SPACE ROLE IN ARCHITECTURAL DESIGN TOWARDS A SPACE-CENTERED ARCHITECTURAL DESIGN

Amr Galal El-Adawi and Amr Youssef El-Sherif
Department of Architecture, Faculty of Engineering,
Alexandria University, Alexandria, Egypt.

There is a certain censorship for films and for books but not for the presentation of architectural and urban outrages which have far more serious and lasting consequences. Everyone is free to shut off the radio or television, to walk out on concerts, to shun the movies and theater, and to stop reading books. But no one can close his eyes to the buildings which form the setting of city life. Bruno Zevi

ABSTRACT

Without consideration for space in architectural design, architecture becomes simply a material commodity, loosing much of its intangible essence. Space should become the primary concern of all architects. Architectural design is not concerned merely with aesthetic qualities and functional competence of an architecture *tour de force* rather it should be seen as a process of balancing a combination of logical, functional, and spatial constraints. The paper is organized around three main themes reflecting varying levels of concern and action influencing architectural space. These themes reflect the role of space in architectural design: space and form; architectural space and the design process; and space as a representation of architectural creativity. A review of the state of art is outlined underlying the various concepts of architectural space. The paper intends to raise the awareness of the importance of space design in the architecture of buildings. The paper endeavors to use the design studio as a representation of professional practice in order to examine the problem of space design. The concept of space is utilized under two main themes: space representing a functional need and representing the totality of architecture. The architect's task should correlate the physiological and physical aspects of space in a variety of levels.

Keywords: Architectural space, Spatial qualities, Meaning of space, Concept of space, Design process, Architecture creativity, Architectural style.

1. INTRODUCTION

Much of the art of architecture is revealed to the architect when he first realizes that he is dealing not with areas but with volumes or spaces and with a multiplicity of cultural, social, economic and biological issues integrated in them. The problem of neglecting architectural space in current design practice/education is manifested nowadays in the low quality of buildings in our cities. Architects devote their concern and efforts to the form of the building and particularly to the facade of its outer planes rather than the enclosed space of the building. The facades of the building which in effect are considered sculpture on a large scale, have little to do with architecture in the spatial sense.

The problem of architectural space was raised while preparing the architectural design course for the second year architectural students in the Department of Architecture in Alexandria University. The issue of architectural space was considered as an essential objective of the course. We set two main objectives for the course. First we addressed the design of "use areas" and their relationships to one another and to the total site. Second we addressed the translation of these areas into " use - volumes " or spaces , where each volume or complex of volumes have a shape, size, material, color, texture and other qualities that best express and accommodate the function for which the space is intended.

In essence the paper takes up the argument that the teaching of architectural design should be viewed from a broader perspective. Design is not concerned merely with the aesthetic qualities and functional competence of an architectural *tour de force* rather it should be seen as a process of balancing a combination of logical, functional, and spatial constraints.

The aim of this paper is to identify the essential ingredients of a design approach based on architectural-space. The paper draws attention to the importance of designing architectural space . The paper attempts to raise the awareness of the importance of space design in the architecture of buildings. The endeavor to use the design studio as a representation of professional practice in order to examine the problem of space design. This methodology is adopted in order to suggest the factors that influence architectural space problem in education and in practice.

The goals of this paper are derived from the needs just discussed as follows :

1. To provide some of the considerations that architects deal with in building design.
2. To introduce students in earlier years to some of the concerns of building design.
3. To serve as a stimulant and catalyst for generating architectural concepts.
4. To promote creative design by helping to make traditional design strategies second nature.
5. To help foster an understanding about the relation between project facts and building form.
6. To help the designer overcome the tendency to spend too much time in plan.
7. To help the designer transcend his timidity in exploring new building form.

Within the focus of this paper, the utilization of the concept of space in architectural education/practice is confined to two main themes: space representing a functional need ; and space representing the totality of architectural objects. Therefore the paper consists of two main parts. The first part covers the utility dimension of the architectural space in relation to particular uses or activities, the second part deals with the role of space in the form-giving steps and in defining the character of the building and its architecture. Finally a concluding section discusses the relevance of a space-centered architectural design concept and process which could be used to enhance architectural students' grasp of the importance of space in architectural design studios.

2. CONCEPTS OF ARCHITECTURAL SPACE

Much attention has been given to the notion of space in architecture both at the academic level and in practice. As a matter of fact, space - *Faragh* in Arabic- has become a "catch word" of the architectural "daily language". As a key term, it is used consciously and unconsciously by architects, students, teachers and critics and sometimes without further qualification of what do each mean exactly with it and how it is used in conceptualizing their architectural expression. Theoretical concepts of architectural design attempt to qualify this term and to understand its implication on the process and quality of architectural design and production. Using examples from our experience in teaching and practice and correlating them to recent advances in architectural design theory and practice, the paper first reviews the theories underlying the various concepts of architectural space.

2.1 *Theoretical Development of The Concept of Architectural Space*

To many critics *Space* clarify without further qualification what architecture is all about. Architecture has always been defined by architects as the *art of space* simply because it is seen as a large hallow structure into which man enters and around which he moves. However the nature of this space has rarely been discussed or defined. Bruno Zevi's book *Architecture as a space* (1957) is an early critical analysis that advocated a spatial interpretation of architecture. Criticizing earlier theoretical works for overemphasizing the edifice/facade in his writings, he adopts what he called the *perspective space*. Zevi considers architectural space the protagonist of architecture which refers to the intangible content of architecture : "The facade and walls of a house, church or palace, no matter how beautiful they may be, are only the container, the box formed by the walls; the content is the internal space" [1] Historical analysis of architectural practice shows that the container and the contained are

mutually interdependent. However Zevi points out to the often found clear discrepancy between container and contained, especially where the "box" formed by the walls has been the object of more thought and labor than the architectural space itself.

Instead Zevi's appeal is to movement. Architecture is expressed through three dimensions representations in addition to a forth dimension referring to the factor of time. The forth dimension, indispensable to architecture, is created by moving about within a building to give the space an integrated reality. Space, in his view , in fact is a liberty of movement. That is its value to us, and as such it enters our physical consciousness. We adapt ourselves into them, project ourselves into them, fill them ideally with our movements

This realistic concept of space was only a step forward in understanding the complexity of factors involved in the problem of architectural space. Sigfried Giedion is probably the writer who has contributed most to the actualization of the space concept. In his book Space, Time and Architecture (1967), he puts the problem of space at the center of the development of modern architecture. He attempts to describe the qualitative differences which are related to the general development of man's image of the word, presenting the history of architecture as a succession of space conceptions whereby he distinguishes between three basic stages:

1. Architecture as a factor of space, the power of volumes, their relation with one another and their interaction as seen in the Egyptian and Greek architecture.
2. Architectural space as indistinguishable from the concept of hollowed-out interior space which in his view starts with the dome of Hadrienn's Pantheon at the beginning of the second century.
3. Architectural space as the basic and strongest impulse for original architecture creation.

According to this analysis, it is possible to identify three stages that characterize architectural historical development. During the first stage which encompasses the architecture of Egypt, Sumer and Greece - the first space conception was brought into being by the interplay between volumes. The second space conception began in the mi 'st of the Roman period when interior space and with it the vaulting problem started to become the highest objective of architecture . The Roman Pantheon with its forerunners marks its beginning. According to Giedion in this second space conception which lasted until the end of the eighteenth century, the formation of interior space became synonymous with hollowed-out interior space.

The third conception of space was set in the beginning of this century had fundamental consequence on man's conception of architecture and the urban sense. Architects tried many ways of arriving at a new feeling of space - became the basis and the strongest impulse for original architectural creation beyond the narrow gates of "fitness to purpose" and "rejection of historical styles" which were traditionally open to such endeavors. New and dynamic penetration of inner and outer space and interpenetrating of different levels has forced the incorporation of movement as an inseparable element of architecture.[2]

Norberg-Schulz (1971) criticizes these theories of architecture space as naively realistic with no conceptual definition. He classify them into two bodies: those which are based on ' Euclidean' space (more concerned with geometry) and a theory of space on the basis of perception psychology. Norberg-Shultz places the physical appreciation of architectural space in the context of man's representation of his general physical structure. In the 19th century and with the theory of relativity the ancient concept of a united space was split in several *spaces* : concrete physical spaces (micro, everyday and macro) and abstract mathematical. Spaces are invented by man to describe the former with a greater or lesser degree of approximation. This substitute the idea of the world as lumps of matter in a three dimensional space with a series of events in a four dimensional space-time. Just as physics aims at a structural description of physical events by means of mathematical models, psychology also describes the structure of a psychic process by means of a system of abstract concepts. The notion of *' human space'* has been studied by psychologists for about a hundred years. Taking up the question of man's experience of his environment, it has been proved that space perception is a complex process, where many variables are involved.

Meanwhile Norberg-Shultz makes a fundamental contribution to the theory of space . He argues that the appreciation of space does not only depend on

the real, undeniable three-dimensional entity of the space, but it also depends on the appreciator's previous experiences, level of connotations, and general appreciation of "schemata". Perception mediates a world which could also very well be described as 'events in a four dimensional space-time' . He also suggests the concept of *existential space* to explain the concept of architectural space. In such a view, man's interest in space has existential roots. It stems from a need to grasp vital relation in his environment, to bring meaning and order into a world of events and actions. He also suggests a theory where space is really understood as a dimension of human existence, rather than as a dimension of thought or perception. [3]

Norberg-Shultz therefore realizes the cultural and experiential differences between various individuals and he suggests that architectural space is really the public space , where most humans have subordinated their private preferences and feelings to a common public denominator, perhaps a denominator of an accepted behavior. However, taking the cultural and experiential differences in consideration, the pattern language theory of Christopher Alexander gives a new life to the "Euclidean Space" . Culturally established and easily recognized architectural spaces are the essential ingredients of the concept of *pattern* advocated by him as a proposed basic unit of the built environment as a whole. His attention upon integrating cultural, physical and psychological meanings of ideal Euclidean spaces defining such a space in terms of its archetype function or use rather than its geometry, takes an important step towards the development of integrated theory of urban and architectural space. [4]

3. ARCHITECTURAL SPACE AND SPATIAL QUALITIES

As suggested by the previous theoretical review, theories and concepts of space (Euclidean, psychological, or existential) reflect variety of human relations but with little concrete definitions. At a more practical level architectural space is a piece of the built environment that can be recognized by its spatial qualities. This practical level is more related to the meaning frequently used between architectural students and especially in earlier design studios.

Architectural space is the volume that incorporates any activity in a building whether living, working, entertainment, or manufacturing, etc._ To have a space you must have enclosure and that the size, shape, and character of the enclosure determine the quality of the space. The spatial qualities of space depends on its form, proportion, scale, illumination,, and other elements of the enclosure of space (see (Figure (1)). [5]

Properties of Enclosure	Spatial Qualities
• Dimensions	Proportion
• Shape	Scale
• Surface	Form Definition
• Edges	Texture Pattern
• Openings	Enclosure Light View

Figure 1. The Relation between Properties of Enclosure and Spatial Qualities.

Spaces by nature, may vary from the vast to the minute, from the light and airy to the heavy and ponderous, from the dynamic to the serene, from the crude to the refined, from the simple to the complex, and from the somber to the dazzling. Spaces in their size, shape, and quality, may vary endlessly. In designing space for any given function, first the essential qualities desired is determined then the designer can create them. Figure (2) shows some special qualities of space.

3.1 *Spatial Forms*

The essence of a volume is its quality of imposed or implied containment. Simonds (1961) put forward some spatial qualities of architectural spaces: [6]

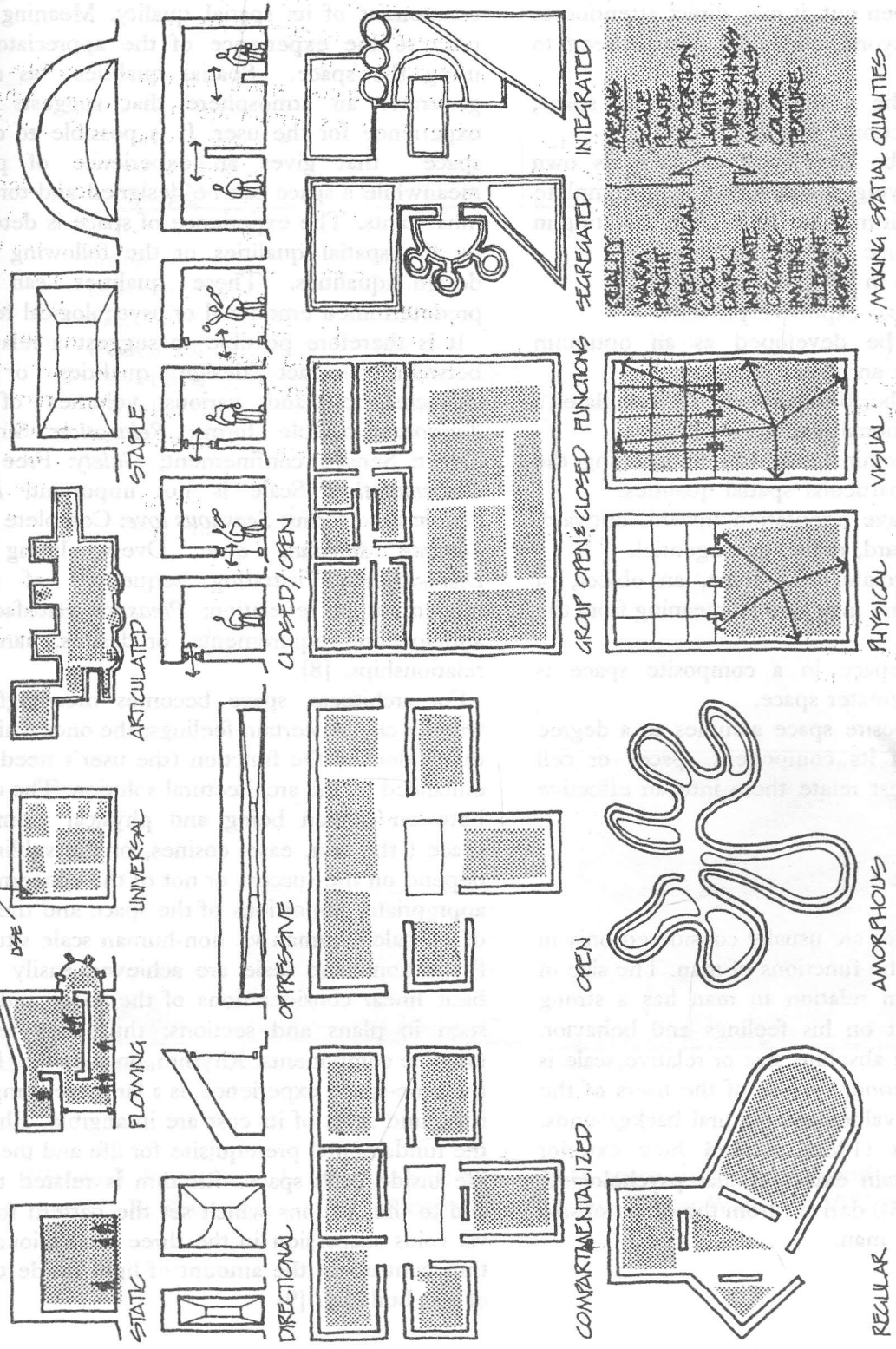


Figure 2 shows spatial qualities of space (after White, E. 1975 [7] P 67)

- A confined space may be static, it may hold interest, induce repose, it may direct and concentrate interest and vision inward.
- A space may open out, it may direct attention to its frame and beyond, it may fall away, or seem to expand.
- A space may be a flowing undulating space, suggesting directional movement.
- A space may be developed to have its own sufficient, satisfying qualities, and seem complete within itself; or it may be incomplete, a setting in which to introduce objects.
- A space may be in effect a vacuum.
- A space may have expulsive pressure.
- A space may be developed as an optimum environment for an object or a use.
- A space may be designed as to stimulate a prescribed emotional response.
- A space may dominate an object, imbuing the object with its particular spatial qualities.
- A space may have orientation inward, outward, upward, downward, radial, or tangential.
- A space may relate to a force, an object, or another space, and may gain its meaning from the relationship.
- A component space in a composite space is colored by the greater space.
- A total or composite space assumes to a degree the qualities of its component spaces or cell volume, and must relate them into an effective entity.

3.2. *Spatial Size-Scale*

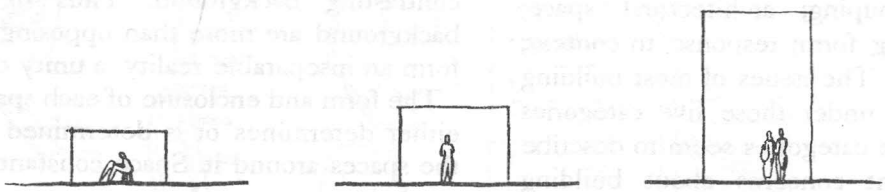
Architectural spaces are usually considered only in relation to man or the functions of man. The size of an interior space in relation to man has a strong psychological effect on his feelings and behavior. Perception of space absolute size or relative scale is also related to functional needs of the users of the space, their habits, values and cultural backgrounds. However, Simonds (1961) showed how exterior spaces have to certain extent similar psychological attributes (Figure (3)) derived from the effect of size of interior space on man.

3.3. *Spatial Meanings*

Specific meanings of a space is also an essential component of its spatial quality. Meaning usually refer to the experience of the appreciator when using the space. Spatial qualities as a whole generates an atmosphere that suggests specific experience for the user. It is possible to design a space that gives an experience of pleasure, meanwhile a space can be designed and tortures its inhabitants. The experience of space is determined by the spatial qualities or the following abstract design qualities. These qualities can induce predetermined emotional or psychological response.

It is therefore possible to suggest a relationship between abstract design qualities or spatial characteristics and various volumes of space: *Tension*: Unstable forms; *Relaxation*: Simplicity; *Fright*: Sensed confinement; *Gaiety*: Free spaces; *Contemplation*: Scale is not important; *Dynamic action*: Bold forms; *Sensuous love*: Complete privacy; *Sublime spiritual awe*: Overwhelming scale; *Displeasure*: Frustrating sequences of possible movement or revelation; *Pleasure*: Satisfaction of anticipation, requirements, or desires, harmonious relationships. [8]

For architects, space becomes meaningful only when it creates certain feelings; the ones which were demanded by the function (the user's need) and as enhanced by the architectural solution. The dialectic between human being and physical elements of space (the fear, ease, cosines, or the sublime) all depend on the success or not of the concern for the appropriate proportions of the space and the quality of its scale (human vs. non-human scale situation). Proportion and scale are achieved easily through basic linear considerations of the space and can be seen in plans and sections; thus they represent tangible components. Rhythm, on the other hand, as the time-space experience, is a far more complicated issue and most of its cost are intangible. Rhythm is the fundamental prerequisite for life and the type of life inside each space. Rhythm is related to plans and to the sections which set the pattern for solids vs. voids succession in the three dimensional sense thus controlling the amount of light inside the guts of any building. [9]



Squat	Sit	Be seated
Eat	Dine	Banquet
Yak	Talk	Converse
Rock n' roll	Fox trot	Waltz
The yodelling three	Light opera	Symphony
Growl at the price of fish	Compare car mileages	Discuss world trade relations

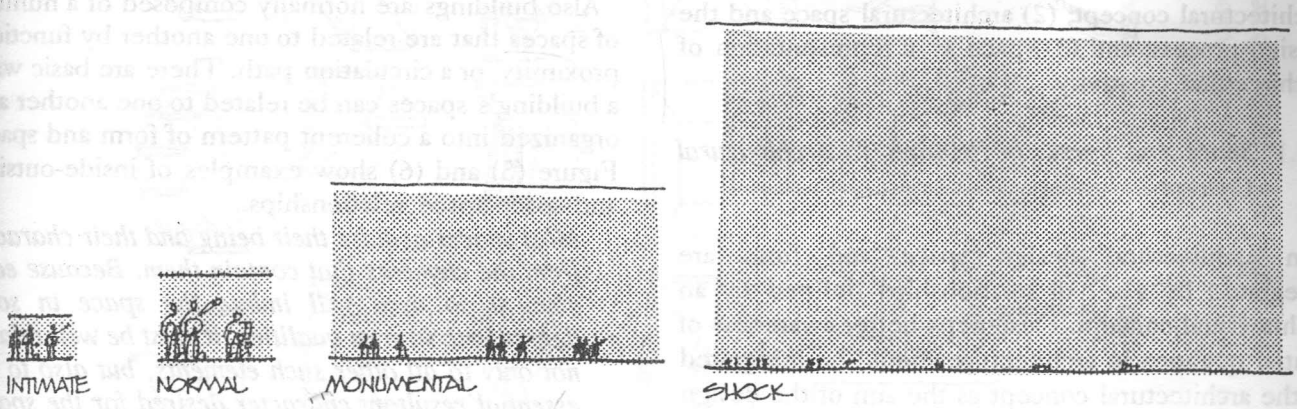


Figure 3. Spatial size A. Psychological attributes of space size (after Simonds, J. 1961 p. 86). B. Scale type and its effects on man's feeling (after White, E. 1975 p. 68).

4. DISCUSSION : SPACE ROLE IN ARCHITECTURAL DESIGN

Architectural design is mainly concerned with five issues: functional grouping; architectural space; circulation and building form; response to context; and building envelope. The issues of most building types fit conveniently under these five categories and taken together, the categories seem to describe most of the important concerns about building design.

In design practice, the architect has to correlate the psychological and physical aspects of the space in all these levels. Behavioral relations between man and building, ecological interactions between buildings and nature and the role of building in man's perception of and orientation to the city scape are some contemporary considerations that the architectural designer must address in designing buildings. The sub-issues of these concerns and others that are becoming available to architecture from related fields such as sociology and psychology are mounting in number and complexity. For the purpose of this paper, the following discussion emphasizes three key principles that need to be developed in a space-centered architectural design approach (1) space and form in relation to architectural concept; (2) architectural space and the design process; and (3) space as a representation of architectural creativity.

4.1 *Space And Form In Relation To Architectural Concept*

In architectural design space and form are integrated by a set of relationships defined by an architectural concept. Designer's better awareness of spatial qualities in architecture should be integrated in the architectural concept as the aim of the design itself

The elements of form and space together form the reality of architecture. Our visual field normally consists of heterogeneous elements, subject matter that differ in shape, size, color, etc. The structure of a visual field is comprehended by organizing the elements within it into two opposing groups positive elements that are perceived as figures, and negative elements that provide a background for the figure. The perception and understanding of a composition depends on the interpretation of the visual interaction between the positive and negative elements within the field. The positive elements that attracts attention could not exist without a contrasting background. Thus figures and their background are more than opposing elements, they form an inseparable reality, a unity of opposites.[10]

The form and enclosure of each space in a building either determines or is determined by the form of the spaces around it. Space constantly encompasses our being.

> *Through the volume of spaces we move, see forms and objects, hear sounds, feel breezes, smell the fragrances of a flower garden in bloom. It is a material substance like wood or stone. Yet it is inherently formless. Its visual form, quality of light, dimensions and scale, depend totally on its boundaries as defined by elements of form. As spaces begins to be captured, enclosed, molded, and organized by the elements of form, architecture comes into being. Ching, F.K.[11].*

In other words, any three dimensional form will articulate the volume of space around it and generates a field of influence or territory. Thus, various configuration and orientation of horizontal and vertical elements define specific types of space. Figure (4) shows examples of elements forming space.

Also buildings are normally composed of a number of spaces that are related to one another by function, proximity, or a circulation path. There are basic ways a building's spaces can be related to one another and organized into a coherent pattern of form and space. Figure (5) and (6) show examples of inside-outside and space-space relationships.

> *Most spaces acquire their being and their character from the elements that contain them. Because each element so used will imbue the space in some degree with its own qualities, it must be well related not only to all other such elements, but also to the essential resultant character desired for the space. Lines, forms, colors, textures, sounds, and odor all have certain predictable impacts on the human intellectual- emotional responses. The containing elements of a space have linear characteristics then the abstract line qualities are of great design importance. Every line evident in the form or surface of any element, or described by the meeting of any forms or planes, has its own abstract design expression. The expression must be in harmony with the intended nature of the space. Ching. F.K. [12].*

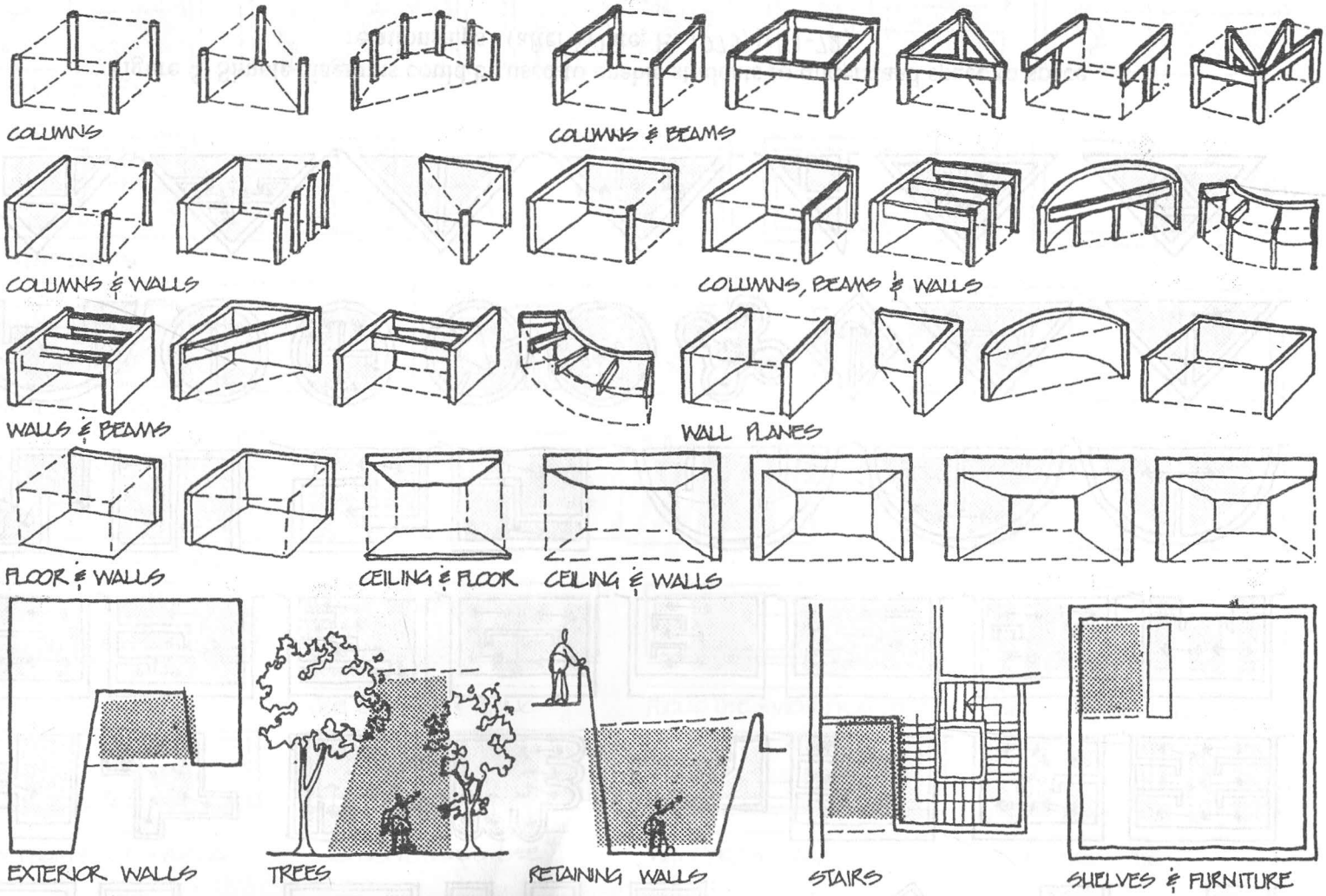


Figure 4 Simple diagrams could be used to enable students to examine various configuration of horizontal and vertical elements forming space (after White, E. 1975 p.66)

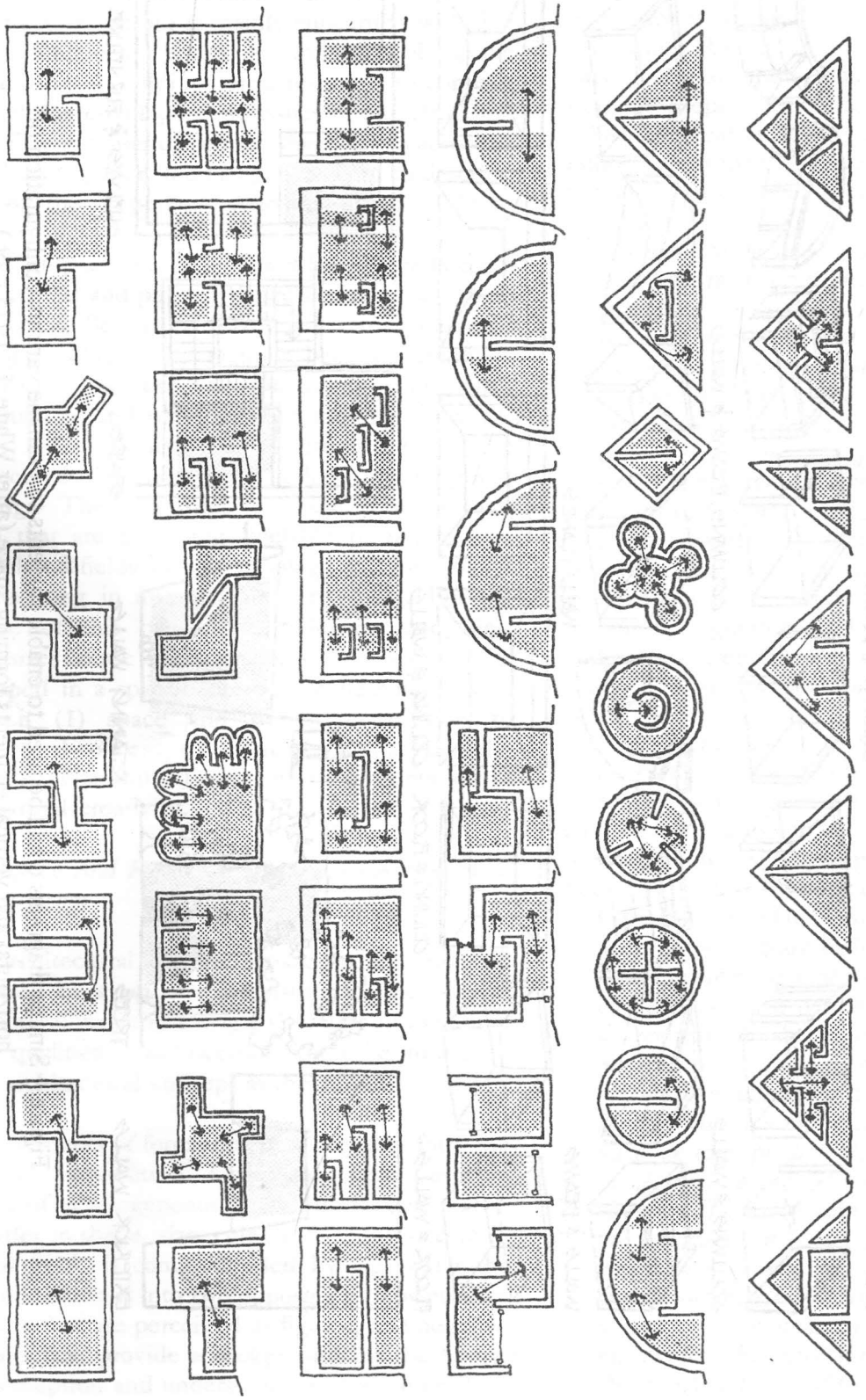


Figure 5 Simple diagrams could be used to enable students to understand space to space relationships (after White, E. 1975, p.71-72)

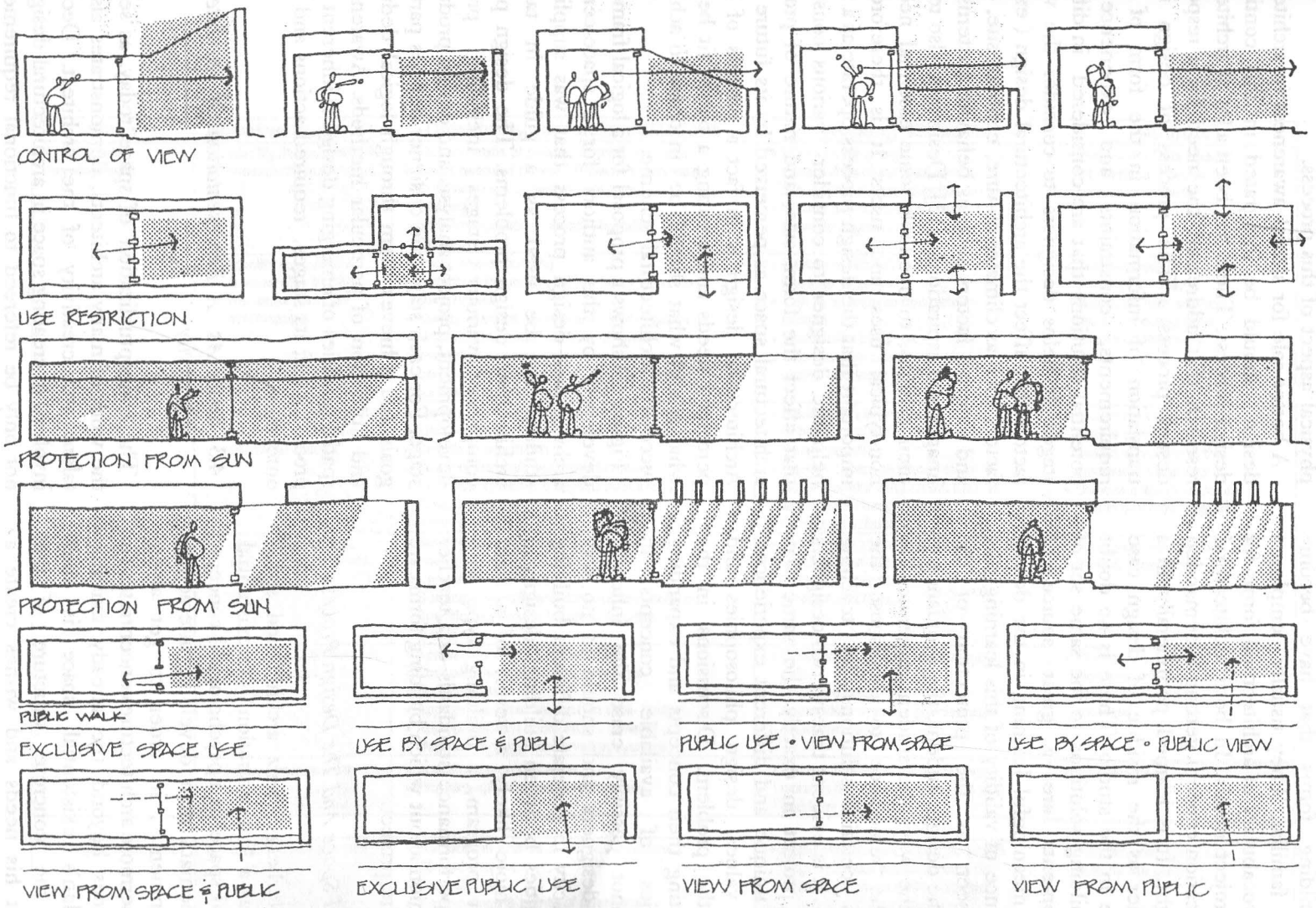


Figure 6 Simple diagrams could be used to enable students to grasp inside-outside space relationships (after White, E. 1975, p.72-73)

The experience in the design studio reveals that students tend to handle very different projects with very similar building forms that have become comfortable and familiar. They usually employ a relatively small vocabulary of architectural forms for responding to project needs. In both architectural practice and education concept getting is demanded but seldom taught. It is learned peripherally in a piecemeal manner as the residue of design case study experience in the studio. There is no doubt that different building solutions to the same set of projects requirements are a great source of stimulation and meaningful learning in the design studio. The essence of validity of this learning tool is sometimes seen as the protection of the individuality of the design student, the avoidance of tampering with the ways the student generates his concepts and the reluctance to predispose the student towards certain solutions by teaching concepts directly. It is evident that no two designers will approach a project in exactly the same way because of their unique and different experiences, life views and values, design philosophies and perceptions of the problem. Discussions in the studio about getting their concepts and expanding their vocabularies of available concepts in architecture cannot possibly erase the inherent individuality of designers and should in no way reduce their capacity to generate different building solutions. Similarities between building designs in the studio are more likely a result of a tight structural project program, a building type with extremely strict performance standards or a teacher with a strong opinion about which building forms are appropriate for the project.

4.2 *Architectural Space And The Design Process*

According to Norberg-Schulz architectural space may be defined as a "concentration" of existential space. "Existential space" is a psychological concept, denoting the schemata man develops, interacting with the environment , in order to get along satisfactory. Furthermore architecture concentrates an image which goes beyond the already existing environment. Man's existential space is thus determined by the concrete structure of the environment, but his needs and wishes create a feedback. The relationship between man and environment is therefore a two way process, a real interaction. "Architectural space" is a concrete, physical aspect of this process.

A better role for spatial awareness in architectural design should be integrated in this continuous design process. There has been a lot of architectural research that addressed the need for a responsive design process . The process of design is the translation of information in the form of space requirements, constraints and experience into potential solutions that are considered in different stages. It helps designers to consider the various factors that affect the architectural design (external factors such as climate; culture, context, site, codes, and external factors such as behavior patterns, user images and aspirations) [13]. Designers also tend, in their designs, to overlook some essential needs of non-typical uses and users It is therefore also important that the design process operate as a tool to help the designer to consider various constraints that affect the form, size, and nature of proposed architectural space as perceived by its future users. Architectural design is in fact a process of fitting perceived needs and creating a better fit between what is and what should be in order to achieve a successful architectural scheme.

Figure (7) shows a proposal for a logical framework developed by the authors for a space-centered architectural design process that was supplied to students to be used as a guide in tackling architectural design problems. The design process comprises various stages including program development, project analysis and design production stage. For each stage the designer defines particular goals and achieves them through logical deduction and utilization of particular methods. Awareness of spatial qualities of emerging design is inherent in the process itself; its stages, required actions and likely outcomes.

4.3 *Space As A Representation Of Architectural Creativity*

The conceptualization of space today, as seen in the work of many architects, demonstrates also the talent and creativity of the architect. Decisions involved in creating space in architectural design can not only be refereed to functional requirement of the project in hand or research process undertaken

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Stage	Narrative Summary	Objectively verifiable indications	Working Methods	Outputs
A. Program Development	1. Identify the purpose of the project/ building	• Human needs of people: comfort- security • Social needs of people : Privacy- Openness' Character • Cultural needs of people: Meaning- • Economic-practical needs: Flexibility- Cost- Duration	• Identify user group • Collect data about their needs through interviews- questionnaires • Identify key conflicts & suggest possible approaches	• Preliminary Data needed for client/user profile & context-site needs
	2. Identify the relation between the building, the society and the environment	• Public role of building • Impacts & influences of the building on the environment • Identity of users: permanent - staff- visitors • Maximum/minimum number of users • Interaction or segregation between particular user groups & between building and the surrounding environment	• Review published books- journals- previous projects- • Talk to an experienced person-experts • Visit similar buildings • Observe how people are using similar buildings	• Detailed Data & information sheets supported with site-visit reports- photographs- annotated diagrams- record sheets
	3. Identify the external and internal factors that affect the design	• Design values & performance requirements • Plan- location characteristics • Climate & orientation • Building materials and specifications • Technical systems & applied technology • Structural system • Form and style	• Review the general design theory of building type & identify key developments • Review recent studies -research work or official data on this topic in site specific local context. • Consult specialists	• Report on research work: restate the aims of the design in relation to this theoretical background: • Decisions about structure/ module systems/ spaces
	4. Identify the building codes and regulations	• Building size and envelope • Height -stairs- light wells • Life safety - fire-escape • Building materials and construction methods • Specific regulations for style: facades- - details	• Identify applicable legal text- building laws- planning law- Technical specifications- professional laws	• Schematic analysis of limits & constraints
	5. Conduct basic research on the subject of the design	• Appropriate area per person/ unit • Cost parameters- Maximum budget • Economic data • Appropriate structure system (soil- budget...) • Appropriate Air-conditioning - sewage disposal- energy conservation systems.	• Collection of space requirement data • Compare and select more appropriate systems (mechanical-environmental)	• All data concerning technical and architectural systems of building collected
	6. Define accurately the problem	• Specific design problems • Program-specific needs -comprises	• Review & evaluate all preceding work so far. Examine all needs in a matrix to show conflicts	• A full program
B. Project Analysis	1. Conduct a site analysis	• Site location Entries & drop-off locations • Climate analysis • Code survey • Surroundings & points of reference • Indigenous natural elements	• Apply requirement of program from stage A in your particular site, put all information on a site map and calculate accurate areas and volumes of spaces	• Diagram analysis of site-sketchy site plan

Figure 7: A Logical Framework for A Space-Centered Architectural Design Process (source: the authors)

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	2. Determine the space requirement	• Internal space requirements • Parking requirements • Outdoor space requirements	• Sketch diagrams showing space requirement: group spaces (indoors-outdoors) around circulation areas	• Scaled drawings of spaces- groupings in levels-floors- functional sections
	3. Determine the functional relationship between different elements	• Types of spaces: serviced & servicing spaces: rooms, classes toilets - staff rooms • Types circulation modes & their relationship with permanent use areas • Entrances and orientation relationships	• Analyze the program in relation to site and main functional areas and likely form of building.	• Flow charts and circulation diagrams of each floor and each functional sections
	4. Determine the appropriate organization of space:	• Grouping of amicable activities and spaces • Grouping of services • Grouping of similar circulation systems	• Work out the most suitable and efficient space organization diagram of the building type. • Identify problems-conflicts and try to solve them	• Scaled schematic diagrams of plans • Circulation diagram
	5. Determine the appropriate circulation pattern	• Identify best circulation pattern: sequential flow- separated flow- mixed flow		
	6. Select an appropriate module	• Structure system • Room size - furniture		• A dimensional & modular system
C. Design Stage	1. Develop alternative solutions to the problem	• Function of building • Form: symbolic meaning • Style- character • Contextual integration or segregation • Decoration and ornaments	• Apply & produce schematic layouts of building according to previous analysis • Consider aspects related to the 3d volume of building- the architectural language- landscape	• Schematic layouts- study models - level models-sections- mass elevations • Report on design concept
	2. Evaluate alternative solutions	• Efficient allocation of spaces • Good relation with surrounding buildings /uses • Promote social interaction • Clear and direct entries • Clarity of internal design • Sound structure • Efficient land use	• Select two or three alternatives and evaluate them in a systematic way. • Use matrixes between variables and alternatives. Compare each alternative to earlier analysis of program and site.	• Diagrams of comparisons- Written report on *Design Decisions*
	3. Select the most suitable solution for the problem	• Efficiency & appropriateness to client • Safety - firmness • Orientation- comfort • Practicality in use- flexibility • Accessibility & legibility • Character & beauty • Value within context and fit	• All previous issues should be re-evaluated	• Final Report
	4. Re-compare program with selected solution & modify solution/program:	• system review - and self-criticism	• Ensure consistency with stage A & B. Undertake a self-criticism exercise- consult your tutor	• Final Drawings
	5. Develop the selected solution	• Layout Details- Technical Details- Overall quality- Presentation techniques	• Produce final drawings.	• Final Presentation

Figure 7-Continued : A Logical Framework for A Space-Centered Architectural Design Process (source: the authors)

by the designer, but space creation is also, in many situation, an individual choices on the part of the designer that reflects his own creativity and expressive language. Architects have acquired confidence in their role as space makers and their continuous search for spatial vocabulary. Architect's intentions to suggest spatial experience of particular feelings such as serenity, admiration and spiritual contemplation can also be a reason for the individual self-based nature of space creation

The creativity of the designer in defining architectural space has always been the concern of architectural and art schools. The modern movement in architecture was especially influenced by cubism- the dissolution of the perspective- The modern movement emphasis on cubism and reductionism represented a break with renaissance perspective. This led to the advancing of the importance of planes. Hitherto planes in themselves, without naturalistic features, had lacked emotional content. With the modern movement they came to the fore as an artistic means, employed in various ways. A tradition also starts that architect start his design work with a spatial research that concentrate on objects of architecture or "architectonic". Later interrelations are created between these objects; slabs, surfaces and prisms when they penetrate or dislodge each other. Neo-Plasticisim, an expression used by the Dutch painter Monderian, signifies that three-dimensional volume is reduced to the new element of plasticity, the plane.

While modern architecture was seen to have broken ranks with all previous architectures and did not fit into the history of architecture. An emphasis on space provide a link between current modern problems and the continuum of architectural history. This is because of the fundamentally new way of viewing architectural space that prevailed there. Space here is treated as a visible and tangible thing, determined by walls, floor, roof and structure, to be shaped according to rules of formal composition. Students learn to "see" and organize space (the ground or field around the solid object) At the same time, modeling architectural form and mass, the solid object itself, was down played. These types of spaces , created mainly by the " section drawing", has evolved from the two-dimensional handicaps of over emphasizing the plan supremacy. Antoniades, A. (1981) suggests that the typology of spaces of recent decades shows a trend toward three-dimensional boldness analogous to the two dimensional concept of Miesian "goodness" and the spatial vocabularies of the pioneers of the modern movement. Figure (8) shows examples of the "space-maker" section epitomizes the creative spatial ideas of famous architectural works.

Emphasis on form without considering space only reduces architectural design to a style application exercise. Styles are easily imitated because they ignore background and context, but background and context may mean the difference between life and death between loved and live-in space and dead form. Style labels such as Deconstruction conceive people that a phenomenon has been identified, and they look no further: connections are forged which tends to precludes all others [14]. Irregular, asymmetrical buildings have been about for a long time, indeed there is a tradition of them running back through the modern movement and beyond, to national romanticism and the English free style. The aims has not been disorder or the inspiration despair. Rather a kind of idiosyncratic ordering has been sought in relation to the place and task, as opposed to the ready -made orders of type and technique. It has in fact led to a new kind of architectural space, which is certainly related to our time and beliefs, but neither primarily ironical nor negative in intention. The emphasis has been not on empty forms but inhabited space. As such form and content only make sense in terms of one another (see Figure (9) and (10)).

In contrast, one feels very uneasy in that respect with the spaces currently created by many postmoderns. Their works are often characterized by a lack of spatial discipline. In most cases the incorporation of excess spatial gimmick produces chaotic and often torturing spatial experiences.

If now the conceptualization and periodically developed directions of architecture represent an evolving dialectic between the currents of "functionalism" and " freedom", it is clear that the key to designing meaningful and fulfilling spaces rests with design education and architectural studios that emphasize methodologies that will facilitate students to achieve them with out limiting their creative choices. Antoniades, A. (1981) put it in a clear way: There is a need to keep the "space" trend going. We must reverse the current trend of spatially undynamic education. ...The "spatial" reorientation of architectural education would not have to come about through absolute negation of the 'socio-psycho-behavioral' learning; on the contrary, the education should become more inclusive" [16]

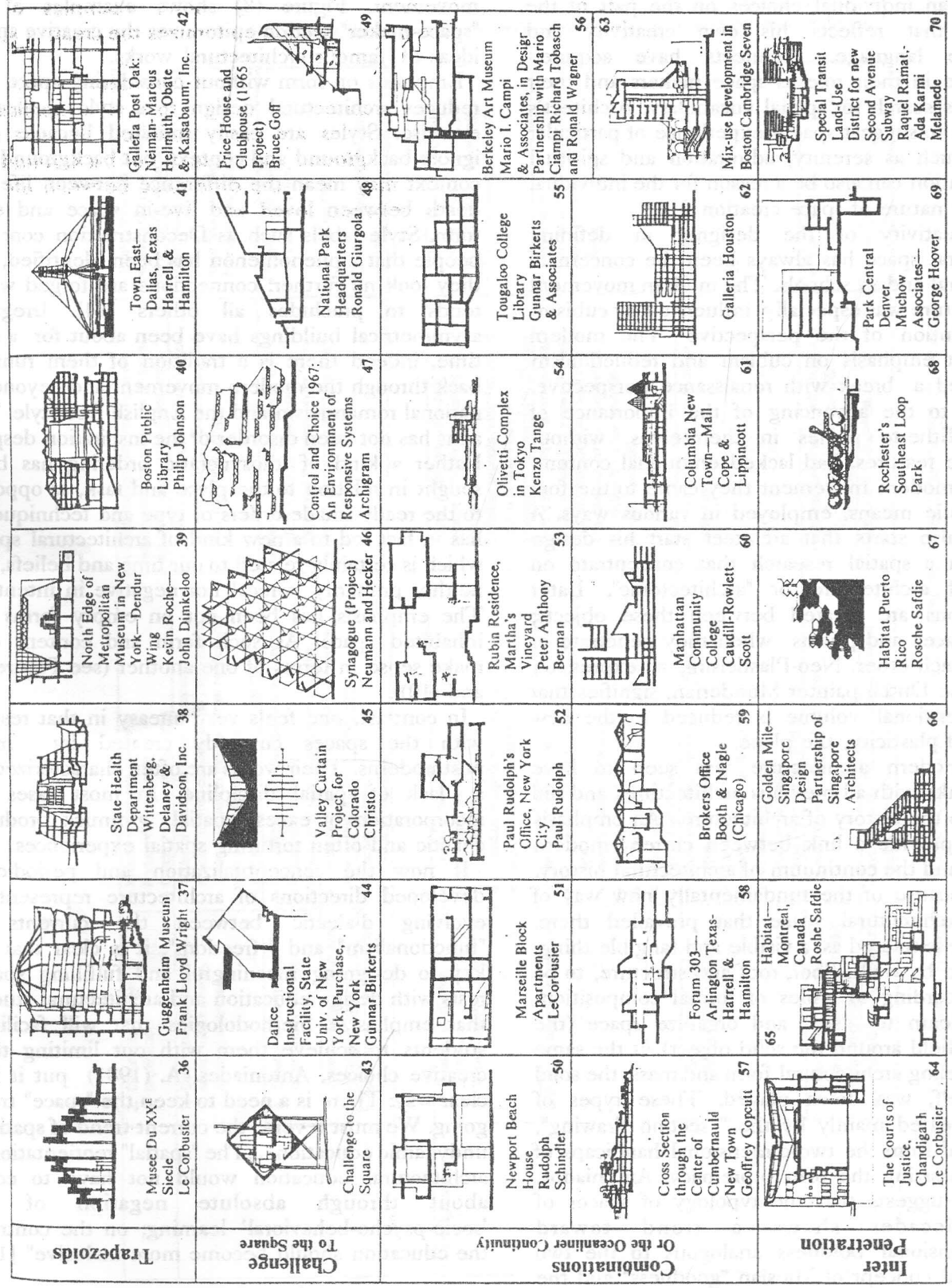

Figure 8 -continued Examples of the "space-maker" section epitomizes the creative spatial ideas of famous architectural works. (after Antoniades, A. p.205-207)

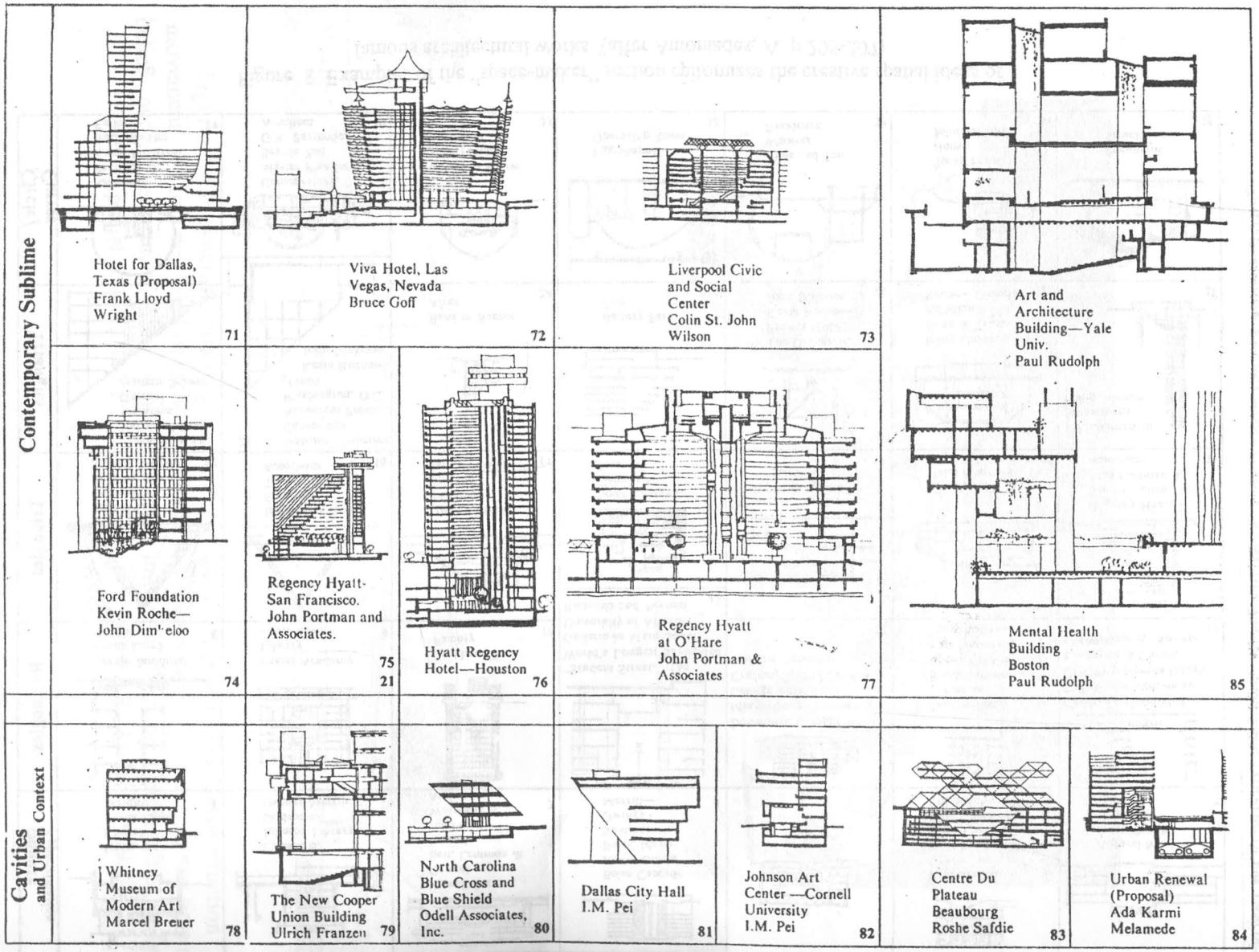

Figure 8 -continued Examples of the "space-maker" section epitomizes the creative spatial ideas of famous architectural works. (after Antoniades, A. p.205-207)

EL-ADAWI and EL-SHERIF: Space Role in Architectural Design Towards a Space-Centered Architectural Design

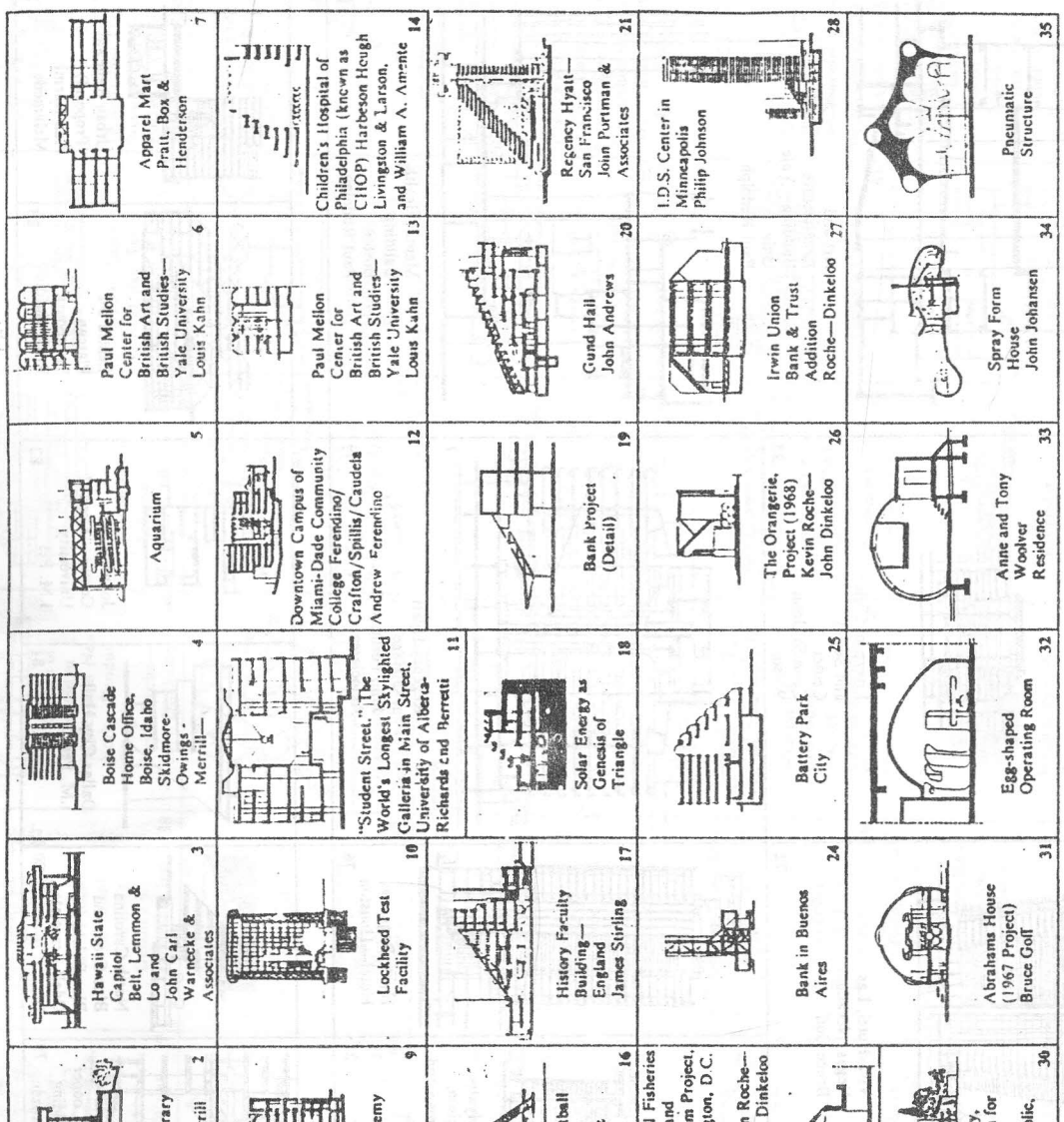

Figure 8 Examples of the "space-maker" section epitomizes the creative spatial ideas of famous architectural works. (after Antoniades, A. p.205-207)

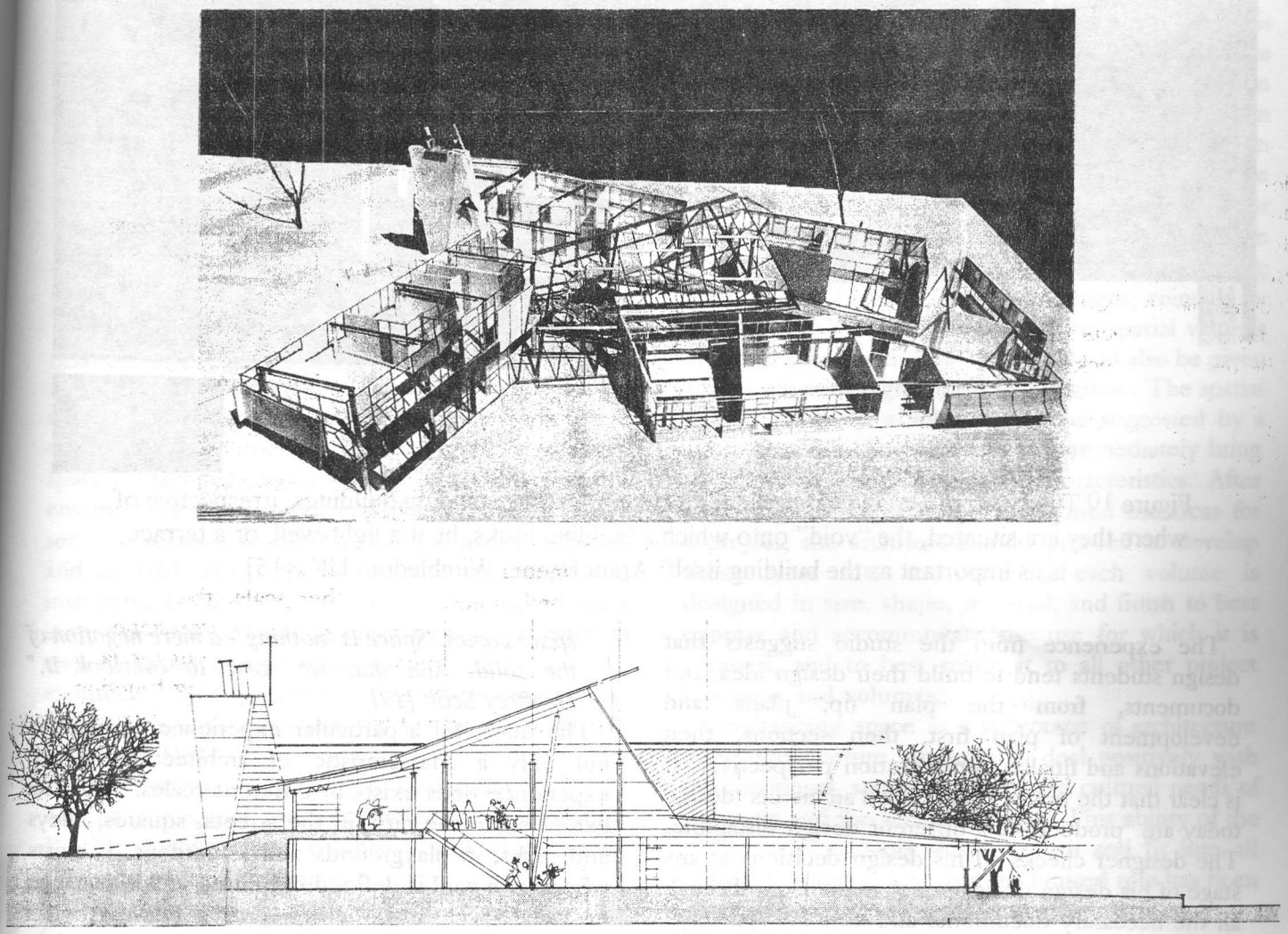

Figure 9 Idiosyncratic ordering in relation to space in the so called "deconstruction movement" led to a new kind of architectural space, which is certainly related to our time and beliefs, but neither primarily ironical nor negative in intention: Architect: Behnisch & Partners, 1991 Special school, Bad-F ppenau, Germany. (after AR No. Vol. P.29/2)

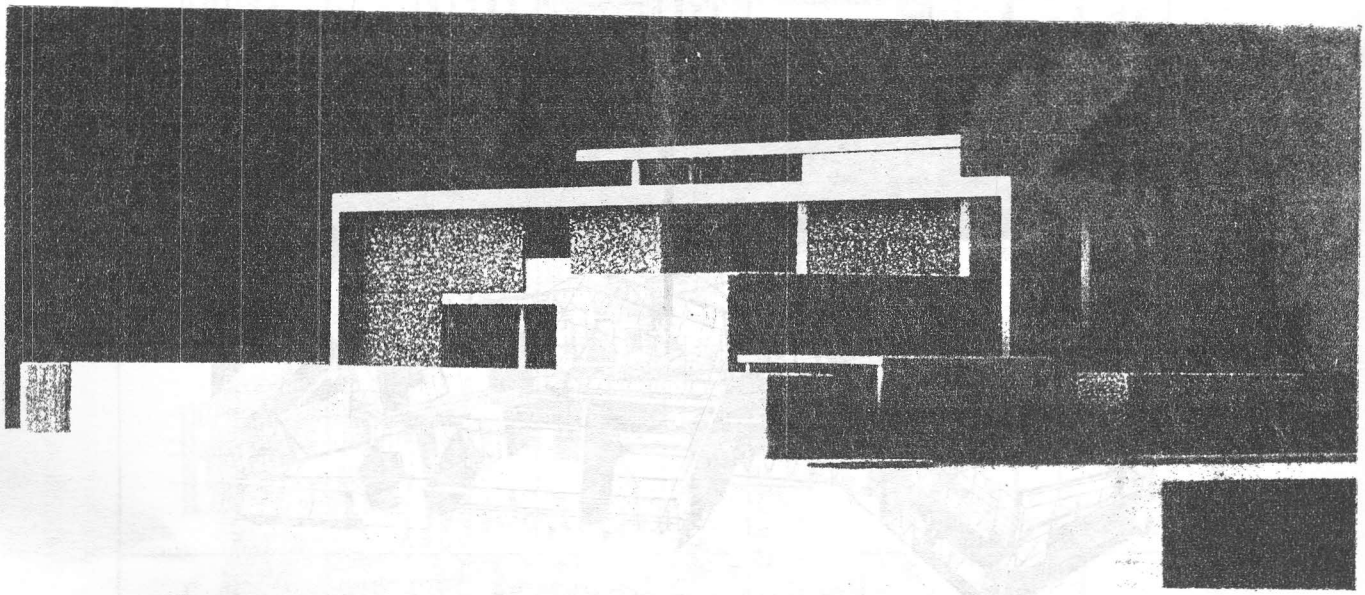

Figure 10 The work of David Chipperfield: in almost his free standing buildings, irrespective of where they are situated, the "void" onto which a building looks, be it a light-well, or a terrace, is as important as the building itself: Aram Home, Wimbledon, UK. [15]

The experience from the studio suggests that design students tend to build their design idea, and documents, from the plan up, plans and development of plan first, then sections, then elevations and finally a presentation perspective. It is clear that the better spaces good architects design today are products of a different design discipline. The designer checks all his design decisions at any stage of his design decision-making process through all the necessary documents and uses all "spatially". Plans, sections, elevations, sketches of spatial fragments and spatial models represent tools of this process.

5. CONCLUSION

"Criticism has singularly failed to recognize the supremacy in architecture of spatial values. The tradition of criticism is practical. The habits of our mind are fixed on matter. We talk of what occupies our tools and arrests our eyes. Matter is fashioned; space comes. Space is 'nothing'- a mere negation of the solid. And thus we come to overlook it." Geoffrey Scott [17]

The quest for a particular experience of space is not only a characteristic of architecture. Space experience does exists in different scales. It has its extension in the city, in the streets, squares, alleys and parks, in playgrounds and in gardens. It exists wherever a void is defined or limited and became an enclosed space. In buildings space is defined by six planes, A void enclosed by five planes instead of six is regarded with equal validity as interior of building space. All urban spaces wherever the view is screened off, whether by walls or rows of trees or embankments, presents the same feature as in architectural space. On another scale, the city is a pattern of open spaces it is not just a heterogeneous conglomeration of buildings arranged about the land in a rigid pattern. Obviously, every building function in the creation of two kinds of space defined by the building itself and its external space or urban space

defined by that building and other buildings around it The arrangement and character of the open spaces, the buildings define, that give a city its essential quality.

However we may overlook space, it affects us and can control our spirit; and a large part of the pleasure we obtain from architecture-pleasure which seems unaccountable, or for which we do not trouble to account- springs in reality from space. Even from a utilitarian point of view, space is logically our end. To enclose a space is the object of building; when we build we do but detach a convenient quantity of space; seclude it and protect it, and all architecture springs from that necessity. But aesthetically space is more supreme. The architect models in space as a sculptor in clay. He designs his space as a work of art, that is, he attempts through its means to excite a certain mood in those who enter it. [18]

Architectural space as an organism: Theorists have demonstrated that man's existence is dependent upon the establishment of a meaningful and coherent environmental image of his "existential space".. Architecture is usually the focus of this environmental image but it is also the product of all sorts of factors- social, economic, scientific, technical and cultural. However architecture may be called into being by all these external conditions, but once it appears it constitutes an organism in itself, with its own character and its own continuing life. It is the architect's task to correlate the physiological and physical aspects of space in a variety of levels including: [19]

1. The pragmatic space of physical action
2. The perceptual space of immediate orientation
3. The existential space which forms man's stable image of his environment
4. The cognitive space of the physical world
5. The abstract space of pure logical relations

In doing so architectural space becomes an organism and architects ultimate goal is to create what Norberg-Shultz calls "expressive space"- to express the structure of their world as real images and to express the aspirations of their societies.

Architectural space education: At the level of education , it is important that students should see space as the crucial substance of architecture. With space as the common denominator, decorative style becomes a second concern and labels such as Modernism, Post-modernism, Deconstructivism or Neo-structuralism or other current schools- solely occupying students conscious with their imagined revolutionary concepts - fit neatly in with the rest of architectural history in their most important goal which is the creation of a human fluid and plastic space.

The design approach that is promoted by this paper is space-centered, rather than mass-form- style oriented . "Architecture as space", while an old idiom can be utilized to inform a participatory and human spatial design process. In a space-centered design approach, the original, intrinsic value of architecture depends on internal space and that all other factors-volumetric, plastic, and decorative elements-count in the judgment of a building according to how well they accentuate, coincide or interfere with the spatial value. The spatial value is also concerned with how spaces should also be given their form with high regard for function . The spatial characteristics of a volume may be suggested by a given function. Any function will immediately bring to our mind desirable spatial characteristics. After allocating and organizing the required use-areas for a project, the architect should proceed to develop these areas into use-volumes, each volume is designed in size, shape, material, and finish to best express and accommodate the use for which it is planned, and to best relate it to all other project functions and volumes.

Emphasizing space as a substance of architecture direct architecture students to deal positively with the functional, socio-economic and cultural needs of the users and the society at large. This ability of the architect to respond sensitively to and fit into all these circumstances within his limited role has been always a goal of the architectural profession.

REFERENCES

[1] Zevi, Bruno. *Architecture as Space. How to Look at Architecture.* Horizon Press, New York, 1957.

[2] Giedion, Sigfried. *Space, Time and Architecture.* Fifth edition, Harvard University Press, Cam., Massachusetts, 1967.

[3] C. Norberg-Schulz, *Existence, Space and Architecture.* London, Studio Vista, p. 10, 1971.

[4] Alexander, Christopher et. al. *A Pattern*

Language: Towns, Buildings, Construction. Oxford University Press, New York, 1977.
[5] F.D.K. Ching, *Architecture: Form, Space and Order*. Van Nostrand Reinhold Company, New York, 1979.
[6] Simonds, John Ormsbee. *Landscape Architecture*. Iliffe books Ltd., London, pp. 85-86, 1961.
[7] White, Edward T. *Concept Sourcebook: A Vocabulary of Architectural Forms*. Architectural Media ltd., Arizona, 1975.
[8] J.O. Simonds, pp. 81-83.
[9] Antoniades, Anthony C. *Architecture and Allied Design: An Environmental Design Perspective*. Kendall/Hunt Publishing Co. Iowa, pp. 188-189, 1981.
[10] F.D.K. Ching, F.D.K. p. 108, 1979.
[11] Ibid., p., 110.
[12] J.O. Simonds, p. 93-94, 1961.
[13] A. El-Adawi, "The Architectural Design Process " *Alexandria Engineering Journal*, vol. 35, No. 4 Section C, July, pp. 185-195, 1996,.
[14] Jones, Peter Blundell. " Responsive Irregularity ", *The Architectural Review*, vol. CXC, No. 1140, February, p. 19, 1992.
[15] *David, Chipperfield*, second edition, Gustavo Gili, Barcelona, 1994.
[16] A. Antoniades, p. 213, 1981 .
[17] Scott, Geoffery. *The Architecture of Humanism*. Charles, Scribner & Sons, New York, 1925.
[18] Ibid., pp. 168-171.
[19] Norberg-Schulz, C. 1971, pp. 9-11.