	8
Utilities	1	5	5
Security and safety	2	10	10
Image/ Visual Quality	2	10	8
Visibility	2	10	10
Future Development	3	15	15
Demographic Patterns	2	10	8
Surrounding	3	12	8
Views	1	5	4
Total		125	124

SITE SELECTION AND ANALYSIS

This study considered two sites location for the project development. Site 1 is located at Ash Shati (Figure 4), while site 2 is located at Al-Baghdadiyah Al-Gharbiyah (Figure 5), Jeddah, Saudi Arabia.

There are 13 criteria used to evaluate the site for the project location. The criteria are capacity, shape/ proportional, topography, access/ traffic, noise levels, utilities, security and safety, image/ visual quality, visibility, future development, demographic patterns, surrounding, and views. Each criterion is given a weight factor to indicate the level of important of the criteria toward to project requirement. The site evaluation result is tabulated in Table 4.

Based on the site evaluation result in Table 4, Site 1 seems to be more suitable and appropriate for the project’s purpose. Site 1 is located at the Jeddah, near to the Saline Water Conversion Cooperation. Site 1 also located at the Corniche Rd. Intersection with Aws bin Awf Street, and Al-Shati’I District. Site 1 is the re-use of an industrial site.

The strengths of the selected site are the site would add to the concept and user experience. Secondary, the site 1 is the re-use of an industrial site, which may reduce cost for open up a new site. The site also has good views from and to the site and located

on a main road which benefit in term of accessibility. In addition, this site could feature for future expansion.

There are several constraints that required revising when considered for this site. First is the noise from the industrial area which is the existing water desalination industry. Secondly, there is limited main road connected to the location. The accessible to the site is through the corniche road. Besides that, the high traffic and difficulty working on the site also part of the constraints of the site.

ZONING AND PROJECT DESIGN

The building code and regulations considered for this project are 15m for front setbacks, 10m for back setbacks and 5m for side setbacks. Besides that, there is 60% of maximum built-up, maximum of 2 floors, and minimum of 15m height. Figure 6 and Figure 7 illustrate the site layout and 3D site layout respectively.

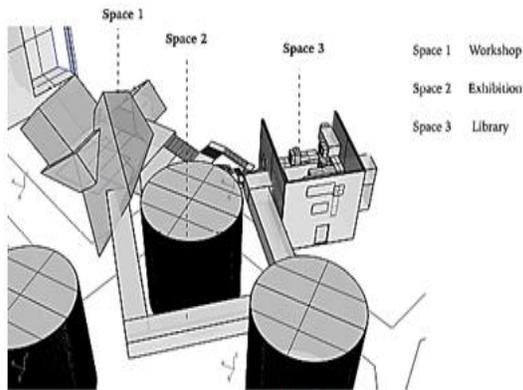


Figure 6. Site layout

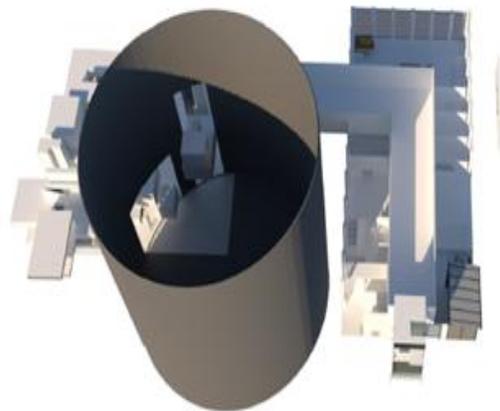


Figure 7. 3D site layout

An exhibition is designed along a corridor. It could be seen on the x and y axis. The exhibition not only exhibits work, but breaks the social order by introducing activities within the space that tends to shifts borders. The accessible cubicles defined the standardized spatial arrangement in libraries. The design of the library is a futuristic approach conveying disorder from order. An elevated lecture hall is designed in the building. The lecture hall can be reached through a maze of stairs. The library cubicles would be overlooking the lecture hall. The workshop is designed from a matrix of connected rooms and no corridors existing. Figure 8, Figure 9, Figure 10 and Figure 11 demonstrate the front elevation, left elevation of the project, 2D and 3D prospective respectively.



Figure 8. Front elevation

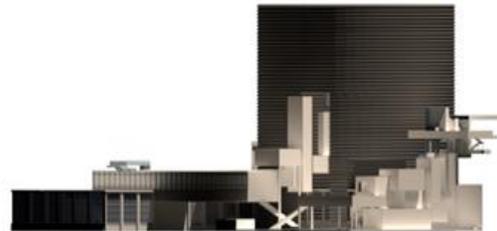


Figure 9. Left elevation

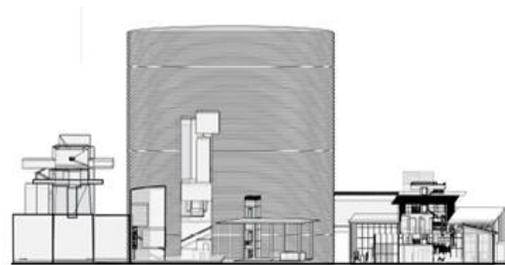


Figure 10. 2D prospective

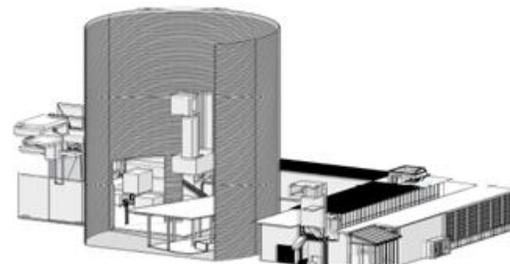


Figure 11. 3D prospective

CONCLUSION

This study implemented chaos theory combining the social sciences that include architecture and sociology to develop an upsetting order of learning space. The proposed space program of the project consists of three main components namely controlling chaos, inside outside library and learning house. The selection site is located at Ash Shati, Jeddah, Saudi Arabia based on the site evaluation criteria of capacity, shape/ proportional, topography, access/ traffic, noise levels, utilities, security and safety, image/ visual quality, visibility, future development, demographic patterns, surrounding, and views. The development of the chaos theory creates a new perspective for better understanding complex processes in architecture.

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