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Lateral Integration of Architectural Theory in Design Studio Pedagogy during the Early Years of Architecture Education – A Trans-disciplinary Approach

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Abstract Architectural Design studio, a dominant segment of the stipulated curriculum, constitutes the core of architecture education. It is the foremost learning environment for creative thinking, assimilated with intellectual stimulation. More often than not, lateral integration of the syllabus content is not the prevalent mode as a conscious teaching methodology. The individual courses are dealt with in isolation, with the result that their desired contribution to the final evolution of the architectural design process becomes debatable. This paper maps the qualitative and intellectual dimensions that define the integration of Architectural Theory within Design Studio Pedagogy and Mode of Delivery. Also of essence is the design engagement of the individual student, development of the conceptual framework, adaptability to typological context and, prioritising sensitivity to the site. This paper will specifically feature illustrations of the First Year B. Arch. Studio in progress at the Aakar Academy of Architecture at the time of writing this paper, thus focusing on case examples of the design-process sheets rather than the final presentation portfolios.

Keywords: Lateral Integration; Architectural Theory; Design Pedagogy; Concept; Trans-disciplinary Approach

1. INTRODUCTION

Design is a non-linear process. Adapting a mechanised or a systemic approach may not be an ideal solution in Architectural Design Studio Pedagogy. Also, the desirability of a lateral integration of subjects relating to History, Architectural Theory, Building Construction or Graphics into the Design Curriculum is open to discussion. Adequate reference to the Hidden Curriculum Concept (Salama, 2013), which stresses on the dogma of knowledge and the social practices, and which influences experiences of educators and students as a

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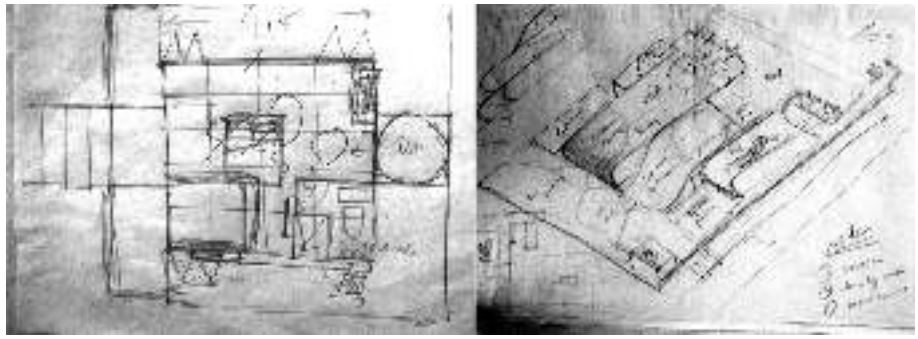

Figure 1: Progressive sketches by a student showing the evolution of his Design Concept (Image Source: authors)

part of the studio learning, may be inferred from various scholarly articles. But the concept, in itself, is open to myriad interpretations by the Studio Faculty or Studio Head. In an attempt to streamline the design process, it may be imperative to redefine the teaching approach. Of special significance here are the preliminary years of design education which are largely responsible for moulding the creative and the cognitive mind of the young student.

Design Studio educators need to lay adequate emphasis on the 'Concept' and the appropriate 'Principles of Architecture' which give a context to the design process. A strong, deep-rooted foundation during the early years of Architectural Education nurtures the architects of tomorrow, promotes lateral thinking, a keen understanding of parameters of the built environment and, and fosters a sensibility towards human needs. The Architectural Design Studio -- the melting pot of all ideologies, theories and experiences -- is where all creative processes are fashioned and ideas are structured into formal thought, even defining the architectural personality in the years to come, be it in Research, Education or Practice. A range of sub-themes in Architectural Theory could be explored to enhance innovative productivity in the Design Studio.

2. ORGANISING PRINCIPLES

Organising principles facilitate a comprehendible approach to design methodology, acting as directives. Application of organising principles into the design delineation process helps systematise the contemplative process. Subsequent to case studies, initial zoning exercises and proximity charts, Axis, Symmetry, Datum and other ordering principles present interesting design possibilities and find potential application to any typology (Ching, 2014). In an attempt to strengthen the aforesaid possibility we can explore **Fig.1**. This is an illustration of a second semester student's process sheets for design of a

residence. This exercise was conceived using 'Axis' as a pre-defining concept. A comparison of the 'Design Quotient' can be assessed with *Before-and-After* sketches, elucidating an enhanced and synchronous design approach.

Clarity in ordering spaces around the primary and secondary axes has facilitated a synchronous design approach. Collaborative efforts between studio coordinators and the student produce a synergy, which could be further enhanced and guided to incorporate technological inputs. The design can then be advanced to achieve appropriate spatial hierarchy while ensuring adherence to the specified site program. As the design brief mandates a two-storey structure, the student can further explore spatial arrangement along the vertical axis, reflecting over areas of focus at the end of axes, nodal points at intersections and, emphasis along the sides of the axes.

3. PRINCIPLES OF VISUAL COMPOSITION

A profound understanding of 'Principles of Visual Composition' allows the qualitative assessment of architectural aesthetics. These principles can find expression in the 2-D plan form, and further manifest in the volumetric spatial environment. Principles of Visual Composition such as Rhythm, Harmony and Contrast may be articulated through Colour, Pattern and other design elements, or through material expression and structural concepts.

With due respect to 'Complexities and Contradictions in Architecture' (Venturi, 1977), which discusses the contradictory nature of architectural spaces that illustrate duality in plan, early architecture education could emphasize on an underlying theme to guide the student through either a two dimensional form extruded into the third dimension, or, explore three dimensional form and environments through sketches that could be subsequently translated into plan layouts. Alternatively, depending on the individual student's creative approach, even verbal or graphic ideas could form the initial spark of the design solution. In either case, appropriate mentoring by studio faculty is required to channelise the student's thought process from the original idea into a workable solution.

Pursuant to brainstorming interpretations of Rhythm through Pattern, Geometry, Repetition of Form (Ching, 2014), **Fig. 2** reflects the student's interest in integrating irregular geometry with rhythm. The sketch illustrates Rhythm explored through irregular geometry of the plan form. The concept is further enhanced by adapting the approach to a series of sloping roof profiles which echo the visual line of continuity. Departing from the often explored concept of rhythm through repetition of predictable rectilinear or curvilinear form, the above example focuses on a paradoxical arrangement of integrating irregular geometrical spaces in a rhythmic manner, thus resulting in a harmonious composition, while avoiding monotony.

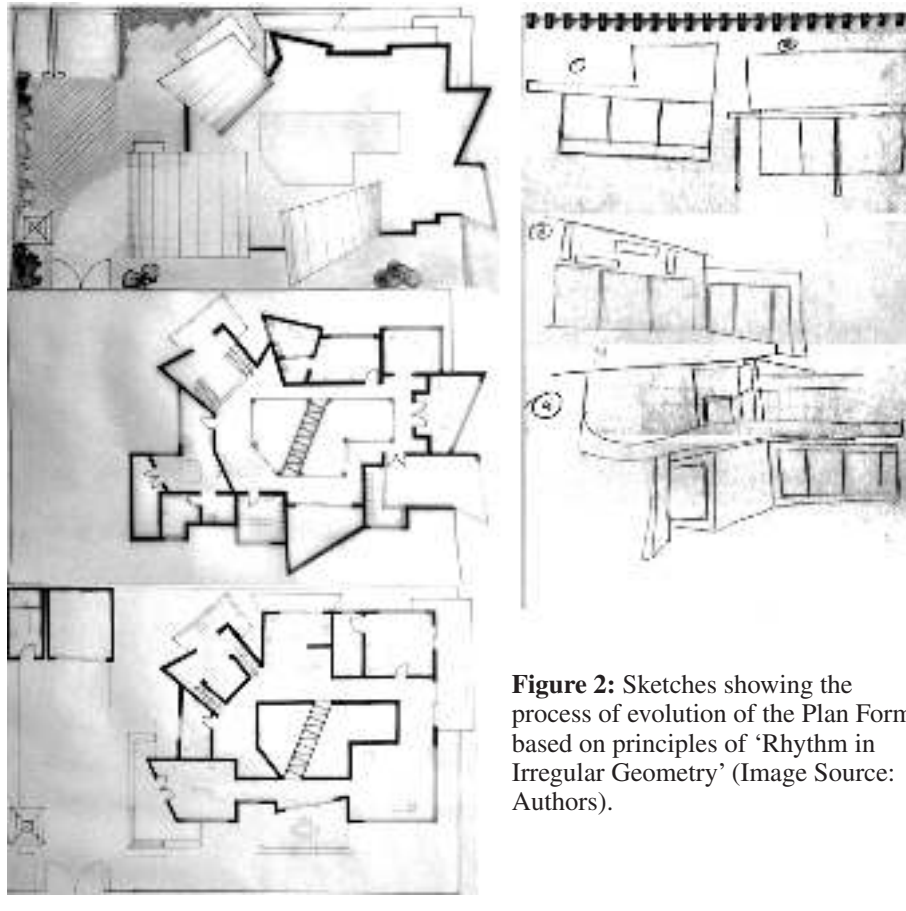

Figure 2: Sketches showing the process of evolution of the Plan Form based on principles of 'Rhythm in Irregular Geometry' (Image Source: Authors).

4. INSPIRATION FROM THE GREAT MASTERS

The curriculum of Architectural Theory encompasses a study of the design philosophy and works of various architectural legends and torch bearers. Students may also be encouraged to research and interpret their works, leading to essays on lessons learnt and application in a given design context. This methodology provides invaluable exposure to students about the influences and design sensibilities of various renowned architects. The student will also be able to comprehend the concept and reason behind the design approach.

The 'Design in Process' sketches (Fig. 3a) show the student's adaptation of the Prairie style of architecture (Curtis, 1996) popularised by Frank Lloyd Wright (Fig. 3b). The student must, in this instance, be encouraged to delve deeper into the architect's style, starting from his initial zoning and circulation

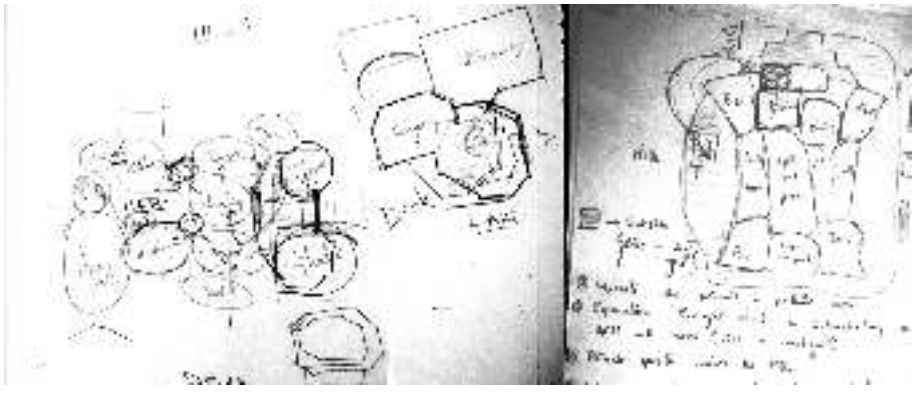

Figure 3a: Design and Form inspired by the Prairie Style of Architecture (Image Source: Authors).

Figure3b: The Darwin Martin House; Buffalo, NY built 1903-05 by Frank Lloyd Wright. Image available from: https://en.wikipedia.org/wiki/Prairie_School. [Accessed: 20 June 2015].

diagrams, and understand the spirit of his architecture. The concept here should find reflection in the initial sketch itself and not as an afterthought by merely adding external features which can be observed even by a layman.

Characterised by low horizontal lines and free interior spaces, Wright's Prairie Houses integrated structural and aesthetic beauty with sensitivity. The open interior plan form ensured spatial and visual connectivity. This layout, coupled with the low-pitched roof, created an inviting space that blended with the landscape. Prairie Homes could have any shape, subject to openness of the configuration. Hence, the student here was initially instructed to study the style in detail with respect to all influencing parameters, and then analyse its application to the given design problem.

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5. *'ISMS'* AND NEO CONCEPTS IN ARCHITECTURE

Currently, an inter-disciplinary approach is a fast emerging global trend among researchers and the academia. In a professional stream like architecture, the boundaries seem to merge and sometimes encompass parallel disciplines such as Basic Sciences and Humanities, Urban Economics, Sociology, Demographics and other such inter-related departments.

Efforts must be made to enhance students' awareness through book reviews and research-based assignments and advance their knowledge-based skills and capacity for identification of potential application. It can also help to promote critical reflection of the emerging ideologies in Architecture in juxtaposition with other current trends. Apart from various "isms" in Architecture such as Post-modernism, Deconstructivism and Symbolism, recent concepts in Architecture such as 'Blobitecture,' 'Digital Architecture' or 'Biomimetics' (Borden et al, 2008) could also be explored and applied to design methodology.

5.1. Biomimetics

'Biomimetics', an adaptation of the systems and elements of nature into architectural design while considering aesthetic or functional purposes, provides many possibilities in a design studio. Biomimetics has also contributed to the emergence of new construction technologies. The vast potential of this specific topic allows Biomimetics in itself to be introduced as a studio problem.

Many architects, from the historic to contemporary times, have drawn inspiration from nature to evolve varied aspects of design, be it planning, circulation, aesthetics and even solution for integrating aspects of structure and services. Norman Foster's Gherkin Tower, with a hexagonal skin inspired by the Venus Flower Basket Sponge is one such prominent example (Rao, 2014) (Fig. 4a). Drawing inspiration from the volute form of a shell, the student's design interpretation (Fig. 4b) involves space visualisation, including a central atrium, or a courtyard space, encircled by primary and ancillary spaces arranged in response to the required spatial hierarchy and zoning analysis. Here, the student further explores the concept of the incremental volume of space to express his design in the two-dimensional plan as well as three dimensionally.

5.2. Blobitecture

'Blobitecture', where architectural conceptualisation relates to organic and amoeboid form, can be ideated through manual sketches or digital tools. Such sculpted forms (Fig. 5a) could be adapted to arrive at design possibilities involving sectional drawings to understand pragmatic application and comprehend buildabilty in terms of construction details.

Figure 4a: Norman Foster's Gherkin Tower (2003). Image available from: https://en.wikipedia.org/wiki/Biomimetic_architecture. [Accessed: 20 June 2015].

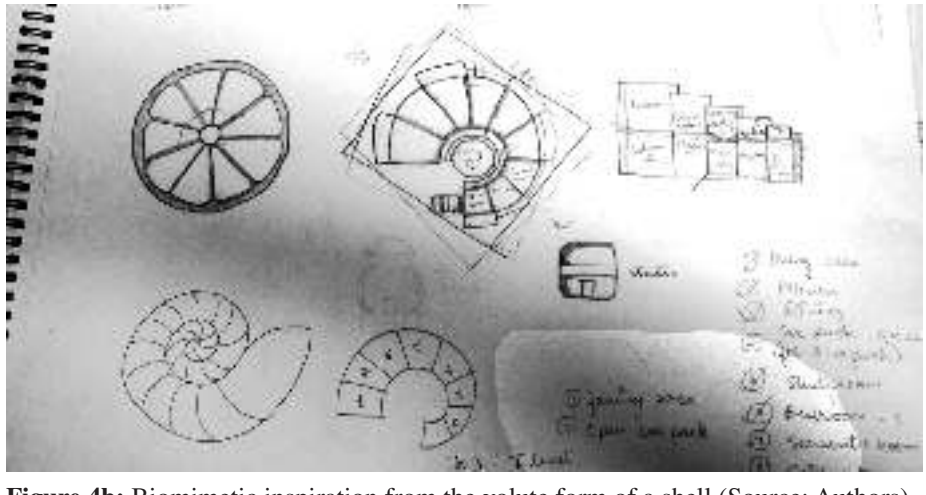

Figure 4b: Biomimetic inspiration from the volute form of a shell (Source: Authors).

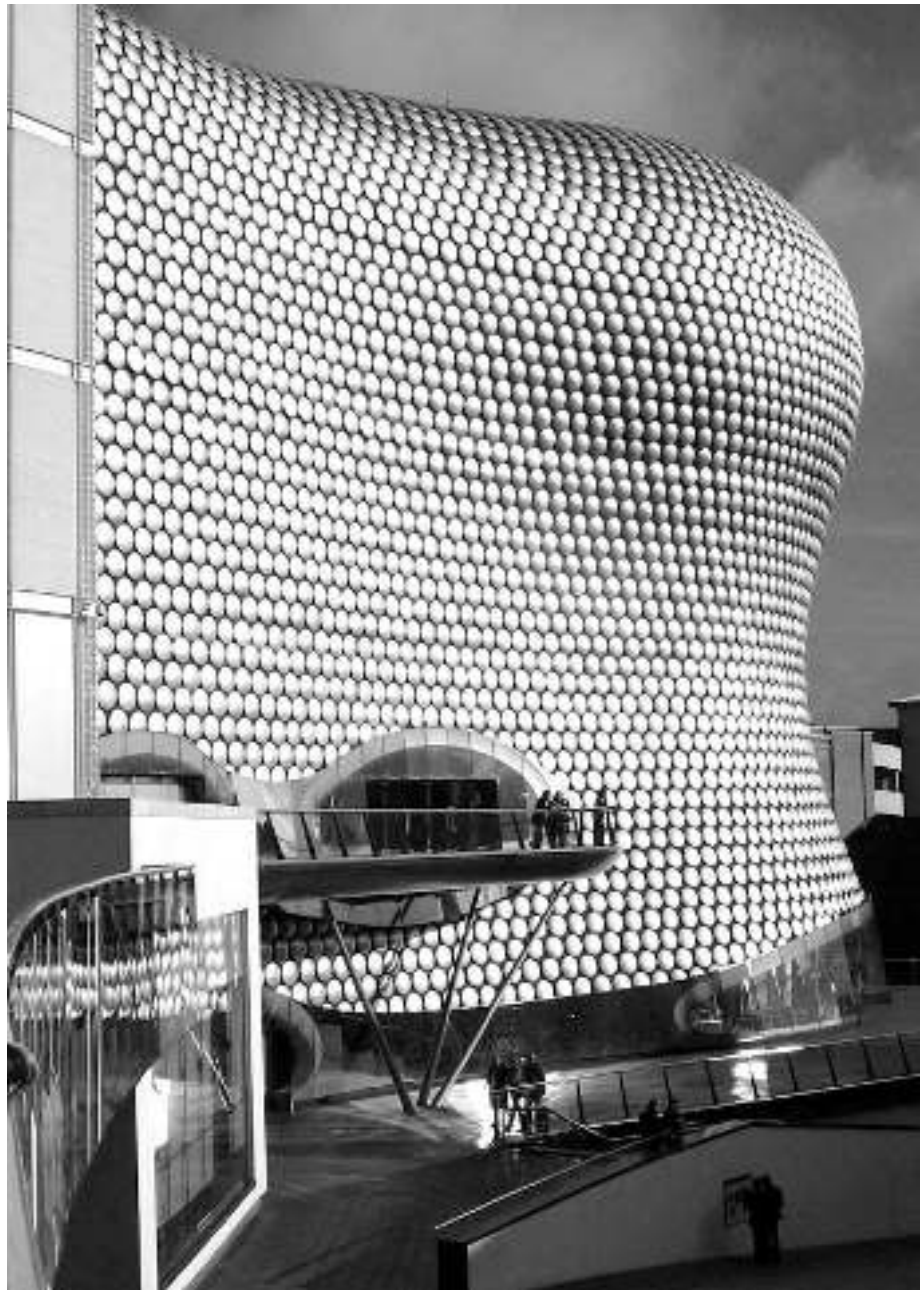

Figure 5a: Future Systems -- Blobitecture Design Selfridges Building (2003). Image available from: https://en.wikipedia.org/wiki/Blobitecture. [Accessed: 20 June 2015].

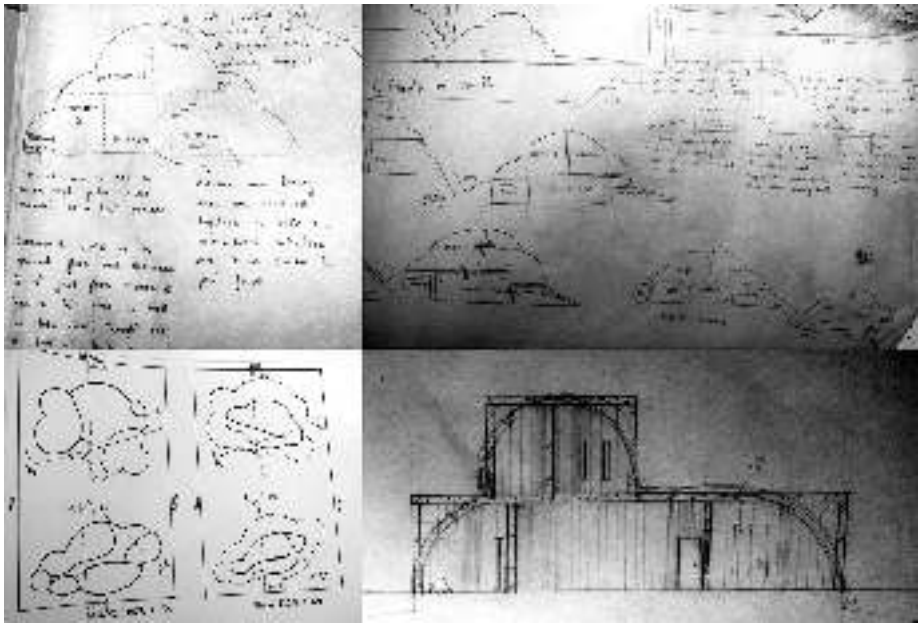

Figure 5b: Student's Blobitecture studies based on Cloud Physiometry (Image Source: Authors).

The student's design solution (Fig. 5b) involved an intensive study of the morphology and physiometrics of the cloud form followed by an analogous adaptation into the building typology. Parallel development of sketches for the resultant form, as well as the horizontal and vertical circulation networking diagrams, helped the student to evolve a comprehensive response.

The design has also been analysed to understand spaces that need to be designated to the lower and upper floors in response to residential zoning factors. Interrelationship between spaces horizontally and vertically, understanding of varying heights due to the use of amoeboid forms, also affects the structural implication and construction methodology. Sectional studies can help the student correlate these diverse parameters into the design process.

6. DESIGN VARIABLES

Design variables can also be consciously applied in varied situations where desirable outcome could not be achieved. Variables such as light, fenestrations and material selection can enhance design aesthetics. Three dimensional form study models could be used to research possibilities in terms of spatial quality.

6.1. Design Variable -- Transformation

The exercise illustrated in Fig. 6 demonstrates students' exploration of additive, subtractive and dimensional transformation of a primary cube. Application of variables, such as openings and material, helps them in understanding visual and spatial perceptions of varied built environments externally and internally. In this example, the student has attempted to understand the negative space generated through subtractive transformation. Multiplication of the same, hierarchically arranged to assign a potential function, while also corresponding to the form, has been the resultant design solution.

6.2. Design Variable -- Openings

In this exercise, the student has explored implication of various openings along different planes to comprehend the variation in light intensity with reference to wall planes and overhead planes. Openings to permit light versus ventilation air movement could be further explored in consecutive studio exercises.

As a challenge to normative thinking, design studio pedagogy should be formulated to encourage out-of-the-box solutions. The students should be coaxed to push the frontiers of their imaginative process in a sublime manner. Ultimately, an architect's work needs to be an integration of the larger cultural framework, relevant to its physical, socio-cultural and environmental context. Neglect of such integration adversely affects the design outcome, lowering the global benchmark for the built environment. The above-discussed parameters can function as design generators, further refinement of which can be accomplished through all-inclusive mentoring by the Studio Coordinators.

CONCLUSION

In conclusion, the entire exercise is aimed at building up students' early years of Architectural Education so as to focus on lateral thinking, adaptation of the abstract to promote interdisciplinary skills and, understanding the control of complex cerebral processes involving Architectural Design. The expected outcome of such a pedagogical approach in the Studio could help to formulate design processes as listed below:

a. Comprehension of Design as a collaborative process rather than a linear approach.

b. Familiarisation with a wide range of parallel issues in architecture and their interrelations.

c. Augmentation of the interpretation and integration of core concepts into Architectural Design.

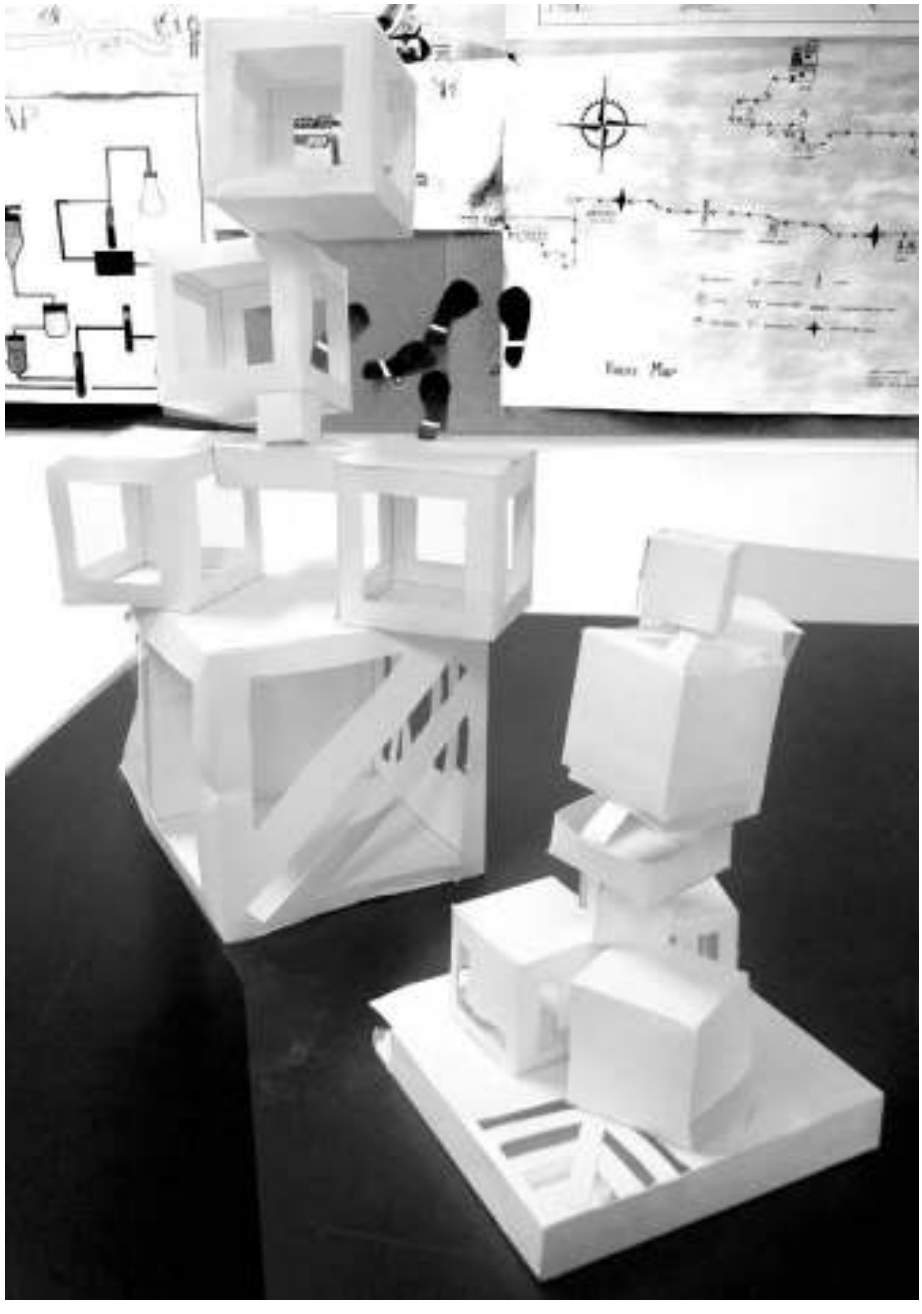

Figure 6: Study of Design Variable – Students' exploration of 'Transformations in Primary Solids' (Image Source: Authors)

Figure 7: Study of Design Variables -- Openings in Primary Solids (Image: Authors).

d. Enhancement of critical reasoning skills and their application at different stages of the design process.

e. Development of cognitive skills and understanding of interrelated parameters essential to workability of Design through programme and process.

As discussed in *The Romantic Manifesto*, "*The closer an artist comes to a conceptual method of functioning visually, the greater his work*"[1]. So it is in Architecture. The design process guided by conceptual reasoning, and adapted through varied architectural theories and inspirations, is an educational tool in the Design Studio. Pedagogy, inclusive of lateral or parallel streams and directed towards evolution of architectural design solutions through similar approaches, promotes critical thinking during the formative years, which can be augmented with increase in design complexity in the later stages of Architectural Education.

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