Integration of multi domain based learning model for enhancing design process in architecture studio

*Muzaffar Ali, #Arshi Rafique

*Architect, Educator & Co-Founder Concept & Objet House, New Delhi (India).

#Urban regenerations expert, Educator & Co-Founder Concept & Objet House, New Delhi (India).

*Correspondence - (ar.muzaffar@gmail.com), https://orcid.org/0000-0002-8181-3657

Abstract - This research paper emphasis on integration of studio learning domains, into one integrated learning model. Which is helps to enhance and develop thinking and problem solving process inside the architecture students as per contemporary social needs and challenges. The architecture problem in studios associated with technology, arts, computation, engineering, and management. Most of the time Traditional learning approaches is not enough to provide desirable solution of studio design problem. Meanwhile in each phases of design process students need a separate learning and teaching methodology to acquire knowledge from educators or from experts. The integration of learning domain and collaborative process is the only solution under one roof to provide step by step possible solution for design problem. The concept of integration in learning practice explores incidents pedagogical trends in design studio as well as enhance students learning outcomes. Also develops a positive attitude inside the young generation of architects to accept futuristic challenge of advanced architectural demands.

Keywords —Interdisciplinary Learning Module, studio learning style, Architecture design process, architecture pedagogy and studio design practice.

I. INTRODUCTION

Interdisciplinary studios learning modules play a significant role in architecture design education and process. Interdisciplinary integration with emphasis of technology is applied in the main studio of the core studies, while the design of the built environment requires a holistic, integrated change, in respect to the functions, form, aesthetic, structure, construction, and energy efficiency. [1] while the key importance of the design process in architectural education and practice is absolute based on the contemporary interpretation of architecture. An integrated approach to design may be accompanied within the cross disciplinary scope of the area, with one collective connecting elements, specifically the architectural design purposes and objective.

II. PROCESS OF INTEGRATION

A. Process

Furthermore, an interrelation of technology with architecture from conceptual design stage enhances the achievement and application of specific technological innovations, while targeting at the improvement of individual or various architectural design parameters within the holistic design perspective. In this respect self-regulating or symbiotic directions may be followed: The

integration of the architecture design visualization, structure, construction and environmental systems to form the architectural design configuration – design driven technological advancement. It scientifically examines and ventures on the rapidly emerging and developing contemporary built environment and its design challenges through both academic and specific architectural design investigations and Leading to a severe Design process in studios through the exploration of interdisciplinary Studio Learning domains.
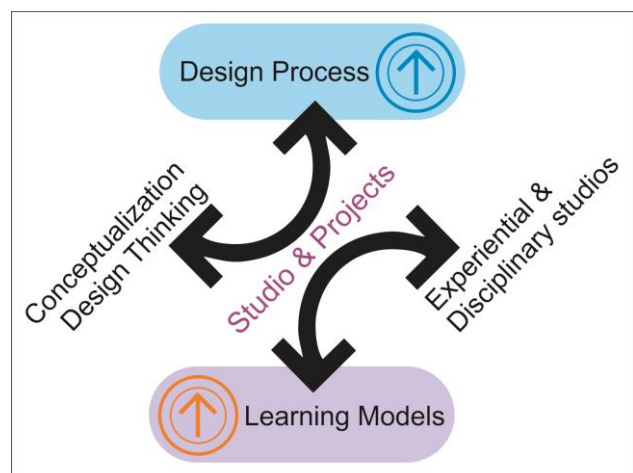

Figure 1: (Source: Author, 2018) Studio learning structure during architecture design process.

B. Development and Discussion

The nature of the design process and architectural problems are almost completely collaborative, that demanding the proficiency of individuals working together to achieve remarkable objectives. The experts including architects, and other individuals who has been involve in design process in studio or any architectural project need an interdisciplinary integration to accept the and solve the concern problem.
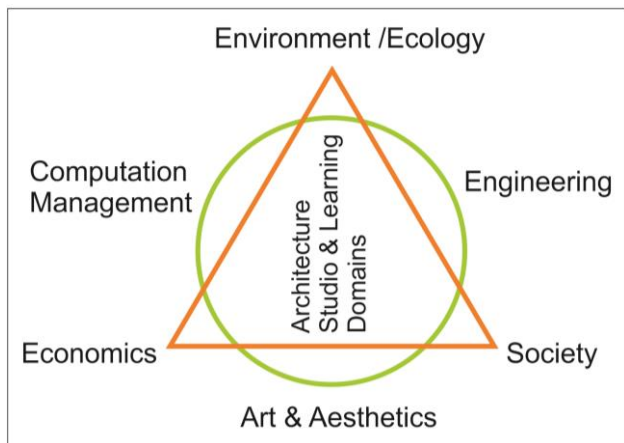

Figure 2: (Source: Author, 2018)
Interdisciplinary sub domain associated with architecture learning in design studio.

C. Purpose and Methodology

The purposes of this paper, to analyzing of an integrated interdisciplinary approaches of technology, computations and Arts disciplines associated to contemporary architecture problems. Also enhance learning culture and problem solving process in studios. Methodology of this paper mainly based on qualitative and quantitative parameters which is used to solve concern research problem. Primarily literature reviews, pre designed Personal interviews of professionals, sets of questioners, studio visits, and online survey by sets of questioner take part to solve concern research problem. For analyzing result and findings both qualitative & quantitative methods are used.

III. LITERATURE REVIEWS

Architectural history records that Vitruvius expressed his views about the process some two thousand years ago. Vitruvius [2], has stated: "architectural designing is the process of selecting parts to achieve a whole". Through the history, architects, and intellectuals have expressed some thoughts on the issue of the design process. For example, thought about the design process very much in the manner of Vitruvius, Descartes [3] developed a set of ideas for structuring some creative efforts in his Discourse on method. Following Descartes, architects such as described the process of designing as one of decomposing a problem,

solving the modules, and then synthesizing the fractional solutions into whole ones. More refer to this as the rational process. Design thinking has influenced designers up to the present time. Le Corbusier, for instance, describes a design process in very much these terms in architecture[4].

Various architects and critics, currently, recommend that the design process is a process of "learning- by-doing". They consider it as an experience of "reflection in input directly". This would suggest that both "purpose" and "perception" could play a major part in this systematic process. Design approach, therefore, is the field of study that is leading one to an understanding of these processes and of the overall structure of built environment [5].
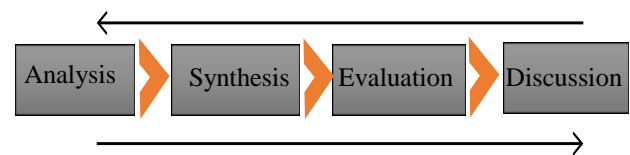

Figure 3: Iconic model of a design process (Source: Redraft by author 2018)

Table 1: Chronology of design process theories (Source: from literature reviews)

THINKERS CHRONOLOGY	DEVELOPMENT YEAR	PRESENCE OF DOMAINS IN DESIGN PROCESS				
		PERCEPTION	PREPARATION	APPLICATION	ASSESSMENT	ACTION
M. Asimow	1962		X	X		
Thornley -1, (Student Design)	1963		X	X		X
Thornley -2 (Student Design)	1963	X	X	X		X
J. C. Jones, (Design Method)	1970	X	X	X	X	X
G.T. Moore,	1970	X	X	X	X	
Guenter and Corkill, (Systematic Approach to Architectural Design)	1970	X	X	X	X	X
H. Rittel,	1972	X	X	X	X	X
John Lang. (Basic Phases of The Environmental Design Process)	1987	X		X	X	X
Geoffrey Broadbent	1998	X	X	X	X	X
RIBA,	1991	X	X	X		X

Architecture Services						
AIA, (DUERK) (Basic and supplementary Services)	**1993**		X	X		X

IV. LEARNING PRINCIPLES AND APPROACHES IN ARCHITECTURE DESIGN STUDIO

The Design Studios explores the tangible and intangible methods of design process in a cubicle surrounding. With supporting studio teaching technologies and through learning process students increase problem solving skills, design vocabulary, design technicality and project practices. The studio also improves the architectural experience by adopting studios as a diverse design creation abode and more of interchange of design language vocabulary [6]. Now day's collaborative technologies are evolved in the contemporary architecture design studio and, studios initiated to adoptive for interdisciplinary integration and more globalize. Interdisciplinary experiences change nature of traditional studio culture and push studio towards integrated culture of architecture, engineering, computation arts and building construction for optimizing design process for social need [7].


Figure 4: A systematic overview structure of leaning principle act in architecture studio

In studio students to acquire the basic requirement of design problem. Now how would students proceed to achieve this goal? Perhaps, students will present the framework schedule of given architectural problem. One by one orally and ask the students to repeat the problem's requirement with educators. There are many principles of learning act in architecture studio parallel to the design problem (i.e. Principle of effect, Principle of concentration, Principle of practice, Principle of promptness), [8] In order to understand change in performance (Skills of solving design problem) of a learner, let us understand specific and tangible behaviors which occur during the process of learning in studio; (Figure 4)In this regard the following behaviors need to be noted: (i.e. Objective focused or purposive, Activity oriented, Active Participation of learner, Performance generative, Observation, Imitation, Integration, Differentiation (analysis) - dividing the whole into parts. Integration (synthesis) - combining the parts into a new meaningful whole, repeated processes with errors, developing new relationships, Recalling, Selecting, Evaluative, Presentation to new situations and new psychological language patterns for design problem) [9].

There are mainly four principles of learning act in the design studio, i.e. Principle of effect, concentration, practice, and promptness. Principles of learning are creating relation between design studio environment and assign design problem directly. Its responsive mainly for, when educators introduce studio exercise, and after briefing the groups of students or individual students are going to show their responses toward their exercises. This could be principally responsive action of following cognitive action of students, (i.e. *Active response towards exercise, Interest and attitude, Intelligent and problem solving, Skill development).* [10]

V. LEARNING PROCESS AS MULTIDISCIPLINARY APPROACH

Architectural studio has creative active potential to develop significant professional interdisciplinary knowledge by including the allied, associated, and core disciplines. Students and educators are establishing interdisciplinary collaborative environment for creating incipit trends in architecture design & development. [11] the studio transformed from a traditional intuitive in to integrated interdisciplinary environment. Architecture design studio integrates each component of learning and teaching need i.e., design problem, working environment, the students, and educators. Therefore, an integrated approach is accordingly an alternative conception for design studio. The implementation of integrative impact over architectural studio, the result as a creative learning environment. It's
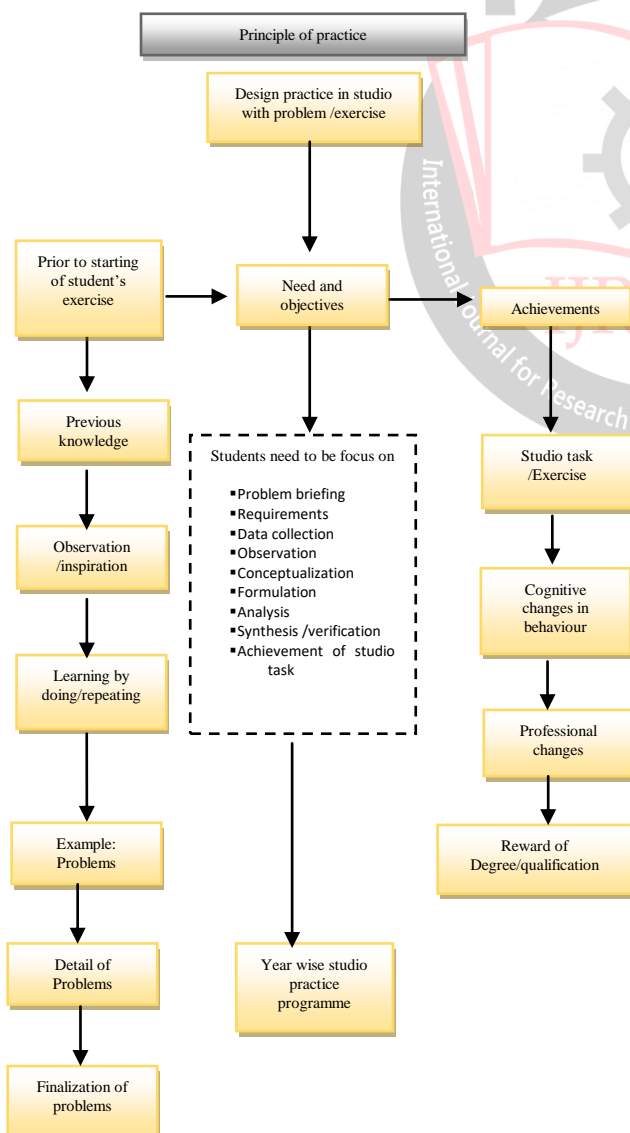
possible through just pedagogical approaches of Interdisciplinary.

The architectural studio is placed in a prime situation to become an interdisciplinary learning space where physical life problems and could be critically interrogated, discussed and debated. [12] posits critical theory as a framework for interdisciplinary critical thinking in order to the gaps between theory and practice. Interdisciplinary critical thinking however, requires students" active production of creative ideas and knowledge through integrated collaboration. This has consequences on the „design problem" which has to be able to engage multiple disciplines, the pedagogical approaches of proposed integration allow to establish an active interdisciplinary collaborative environment for design learning in studio.

VI. NEED OF MULTI DOMAIN BASED LEARNING INTEGRATION IN STUDIO

There are a number of international organizations such as the ACSA, NAAB and UNESCO which arise the issues and release charters for architectural education. However, was the only organization which proposed the solution to this educational crisis by putting a standard objective for architectural design education to mark a boundary for design education, as well as made some interpretations to find related pedagogy [12]. The charter which particularly recommended the methodological aspect in architectural design education is: *An ability of the technological application which respects the social, cultural and aesthetic needs, and aware of the appropriate use of structure and construction materials in architecture and their initial and maintenance cost.* [13], In facing the crisis of architectural integration with other subjects (Interdisciplinary), UNESCO emphasizes design studio in the architectural design teaching and divided it into three main parts: design, Proficiency /skill and knowledge; where knowledge should cover cultural and artistic studies, social studies, environmental studies, design studies, professional and technical studies. (Figure 5)
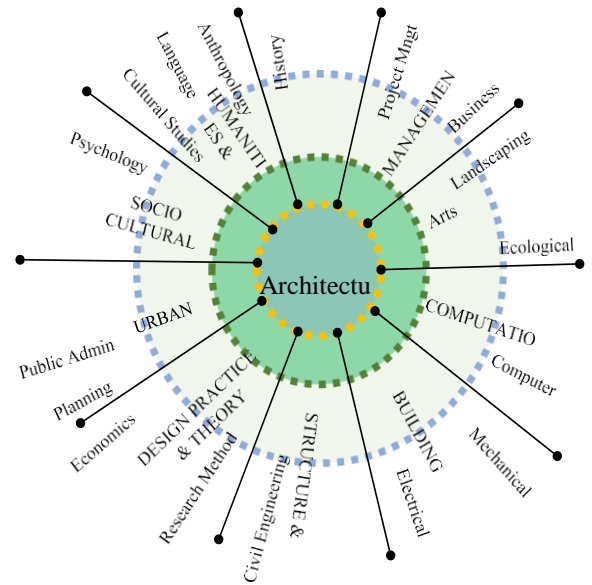

Figure 5: Interdisciplinary integration with associated with architecture domain

VII. DATA COLLECTION AND SAMPLING

The sampling and testing are offered to targeted students, educators, and professionals to collect views and perceptive of interdisciplinary integration towards learning domains. This approach bridging the gap between architecture student and Interdisciplinary in the studio. The survey and model exercise consist various questions in order of core design activity in architectural design studio. The survey question based on design & development process also required various interdisciplinary phases in order to design stages. The groups of student finish their group tasks as well as individual exercise. The survey model has several detail sectional part for students, teachers, and expertise. These sectional parts are e.g., way of design and development process, issues, and Interdisciplinary gaps.

VIII. ANALYSIS AND DISCUSSION

The sample survey and model exercise yielded many students of various colleges. Side by side the corner of expertise and professional are also submitted their valuable suggestion and options. The lower than expected response rate has been attributed to the deadline of the project being

the final day of studios. The students were asked to respond at that time. Internet based surveys typically have a lower response rate than any other method.

To collect the data for the evaluation, a study of two sections of B. Arch. Class was compared. The classes consisted of core subject at two reputed architecture institution in Delhi NCR; the classes were composed of architecture design as core subject with a total enrolment of 8+8 students (Male and Female). Each section was taught by different teachers. The study used a mixed-methods approach.

A major assignment within the subject course was the high rise commercial architecture in two deferent locations in New Delhi. As part of this assignment, a physical scale model was required. The model design, scale, and craftsmanship were the areas of grading consideration. There were no limits for material selection as long as the material reflects the visual intentions. The assignment took 2 working days (6+6 hour) of the course's curriculum. The first stage was focused on case study or data collection, the second week was focused on design concepts or design & development process, and the final day was focused on final outcome and feedback productivity of individual groups of students.

Assessment of final design productivity shown in the graph that is directly proportional to the yield of equal integration of required Interdisciplinary support in each phase of design process. That the results of final design phase having major change in terms of each phase of design process e.g., Conceptualization, sound technical knowledge with proposed space of design, intelligent visualization, MEP, and services and aesthetics services like interior, lighting, façade development and landscaping. In the other hand the team of professional in real time, followed both traditional and collaborative method for design project. So that the result much advanced and enhance design productivity. Design process actually process of creativity and collaboration. Each stage of design process need some required supplement of interdisciplinary knowledge
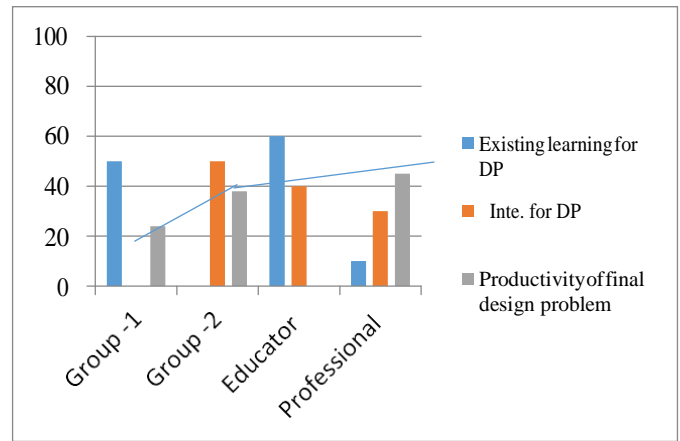

Figure 6 & 7: (Upside) Domain integration effective ness graph (Source: Draft by author 2018), (Down side) Domain adoption percentage (Source: Draft by author 2018)

IX. CONCLUSION

The design studio is the core subject of the architectural education. Therefore, it is highly recommended that the studio problem must be taken and cross-referenced throughout the interdisciplinary collaboration. That to enhance the students" understanding and learning outcomes. By introducing the Interdisciplinary approaches at an early stage of the design process, the students" would have a better perception of their design proposals and its solutions. The concept of an integration, supported by interdisciplinary domains, the studio remained necessary ways in order to develop responsive architectural solutions, However the architectural problems may be related to social, economic and environmental issues. The inclusive practice in architectural design education accordingly moved from a tradition to present responsive need, it must be defined by a collaboration which is adaptive and result oriented in response to an active design process. The integration of domains secures pedagogic approaches and collaboration and define new generation of interdisciplinary design studio culture. Which has been support a sustainable built society.

SUGGESTION AND RECOMMENDATION

After reviews of several literatures, the observation of this study recommends few suggestions to enhance and reform in design process methodology for architecture design studio.

(1)   Institutions required to establish an Active learning culture in the studio, in which knowledge sharing and quality of teaching will help to enhance the design learning process.

(2)   Each session in the studio should be based on a creative instructions' language in which students are trying to understand the comments and response through graphical and sketchy medium clearly.

(3)   Its recommended to the instructor that include philosophical overviews, and inclusiveness in studio. However, in the case of advance design problem its mandatory to discuss such concepts with students.

---
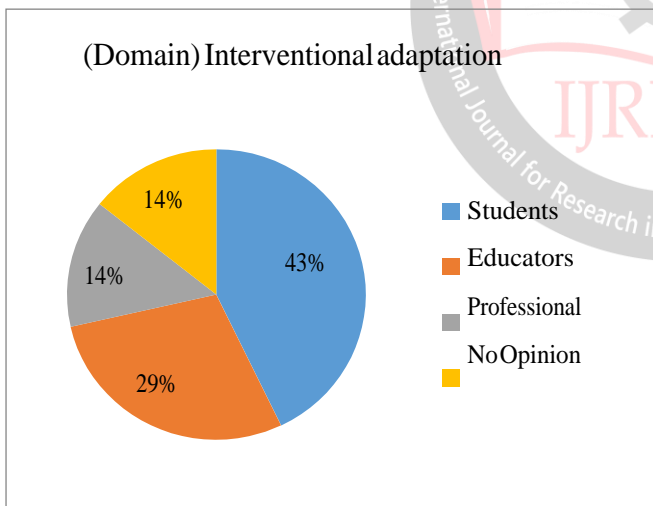
(4)   Instructor required a diverse perspective at the time of student's discussion, however, a criteria-based instruction design always provides inclusive distribution of knowledge.

(5)   Model-based integration of domains provides a quality standard and diverse leaning environment. It Will also maintain studio design productivity.

ACKNOWLEDGMENT

We would like to   thank to all concern teaching staff and students of contributor Architecture institutes, and practicing architects, for support and collaborate with us at every bit and without whom it was impossible to accomplish the end task.

REFERENCES

[1] Ashraf Salama, M. 2010. "Students perception of architecture design jury." *International journal of architectural research* 4 (2): 174-200.

[2] Glassman, M. (2001). Dewey and Vygotsky: Society, Experience, and Inquiry in Educational Practice. Educational Researcher, 16(3).

[3] Martini, K. (1996, March 21). Technologies for Teaching Design in Architecture and Engineering, University of Virginia. Retrieved June 7, 2008, from urban.arch.virginia.edu/~km6e/tti.

[4] McPeek, T. and L. Morthland, Collaborative Design Pedagogy: An Examination of the Four Levels of Collaboration, in 2010 Design Research Society (DRS) international conference Design & Complexity2010: Montreal (Quebec), Canada.

[5] Hmelo-Silver, C.E. (2004). Problem-Based Learning: What and How Do Students Learn. Educational Psychology Review, 30(4).

[6] Barkley, E., P. Cross, and C. Howell-Major, Collaborative learning techniques: A handbook for college faculty2004, San Francisco: Jossey-Bass.

[7] Duggan, F. (2004) The Changing Nature of the Studio as an Educational Setting, CEBE Working Paper series 06, Centre for Education in the Built Environment.

[8] Crow, G., & Pounder, D. (2000). Interdisciplinary teacher teams: Context, design, and process. Education Administration Quarterly, 36(2).

[9] Lentini, M. and Gay, G.K. "Interdisciplinary Collaboration Using a Hypermedia Spreadsheet", IMG Working Paper 95-1, The Interactive Multimedia Group, Cornell University, 1995.

[10] Shao, Y.-J. D., Linda; Vaughan, Laurene (1997). The Design Studio Approach: Learning Design in Architecture Education. Design Education Workshop, Atlanta.

[11] Gibbs, G. and Simpson, C. 2004. "Conditions under which assessment supports students' learning." *Learning and Teaching in Higher Education* 3-31.

[12] Kuhn, D. 2001. "Learning from the architecture studio : Implication for project based pedagogy." *International Journal of Engineering Education* 26 (1): 349-352.

[13] NAAB. 2012. *Conditions for Substantial Equivalency.* National Architectural Accrediting Board, Inc. https://www.naab.org/wp-content/uploads/2012-Conditions-for-Substantial-Equivalency.pdf.