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Formative Studios in Architecture Design: Pedagogy Based on the Syntax

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Abstract: Like any other language, the language of architecture also has a basic grammar which has to be learnt and imbibed. This paper looks at some of the Formative Studios in Architecture Design Education that emphasise on the grammar (syntax) of the language of architecture. It makes a case for the focus on teaching the language of architecture so that the student becomes sufficiently competent to use it for expressing and creating any kind of space. The need to decode some accepted methodologies, beliefs and signs are also important to conceive out-of-the-box solutions. The paper looks at design pedagogy in studios through various exercises that are not problem-solving in nature but passively inculcate in a student the basic vocabulary of design of space.

Keywords: Architecture Design Pedagogy; Syntax; Architecture Design Exercises; Design Process; Language; Grammar.

1. INTRODUCTION

The major concerns, while imparting architectural design education to raw students, are varied and complex. The first aspect is sensitising them to the phenomenon of Space by making them aware of the scale, the relationship of the whole to the part and vice versa. It includes exposing them to the interdependence of Form and Space, which answers the question '*What Space'*. The second aspect is making them understand the optimum space required for various functional needs, which answers '*Why and How Much Space?* The last aspect is exposing students to the technical aspect of making the architectural construct stand physically, which answers '*How to make that Space'*. On this basic grounding, the students can learn to encounter single-unit spatial constructs to multi-unit structures. Subsequently, the other complex parameters of site, climate and context can be tackled.

The answers to these basic questions have been transmitted over the centuries from master craftsmen and master builders to their disciples. Later, it was the Builders' Guilds that imparted training in arts and crafts. By the end

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of the nineteenth century, formal schools of architecture came up to educate students in the field of building design and construction. The crux of all debates regarding architecture design education has been 'how' it should be taught. With the development of psychology, a new dimension has been added as to how best can a student imbibe the nuances of Basic Design and apply these to his Architectural Design Projects. Varied theories for teaching and learning Architecture Design have, therefore, been propagated and applied by the educators over the ages.

2. A BRIEF HISTORY OF FORMAL ARCHITECTURE DESIGN TEACHING

Vitruvius, in his treatise on architecture, elaborates on the qualities of an architect. He says:

> *Let him be educated, skilful with pencil, instructed in geometry, know much history, have followed the philosophers with attention, understand music, have some knowledge of medicine, know the opinions of the jurists and be acquainted with astronomy and the theory of the heavens* (Morgan, 1960).

Earlier in history, the training to be an architect, sculptor or artist was through apprenticeship. The master craftsman would take a few students under his wing and they would imbibe the craft, art or technique as they worked on varied projects. It was somewhat akin to the *Guru-Shishya Parampara* in India, where the teacher and the taught stayed together and learnt together. The arrangement had an element of trust and total submission in the relationship, which made the student imbibe the philosophy and craft of the teacher holistically. Charles Correa talks of this relationship and believes that the students learnt to imbibe every line that the master drew because the student "trusted his judgment and entered the gestalt of his world" (Correa, 2010).

This arrangement gave way to the *ateliers,* where *maîtres* would guide their *protégées* to become -- more or less- -- replicas of themselves. The pedagogy was irrelevant as there were no 'ifs and buts'. There was no room for doubt or skepticism about what was taught and how it was taught. With the coming of the relatively easy spread of information though the print media, the *ateliers* gave way to a formal system of education in arts, engineering and architecture while, at the same time, some sort of design specialisations also surfaced.

Since the end of nineteenth century, there have been many institutes imparting architectural education through a formal curriculum. The basis of imparting knowledge, to begin with, was through learning basic and advanced drawing, understanding proportions, replication of historical motifs

and adaptation of plans for the upcoming functions of the new society. With extensive infrastructure projects undertaken during the 17th and the 18th centuries, technical institutes such as *Ecole des Ponts et Chaussées,* that taught the design of bridges and roads, came up. Later, as the demand for architects grew, J.F. Blondel opened his architectural school at *Rue de la Harpe*, where he set out the precepts of composition, type and character in his syllabus. After the revolution, Durand, a tutor at the École *Polytechnique,* sought to establish a universal building methodology. He propagated the modular permutations and combinations of fixed plan types and alternative elevations (Frampton, 2007). École *des Beaux-Arts* was also established for courses in art, sculpture and architecture. In the Arts and Crafts Movement, guilds and schools promoted the teaching of painting and crafts along with the architecture curriculum.

Bauhaus, which had a more structured course in architecture, spearheaded and sustained the Modern Movement. The Bauhaus Programme was based on the kindergarten theories of teaching creativity – a trait which, by then, was considered imperative for students of architecture. The emphasis on geometrical abstraction for a "universal" design was Bauhaus' hallmark, While the aspect of psychoanalysis of space, motifs and shapes was an *avantgarde* input. To put it succinctly, thinking about design in a theoretically self-conscious way was one of the major contributions of Bauhaus to the learning in Design Studies.

The current Design Studios of architecture schools are striving to strike a balance between intrinsic creativity and the enormous information surfeit. Many disciplines like psychology and behavioral sciences have been used to improve the creative output in the Studio. The basis of the design curriculum of the majority of the architecture schools, however, remains, more or less, similar to that of Bauhaus.

3. THE BASIS OF TEACHING IN ARCHITECTURE DESIGN STUDIOS

Architecture Studio Learning is a specialised kind of education in which the basic theories regarding learning can be applied. Prof. S.A. Deshpande, in an article on architecture education, elaborates on the basic domains of learning given by Benjamin Bloom in his Taxonomy. They are:

a. Cognitive, i.e., mental skills or knowledge, which includes the recall or recognition of facts, patterns and concepts that form the basis of intellectual abilities and their development.

b. Affective, i.e., growth in emotion or sensitivity that forms the attitude and the behaviour of a student.

c. Psychomotor, i.e., manual and dextrous ability or skills (that help a student imitate and articulate), which can be enhanced through experience.

All these domains form part of the learning process in an Architecture Studio but it is the Cognitive part that has to be enhanced the most for fostering creativity. There are questions regarding how much of creativity can be actually taught. There are assertions about it being an inborn ability and not an acquired one. But, the fact that it can be enhanced is certain. The question is how.

During pre-Modern times, Architecture Design was more to do with aesthetics. Today, it is more the idea and the systemic pattern that is inculcated in a student. Many theories and practices are put forth to make the studio more creative, while keeping alive the technical and functional aspect. In a studio, provocation provides a 'creative trigger,' which then acts as a 'concept driver.' Systematic and deliberate tools of thinking can lead to creativity. Intuition and creativity are connected. While intuition is a keen and a quick insight, creativity essentially is 'Abstract Philosophising.' Creativity has been attributed variously to 'divine intervention, cognitive process, social environment, personality traits, and chance as well.' Creative thinking can be induced through 'assumption-breaking process' to discard preconceived ideas, "breaking out of the concept prison" as Edward De Bono describes it (Deshpande, 2010).

3.1 The Design Pedagogy of Bauhaus

Walter Gropius advocated a workshop-based design education at the Bauhaus. Earlier, Bruno Taut had also argued for a "new cultural unity through a new art of building" (Frampton, 2007). The concept of the Basic Course is one of the greatest legacies of the Bauhaus. It borrowed from sensory educational concepts of Friedrich Froebel's kindergarten, which was an application of Jean-Jacques Rousseau's Émile (1762), where he argued that education is the cultivation of inherent faculties, rather than the imposition of knowledge. As a consequence, drawing was adopted as a special mode of cognition in the Basic Course of Architecture in Bauhaus. Many renowned artists, teachers and architects were associated with the school, and they influenced the course through their distinct ideology. Johannes Itten, for example, used unconventional teaching methods, hoping to "unlearn" students and return them to a state of innocence, a point of origin from which true learning could begin. Wassily Kandinsky's *Point and Line to Plane* (1926) distinguishes basic elements from other elements, i.e., elements without which design work cannot come into existence (Fig.1). This universal language was derived from Pestalozzi's widely influential *ABC's of Anschauung* written with assistance by Christopher Buss (1803), and based on basic rules of perception of the form. The latter was further broken down into horizontal, vertical, oblique lines and arcs and their repetition at regular intervals, parallel or at certain angles. This helped in rationalising the form and developing this universal perception amongst the students of architecture.

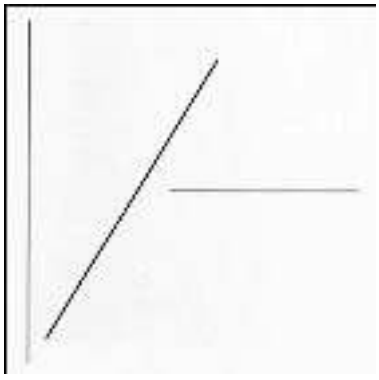
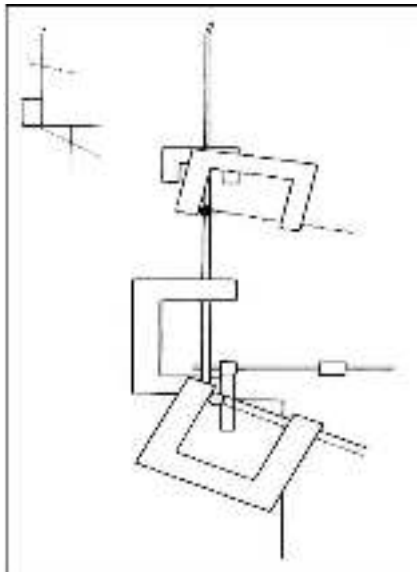
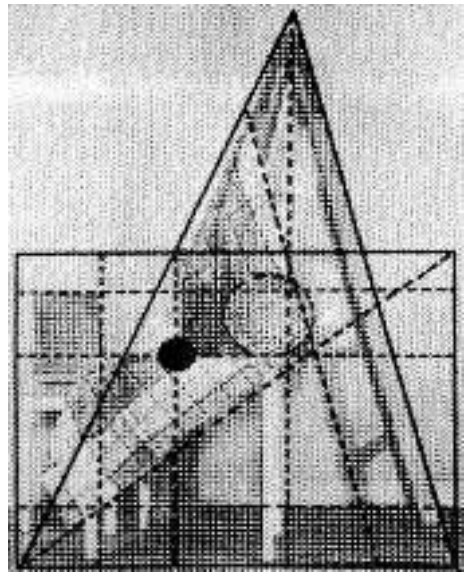


Figure 1 (Left): Kandinsky's 'Point and Line to Plane' (Image Source: Lupten & Miller 1993).

Figure 2 (Left Below): Robert Eduard Kukowka's 'Analytical Drawing of the First Stage with Schema,' 1926 (Image Source: Lupten & Miller 1993).

Figure 3 (Right Below): Hannes Beckmann, 'The Different Stages of Analysis', 1929 (Image Source: Lupten & Miller 1993).





Kandinsky's approach was to simplify and decode a Still Life Composition of clamps of varied sizes to its basic lines that were called "linear translations" (Fig.2). This translation was carried on to every aspect of the world that was given a linear expression. In another exercise, his students analysed an entire non-geometric Still Life composition in various stages of abstraction and developed a structural network to explain the tension through the grid lines that evolve and the geometry that surfaces out of the analytical translation of the composition (Fig.3). This technique of perception, analysis and abstraction became the vocabulary of Bauhaus and is still followed by most of the schools of the world. These were patterns set by teachers who were followers of *De Stijl* or *Constructivism* and were looking for a universal language of design.

The Grid was a form of structural rhythm that was considered active rather than passive and was part of Paul Klee's structural fields, which brought the background to the fore (Fig. 4). Gropius wanted to unify all arts, through training the students in crafts and fine arts simultaneously, so as to develop a common basis for all artistic production (Miller, 1993) (Fig.5). The basic course was a general introduction to composition, colour, materials, and 3-D form so as to familiarise students with techniques, concepts, and formal relationships considered fundamental to all visual expression, whether it be sculpture, metal work, painting or lettering. Abstract geometry, pure colours and their connections were used to eventually create a script to represent a visual language.
In 1923, Kandinsky claimed that:

> *There is a universal correspondence between the three basic shapes and the three primary colours. Moving from hot to cold, light to dark, and active to passive, the series is an elementary sentence in the language of vision* (Fig.6).

This language of vision was seen as a universal and trans-historical script or a graphic code, speaking directly to the mechanics of the eye as well as the brain and, appealing directly to perception (Lupton, 1993). The primary focus was on those aspects of the visual which could be described as elementary, irreducible, essential, foundational and original.

Bauhaus laid the foundation of a universal semantic ideology that, more or less, is followed with some clichés even today. However, the functional and material aspect of the course was more syntactical, such as in the case of the prefabricated houses designed by Gropius, where the basic arrangement of walls, ceilings, partitions, windows and doors were organised as a grammatical exercise. Albeit, the pedagogy was *avant-garde* for that time and had a far reaching consequence.

3.2 Pedagogy of John Hejduk in Cooper Union

In 1975 John Hejduk became the Dean of the School of Architecture at the Cooper Union in New York, where he was to develop the school's renowned pedagogy for the next 25 years. This pedagogy was different from the rest as it emphasised and addressed the inner logic of architectural language, which comprises the basic elements of architectural design. This methodology of evolving a grammar and addressing the components of design independent of the problem / issue was followed till a level where the student could find his own direction. Thus, the central components of Cooper's form-based teaching ideology -- namely, the different modalities of drawing exercises, the practice of abstract design techniques, such as the 'Nine Square Grid' problem, (Fig.7),

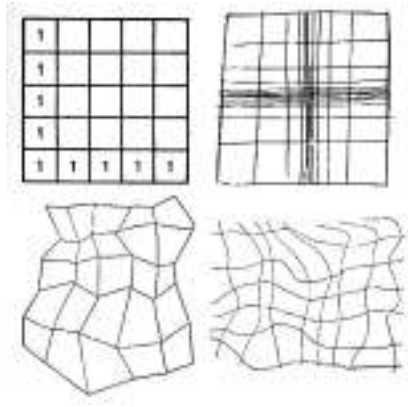


Figure 4: Paul Klee, Drawings from 'The Thinking Eye' (Image Source: Lupten & Miller 1993).

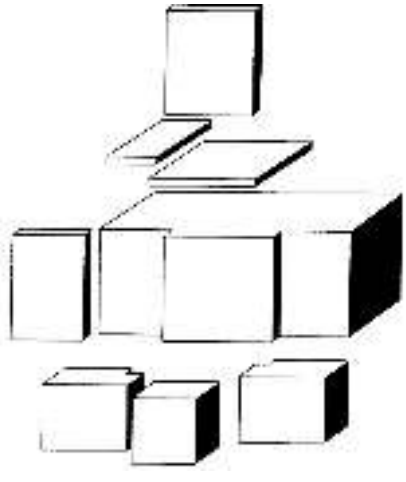


Figure 5: Walter Gropius and Fred Forbart, Honey-Comb Bauhaus Housing (Image Source: Lupten & Miller 1993).

Figure 6: Visual Sign as vocabulary of Bauhaus (Image Source: Lupten & Miller 1993)..

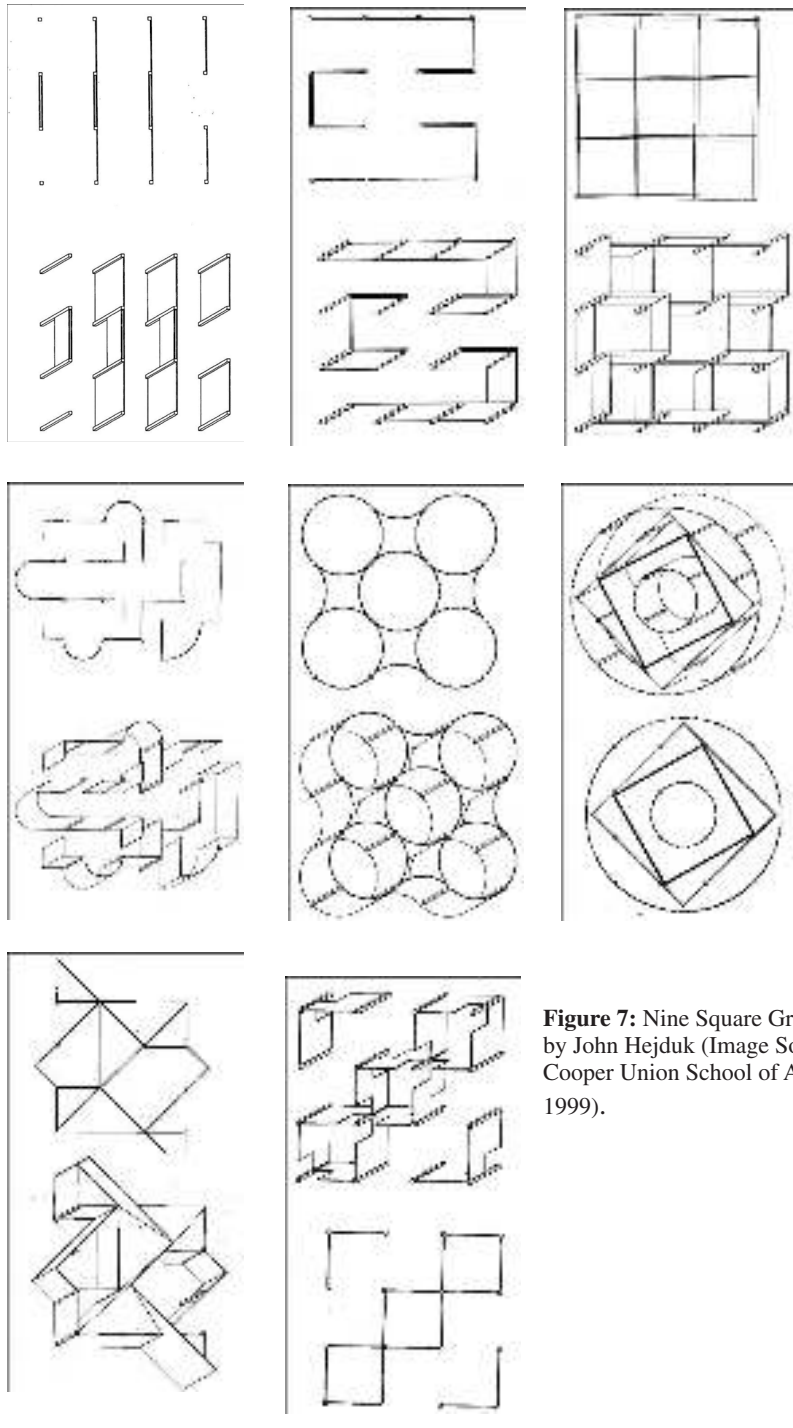


Figure 7: Nine Square Grid Problem by John Hejduk (Image Source: Cooper Union School of Architecture, 1999).

and the analytical approach to the study of historical buildings -- can all be read as a series of strategies oriented to analyse and reinforce the linguistic aspect of the bulk of architectural work. The combination of exploring the deepest recesses of architectural language through abstract exercises, together with learning from the procedural structures underwriting other creative practices, became the path along which the student would be enabled in the processing of his independent, personal voice.

Cooper's pedagogical quest for subjectivity was successful only when the resulting student designs possessed an 'uncoded' character -- that is to say, when they were devoid of clear historic references, tending towards the stripping away of recognisable stylistic codes. Only then would the work of architecture in question live up to the singularity that was written into the process of its conception (Aragüez, 1995). Edward De Bono (1970, 90), while espousing the techniques of spurring creativity gives the theory of 'Lateral Thinking,' which helps break these pre-established codes and suggests exercises to stumble or chance upon new linguistic expressions. This process generates a series of alternatives for its own sake and loosens up the rigid way of looking at things by re-structuring basic patterns and codes while, at the same time, challenging assumptions (De Bono, 1990). This is exemplified in Hejduk's 'Nine Square Grid,' where students begin to understand the elements of architecture while working on the problem (Fig. 7). They probe the meaning of grid, frame, post, beam, panel, centre, periphery, field, edge, line, plane, extension, compression, tension, shear, plan, elevation and section -- all while drawing and comprehending relationships between the two-dimensional, axonometric, and three-dimensional form. An idea of the language and the fabrication emerges in their mind (Cooper Union, 1999).

In some assignments, the students were supposed to look at the *avant-garde* artists and seek the same artistic quest to innovate through the constraints of a similar artistic space while keeping the resultant form very much entrenched in the architectural language. Mondrian tilted the frame in his painting 'Foxtrot A' giving a dynamic quality to its form (Fig. 8a). He was, thereby, able to express an implied extension of the content into the field and beyond the edges. Miller explored similar ramifications of the gesture in the Diamond Building (Fig. 8b). This is also taking from Mondrian the linguistic aspect of connoting something abstract and applying it to the architectural process.

The grammar of architecture involves elements of construction. Sometimes the project involves an actual site for the students to design and construct on. Scale models are made first and every structural component and joint is discussed in seminars and later constructed to the full scale (Fig. 9). Here, the students researched structures of wood, steel and concrete. They then

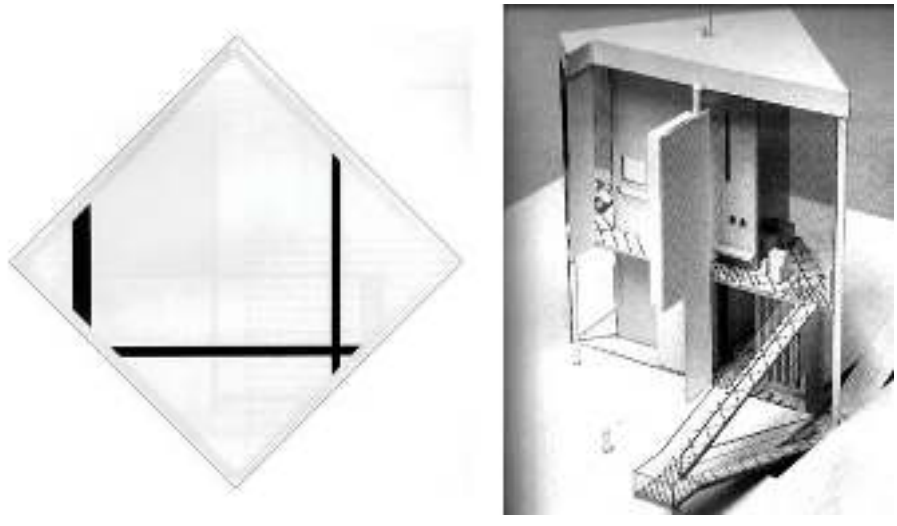


Figure 8a (Left above): Piet Mondran's 'Foxtrot A' (Image Source: Cooper Union School of Architecture, 1999); **Figure 8b (Right above):** Diamond Building, James E. Miller (Image Source: Lupten & Miller, 1993)

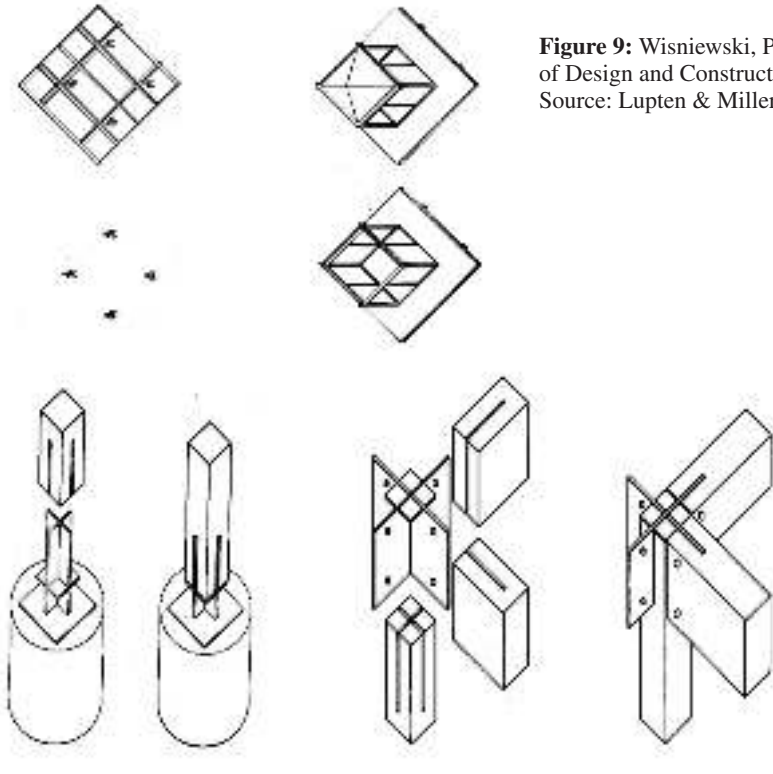


Figure 9: Wisniewski, Problems of Design and Construction (Image Source: Lupten & Miller, 1993)

Figures 10a, 10b: From Part to Whole: Exercise done in Faculty of Architecture, UPTU. Lucknow.

fabricated and erected a modular structure on the campus. It involved surveying the site, installing foundations, welding steel connections, milling lumber and experimenting with a polystyrene-resin roofing system and, finally, assembling the structure. The language of architecture gets sharpened and defined by the direct handling of materials and working hands-on with them.

3.3 Known Pedagogies in Studios by Eminent Architects

There are examples, where methods employed in disciplines such as linguistics are borrowed, even though these might be abstract tools for conceptualising, reinterpreting and redesigning architecture. Different schools, from Ulm to Princeton, became hubs for this kind of pedagogy throughout the 1960s to 1980s. Similarly, in the studios led by Robert Venturi and Denise Scott Brown and, in the pedagogy promoted during Charles Moore's tenure at Yale from 1965 to 1970, sociological techniques were imported to situate the discipline in popular and vernacular culture (Colomina, 2012).

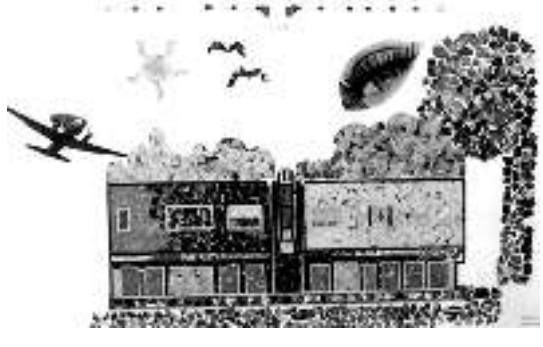
4. EXERCISES BASED ON THE SYNTAX OF ARCHITECTURE

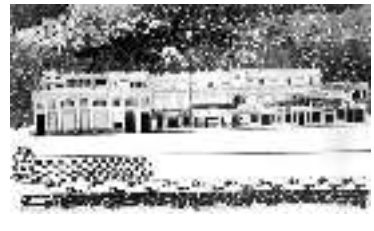
4.1 From Part to Whole and Whole to Part

This exercise helps the students, in a playful way, to understand the importance of looking at an aspect holistically as well as at a minute level. This is important as the compulsion to synthesise is fundamental in architecture. It involves a continuous and iterative process -- which goes easily and swiftly from the overall concept down to the smallest detail and back again (Correa, 2010). A small picture was cut into small squares and divided among the class. They were required to enlarge and colour their piece in any colour they wanted. The pieces were re-assembled to form a pixelated version of the original. It exemplified how an individual student's small piece, complete by itself, fitted with the rest of the scheme and formed a new composition (Fig. 10a, 10b).

Figure 11 (Left): Form and Space: Exercise done in Faculty of Architecture, UP Techinical University, Lucknow (Image Source: Author)

Figures 12a, 12b, 12c (Left): Scale in Historic Architecture: Exercise done in Faculty of Architecture, UP Techinical University, Lucknow (Image Source: Author)





Figures 13a (Left), 13b (Above): Scale in Architecture: Exercise done in Faculty of Architecture, UPTU, Lucknow (Image Source: Author)

4.2 Form and Space Conception

The idea was to sensitise architecture students to the fact that the form encloses the space inside it and the two have an intrinsic connection and a symbiotic relationship. This was exemplified in the studio by taking a papaya and sketching it from various angles and then cutting it and then sketching and colouring it again from varied vantage points (Fig. 11).

4.3 Scale in Architecture

The noted architect, B.V. Doshi, in his autobiography, remembers a meeting with Le Corbusier in Paris, during the time he was establishing the CEPT, Ahmedabad.

> *"I was travelling through Paris and I talked about starting the school. He was kind of pleasantly surprised. 'You starting a school, what would you teach?' he asked. Excitedly I opened the brochure we had prepared for the discussions and pointed out various courses in history, sociology, humanities, technology and the design studio. 'So you are going to teach all this? I did not know you know so much,' he said and looked at me rather questionably. 'But what about this?' he said while waving the 30 cm long wooden scale he had picked up from the drafting table. How True? Without a proper understanding of scale and proportions there cannot be good architecture."*

This exercise on scale is one of the first few that our students attempt. The beginning is made with historic buildings (Fig 12a, 12b, 12c). In another exercise, students measured a known place with steps and represent the same at a suitable scale in two-dimension in the form of a collage (Fig. 13a, 13b).

4.4 Deformation and Transformation through Addition and Subtraction

This exercise emphasises how a form can be deformed through colour and, how its character changes through subtraction and subsequent addition. The functional aspect of the project was added when all these formal permutations and combinations had been tried (Fig. 14, Fig. 15). Another exercise on transformation involved gradual change from one particular surface of the object to a different one on the other side. These combinations become more and more complex as the exercise progresses.

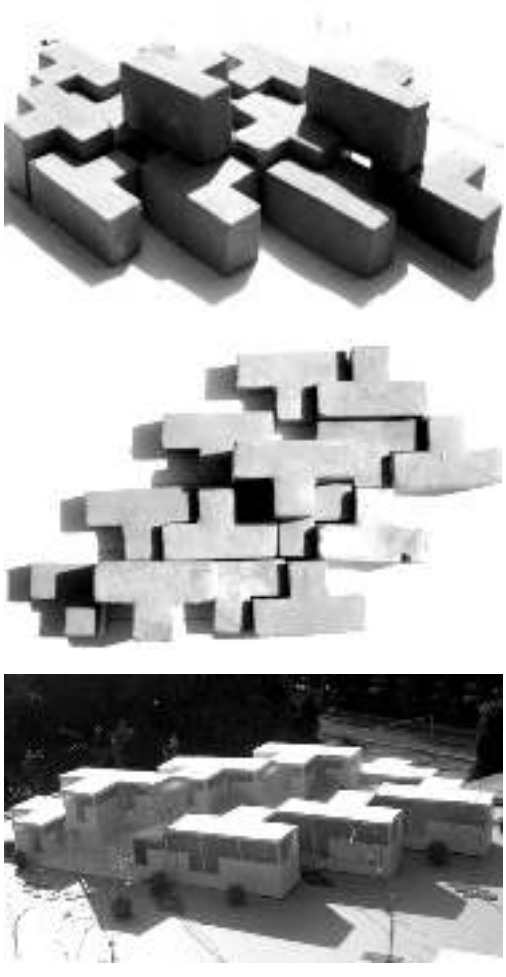
4.5 Elements of Conceiving Architectural Space

Inspired from the 'Nine Square Grid House,' this exercise was based on first selecting a few elements such as a limited number of columns, walls, partitions, roof slabs, a cylinder, a cube, etc. The students were then asked to arrange the

Figures 14 (Above and Left): Deformation through Colour: Exercise done in Faculty of Architecture, UP Technical University. Lucknow (Image Source: Author).

Figure 15 (Above): Transformation through subtraction, addition and modification of surfaces: Exercise done in Faculty of Architecture, UPTU. Lucknow (Image Source: Author).

Figure 16a, 16b, 16 c (Above): Elements and Space: Exercise done in Faculty of Architecture, UPTU, Lucknow (Image Source: Author).

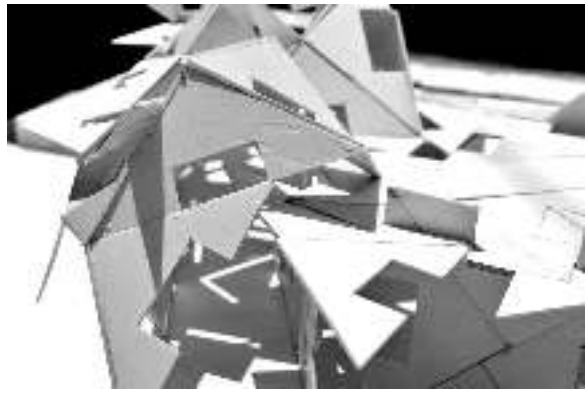


Figures 17a, 17b, 17c (Left): Pattern Building: Exercise done in Faculty of Architecture, UPTU. Lucknow (Image Source: Author).

selected elements in a Cube House to create spaces that connected horizontally and vertically. Some of spaces discovered in the compositions were results of conscious decisions, but most were inadvertent (Fig. 16).

4.6 Pattern and Space

The exercise of repetitive spaces was started with a pattern the students had collected without knowing the intent of the spatial use. The pattern was sketched, rationalised, converted into a three-dimensional model and then was further rationalised. The next step was allotting a scale to fit in a function like a school (Fig. 17).



Figures 18a, 18b (Left): Light/ darkness and Space: Exercise done in Faculty of Architecture, UPTU. Lucknow (Image Source: Author).

4.7 Light/Darkness and Space

This exercise sensitised the students as to how the presence or lack of light can change the character of a space. A module for letting in light was to be designed. This was then used in two diverse scales, either vertically or horizontally, to create a space for worship (Fig. 18).

4.8 Construction of Space

The construction of full scale structures can create sensitivity to material and also improves dexterity amongst students (Fig. 19).

All the exercises exemplify the strengthening of the syntax in the Architecture Studios and, of creating a sensibility of making, exploring, feeling and moulding space. These exercises motivated the students to come up with out-of-the-box ideas. If the linguistic aspect of architecture design is fortified through the lateral thinking pedagogy, the problem-solving aspect gets addressed more effectively.

Figures 19a, 19b, 19c, 19d, 19e (Above): Construction on campus: Exercise done in Faculty of Architecture, UPTU. Lucknow (image Source: Author).

CONCLUSIONS

As one glances at the methodologies adopted in the design studios by diverse institutes in a student's formative years, the emphasis or the influence may vary, but the pedagogy is aimed at imparting the basic language of architecture. Like any language, that of architecture has a semantic aspect and a syntactical one. The latter is the induction of the basic grammar of point, line, plane -- their meaning and consequently, their juxtaposition vis-à-vis each other in terms of scale, texture, inclination, joinery, etc. The students have to be exposed to this grammar and its traditional rules. With the basic knowledge of the language, the student not only uses it in conventional combinations or rules, but also dares to be experimental.

These rules are based on the universal design philosophy promulgated by the Bauhaus, which was further elaborated or modified by the Cooper Union. The Design Studios should aim to strengthen the linguistic aspect of design in the formative years through techniques of lateral thinking. This technique of lateral thinking is used in several pedagogies related to creative fields, where a disconnected creative activity is encouraged and later adapted to create a solution for the problem. This may result in better cognitive skills for eventually tackling the problem-solving aspect of architecture design. Newer theories based on the semantic aspects of the architectural language are also prevalent but they may be introduced at the third year level when the student is well versed with the basic grammar.

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REFERENCES

[1] ARAGÜEZ, J. John Hedjuk : The Cooper Union School of Architecture 1964 - 1985 Available from:http://radical-pedagogies.com/search-cases/a16-cooper-union-school-architecture/ [Accessed:12 may 2015]

[2] COLOMINA, B. et al. (2012) Radical Pedagogies in Architectural Education. Available from:http://www.architectural-review.com/education/radical-pedagogies-in-architectural-education/8636066.article. [Accessed:16 May 2015]

[3] COOPER UNION SCHOOL OF ARCHITECTURE (1999) Education of an Architect - A Point of View. New York: Monacelli Press.

[4] CORREA, C. (2010) A Place in the Shade - The New Landscape & other Essays. New Delhi, India: Penguin Books.

[5] DE BONO, E. (1970, 90) Lateral Thinking. London: Penguin Books.

[6] DESHPANDE, S.A. (2010) Integrated Studio Architecture Education. Spandrel, I(1).

[7] DOSHI, B. (2012) Paths Unchartered. Ahmedabad, India: Vastu Shilpa Foundation.

[8] FRAMPTON, K. (1980, 2007) Modern Architecture - A Critical History. New York: Thames & Hudson Inc.

[9] GHAZIANI, R., MONTAZAMI, A. and BUFTON, F. (2013) Architectural Design Pedagogy: Improving Student Learning Outcomes. Available from: https://architecturaleducators.files.wordpress.com/2013/12/ghaziani-montazami-and-bufton-2013-architectural-design-pedagogy-improving-student-learning-outcomes.pdf. [Accessed: 14 May 2015].

[10] LOVE, T. (2008) Observations about Contemporary Design Pedagogy. The GSD Studio scope Conference. Harvard Design Magazine.10th Anniversary Issue. Fall 2007/ Winter 2008.

[11] LUPTON, E. and MILLER, J.A. (1993) The ABC's of Bauhaus, The Bauhaus and Design Theory. London, U.K: Thames & Hudson.

[12] MCLEOD, S. (2013). Kolb - Learning Styles. Available from: http://www.simplypsychology.org/learning-kolb.html. [Accessed: 14 May 2015].

[13] PESHWE, S.A., CHAKRADEO, U. Creativity Techniques for the Pedagogical Process in Architecture Design Studios. Available from: https://www.academia.edu/4780918/Creativity_Techniques_for_the_Pedagogical_Process_in_Architecture_Design_Studios. [Accessed: 14 may 2015]