

Collaborative Approach to the Spatial Journey- An Experiment in First Year Architectural Design Studio.

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Abstract:

An architectural design studio is a place for learning, experimentation, and exploration. Design of a built environment has constantly remained a collective activity where the architect, client, structural engineer, surveyor, service contractor, mason, and many others work together for a common goal. In the traditional design studio model, a student is expected to follow a set of design procedures like ideation, conceptualization iteration, and finalization to arrive at the outcome. He is supposed to design a built form based on context, climate, socio-economic parameters, and function using appropriate materials and technology. Often the process becomes a drudgery if the student is allowed to follow the sequence all alone. He or she may get stuck and lack motivation. But if the studio pedagogy involves discussion and an endeavor to explore rational thinking by adopting learning by doing together which may involve peer group discussion and continuous inputs from faculties, the process becomes much more interesting. A pupil studying architecture needs to cooperate and engage in design studios with his or her classmates and faculty. In addition, the students need to confederate, to achieve the objective of learning in a way that prepares them for the extremely synergistic phenomena of the architectural profession. (Crosbie, 1995; Daniels, 2002).

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This research aims to understand the effectiveness of design studios that can work in collaboration to refine every partaker's contribution to the design methodology. The research was supervised as a semester-long exercise that integrated forty-six students from the first-year Architectural Design program, at KLE Technological University, India.

The author explored quantitative analysis in the form of rubrics along with qualitative parameters like peer assessment, faculty feedback, and student response in the design process.

Keywords— Collaborative Design Studio; Design Methodology; Traditional Design Studio.

JEET Category— Pedagogy of Teaching and Learning. : Collaborative, Experiential, and Outcome-Based Teaching-Learning Processes.

I. INTRODUCTION

THESE contemporary times offer us five substantial concerns: housing, climate change, unequal distribution of resources, inclusive design, and health. The challenge for our architectural profession is its capacity to treat these consequences, and the success of an architectural design studio is its capability to relate the correlation between design and the complex

environment in which it functions. (Design Pedagogy: The New Architectural Studio and Its Consequences Peggy Deamer) A design studio is a place for ideation and conceptualization of the built form as well as the surrounding landscape based on the immediate environmental context, resources, climate, and the needs of the users taking into account the structural attributes and building services. Design studios for long adopted the Beaux-arts approach where Venustus (Aesthetics) has ruled over Erectus (Structure) and Utilitus (Function). The problem becomes more complex in the contemporary world with fragile resources, extensive use of technology, and a need to be inclusive, resilient, and sustainable than ever.

1. The Design Studio

An architectural design studio results in the ideation and graphic presentation of technical building drawings used for commencing the construction work.

Architectural design pedagogy has often been a unique proposition. From time immemorial, during the master-apprentice model to the modern project management-based practice, Crosbie (1995) asserts that; “Numerous studios deal with singular self, but intricacies of contemporary practice require collaborative teamwork”.

The design studio incorporates the students delving into an open-ended, project-based problem, and every student seeks a solution in their unique way. Students are then adjudged and appraised comprehensively based on their skills in formulating a concept or a story and its translation into correct technical drawings by a design jury, which may be a group of professionals from diverse backgrounds. Alternatively, collaborative learning is a teaching methodology that is implemented with teams of students of varying levels of understanding and capacities, and where all team members endeavor to deliver the assigned work incorporating a variety of pedagogical strategies and activities to improve their respective skills and understanding abilities.

2. Background

Collaboration is explained by Mattessich, Murray-Close, & Monsey as: “Incorporating pre-determined organizations into a novel structure with utter

commitment to a common goal”. Such relationships require comprehensive strategizing and well-laid communication networks operating on specific levels across diverse periods.

The collaborative understanding in the design studio is primarily a learner-centric approach. It bestows responsibility to everyone working together and engages them to learn better from each other. On the other hand, the instructor-centric approach, which is more common, establishes the teachers as the only source of authority and knowledge. Collaborative design allows everyone to evolve their ideas by discussing with peers in the same forum. (Collaborative pedagogy in architectural design studio; A case study in applying collaborative design, Mayii Emam, Dina Taha, Zayed El Sayad)(1)

Collaborative learning is most result-oriented and conclusive if it is integrated into a course or an assignment that has been designed to be learner-centric. During the different stages of a collaborative model, the course coordinator envisages to develop the students’ teamwork skills. This is often accomplished by synthesizing a series of group-based modules to help transition authority and responsibility to the student by achieving effective collaborative engagement in the form of interpersonal skills; group management strategies; inquiry effectiveness; conflict resolution; analysis and synthesis and inference deduction as well as presentation techniques..

The following is an analogy of traditional and collaborative classrooms.

<i>Traditional classroom</i>	<i>Collaborative classroom</i>
Teacher-centered	Learner-centered
Listener, observer	Active problem solver, contributor
Low or moderate expectations of preparation for class	High expectations of preparation for class
Private presence in the class with few or no risks	Public presence with many risks
Attendance dictated by personal choice	Attendance dictated by group expectations
Competition with peers	Collaborative work with peers

(Source: Collaborative pedagogy in the architectural design studio: A case study in applying collaborative design, Maii Emam, Dina Taha et al)

2.1 Structuring the Design Studio

The participation of students in a mutual pedagogical ecosystem determines the success of the ultimate consequence. In the conventional module, the design studio authorizes the design pedagogue to render the projects brief individually for translation into design solutions. This manner of educating requires the respective student's capacity to understand the design process and finish the task. Achieving the consequences mostly requires trial and error, which mitigates the level of productivity in the design stages. Incidentally, the collaborative approach envisages the students to go through a learning curve. This constitutes the engagement of collaborative partners to address a unified design process with individual variation rather than each team member trying to use their alternative design process. This unified process allows the students to be more constructive, resulting in a linear workflow curve.

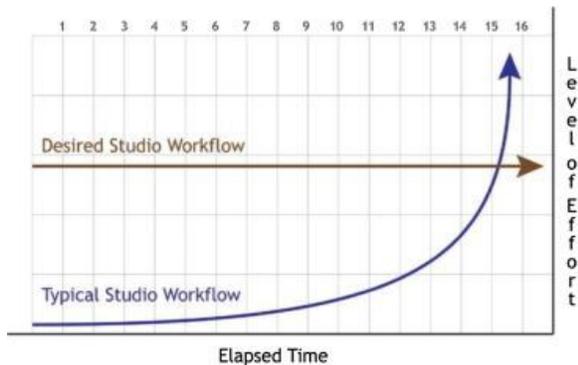


Fig 1: The Learning Curve

2.2 Project selection

Choosing a suitable project is regarded as one of the extremely significant determinants for flourishing interaction. As the intricacy of the system multiplies, the degree of inter-relationship among collaborators enhances, thus leading all members to engage effectively.

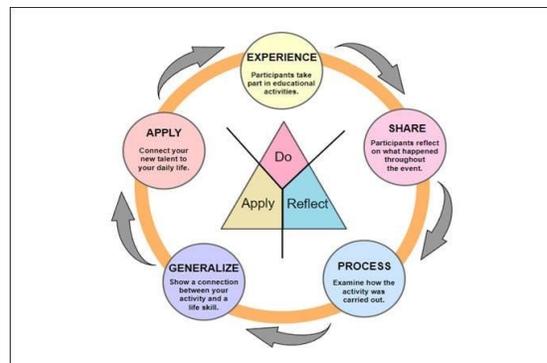
To determine a collaborative learning strategy, Bloom's taxonomy was used. It corroborates three crucial parameters that can be incorporated into design assignments. These are (1) Identification of pedagogical objectives and learning outcomes, (2) Evolving assignments in a suitable mechanism for the learner for necessary engagement, and (3) Elaborating suitable evaluation techniques to appraise pupils.

2.3 Assessment

A collaborative studio's usual challenge is an unbiased and just evaluation. Assessment of individual involvement, in addition to assessment of the compiled work, devises the elaboration of different tools and perception parameters. Alternative assessment methods may consist of; peer assessment, self-assessment, group assessment, instructor assessment, and reflective journaling by oneself.

2.4 Case Study; First-year Architectural Design Studio

The first-year design studio empowers the beginner to address the challenges of taking into consideration the context, microclimate, and place-making in a familiar socio-cultural environment, perhaps a local site addressing resolution of spaces by understanding movement patterns, anthropometry, function, elements of space-making and the gradual transition of built semi-built and un-built spaces. The process begins by understanding the site, developing the design program,

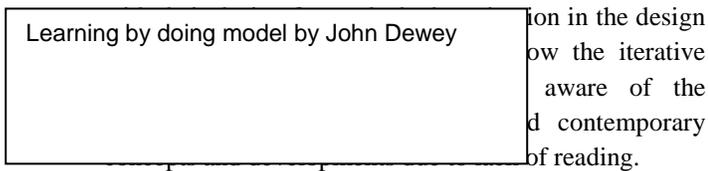


case studies of similar built forms, understanding the context, site planning principles, and zoning, pre-design including bubble diagram and proximity analysis, concept formulation, refinement, and development of architectural drawings. Exploration and experimentation through model making and playing with forms were adopted as a methodology for the first-year architectural design studio. This also involved discussion on space usage and quality of space, integration of nature and

natural forms, quality of light and ventilation in a built space, the importance of inclusive and sustainable design, proper integration of material and services, and learning correct graphical presentation.

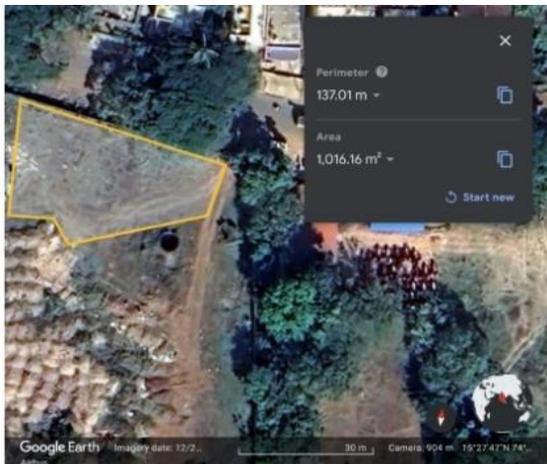
However, during the adoption and implementation of the process, certain constraints were experienced in the design studios. Sometimes the students were lured by fancy visual expressions forgetting the structural and functional context. They lacked visualization and figurative understanding, got stuck and over-regimental

Fig 2: John Dewey Model.



The design studio model adopted thus was a collaborative and shared learning process. The students were given targets and tasks at the beginning of each session following a discussion with them, and after accomplishment, a discussion with peers and faculties would set the next targets. The tasks would involve case study and analysis, zoning, understanding the layers of solid and voids, massing, parking, landscape, mobility, anthropometry and activity chart, site analysis, concept and form development, bubble diagram and proximity chart, space-making elements, space matrix chart, etc.

The motivation level was kept intact by adopting many learning by doing exercises like surface development to form blocks and playing with them to arrive at interesting forms. The resultant configuration would



then be tested for satisfying circulation and other functional parameters.

In the learning-by-doing model adopted by John Dewey,(fig.2) every activity is reflected upon and is related to a life skill. This was adopted in the design studio too in the form of peer-to-peer discussion and learning communication both visual and verbal.

The concept formulation was ideated by encouraging their ability to form a storyline, ability to answer clear, precise, and thoughtful inquiries in a logical progression, ability to transform abstract ideas into solutions(Concept to design sketches), and ability to test alternatives against each criterion and standard (Design alternatives)

The students were grouped based on their skills and area of interest. The skills included sketching, rational thinking, communication skills, technical understanding, creative thinking, drafting, and three-dimensional visualization through model making.

The outcome was encouraging with students enjoying the process of design leading to interesting forms and comprehensive and functional spatial output

3. Methodology Adopted

The architectural design operations comprise seven stages: pre-design, schematic design, design development, building documents, construction license, bidding and negotiation, and construction management. Out of them, pre-design, schematic design, design development, and drawings are dealt with in the first-year design studio.

The design development stage consists of pre-design, schematic design, and final design. The collaborative learning mechanism was adopted in these stages as follows.

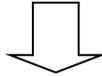
The program was an Art gallery and exhibition center with both visual and performing art getting displayed on a site of approximately, a thousand square meters. The journey started by referring to literature and visiting similar life sites. They visited the Gangubai Hangal Dance Academy in Hubballi.

Pre-design: Understanding spaces through live case study (Understanding various design layers on site)

Literature case study

Zoning, understanding the layers of solid and voids, massing, parking, landscape, mobility, anthropometry and activity chart, site analysis, concept and form development, functions

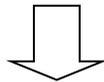
Fig 3: Site Location.



Schematic design: Design Development (Site analysis and zoning, bubble diagram and proximity chart)

Form and function

Exploration of form and its synergy with function, Testing spatial configuration with functional clarity



Final Design: Finalization of design (Iteration till functional clarity is achieved along with aesthetic and structural requirements, development of drawings with correct graphical presentations and line weights.)

In the pre-design stage design juries led to peer-to-peer discussion followed by an intense brainstorming session and demonstration by faculties on form development. Also, a vertical studio in the form of a workshop across various cross sections of the students was organized where the senior students aided the development of ideas and presentation skills.

4. Results and Discussion

The design studio which spanned over three and a half months expected the students to come up with the site plan and entire building drawings of an art Gallery and exhibition center in the renowned art district of Dharwad, North Karnataka. The process involved contextual analysis and developing architectural design solutions. Although the delivery was individual design solutions the case study and analysis as well as the site analysis was done in groups. The individual design solutions were also validated after peer review and

three-dimensional visualization and analysis with the help of software and physical study models.

The faculty also elaborated on the process of developing sample models and understanding the aesthetic and design principles by adopting a workshop-based model in the studio.

Thereafter the students were able to analyze the required functional and structural benchmarks and come up with their solutions addressing the parameters of design requirements holistically.

The students had more sense of ownership and were proud to display their design outcome as it emerged from a series of discussions and adopting the learning-by-doing model. They enjoyed the various stages of the process leading to better solutions. The design parameters obtained were much more mature and were able to address the spatial, aesthetic, and functional



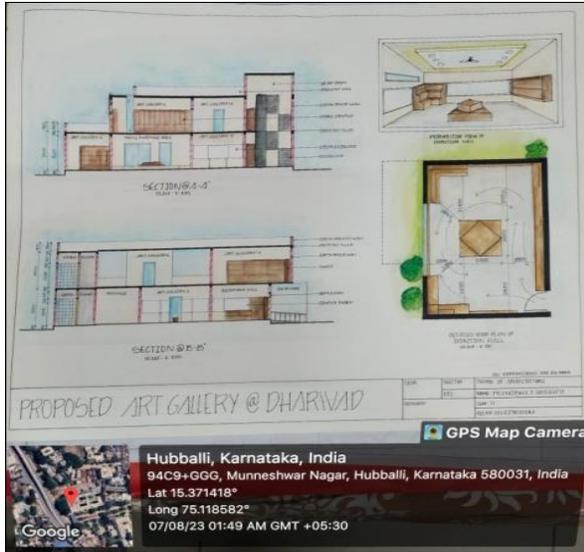
attributes more cohesively.

Fig 4: The Design Studio and conceptual drawings



Review	Deliverables	Total marks	Tentative submission week
Review 1 (Case study and analysis)	<ol style="list-style-type: none"> 1. Selection of appropriate case study 2. Understanding spatial planning 3. Understanding principles of design 4. Study of material and structure 5. Design concept 6. Comparison to standards and inference 7. Understanding spatial design concerning user needs 8. Ability to interpret information (Inference) 9. Inferences applicable to design 10. SWOT analysis 	10	11.04.23 -22.04.23
Review 2 (Design process and design development)	<ol style="list-style-type: none"> 1. Understanding of human scale, appropriate proportion, and space-making elements 2. Data collection and analysis of functional requirement 3. Principles of design 	15	02.05.23
Review 3 (Complete architectural drawings)	<ol style="list-style-type: none"> 4. Structural concept and material behavior 5. Ability to form a storyline 6. Ability to answer clear, precise, and thoughtful questions (Logical progression through sketches) 7. Reaches well-reasoned conclusion (analytical skills) 8. Ability to interpret information (Inference) 9. Ability to transform abstract ideas to design solutions (Concept to design sketches) 10. Ability to test alternatives against each criterion and standards (Design alternatives) 	15	22.05.23
Review 4 (Final Presentation Drawings)	<ol style="list-style-type: none"> 1 Final Architectural drawings Site analysis and site plan Floor plan with details Sections(2) Elevations(2) Models, views 	10	14.06.23

Fig 5; Students' Works and Rubrics



culminating in the probable location of built forms and landscape design. The site planning was arrived at by superimposing various images together with the intersecting parameters leading to the most optimum solution.

The bubble diagram and proximity chart also led to site zoning. Thereafter the built forms were finalized after discussion and three-dimensional analysis.

Once the built forms were finalized the movement pattern, influx of visitors, accessibility for the differently-abled and sustainable design principles were adopted for functional and spatial design and also the details of activities within each space were enacted in class so that the students get an idea of the real life situation. This helped them to understand the spatial context better. In this methodology of learning by doing through sketching, analyzing, and form development, which has been referred to as methodology 1 (M1 in fig. 8,9,10, and 11) the students learned and enjoyed much more as compared to a conventional design studio approach referred to as methodology 2 (M2 in fig.8,9,10 and 11) The overall performance of the students is shown in the mentioned graphs.



The peer-to-peer evaluation model was as follows. The formulated groups were evaluated through discussions with each other and also with inputs from the faculty, and the resultant experience of the class average was computed on a nominal scale of five-point rating.



Fig 6; Students' Works.

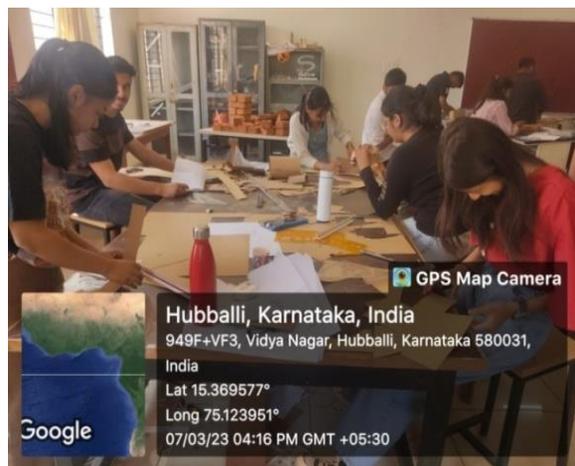


Fig 7: Collaborative Teaching Methodology.

In the pre-design stage, the students explored site zoning through contextual analysis, climatic analysis, SWOT analysis, bubble diagram, and proximity analysis

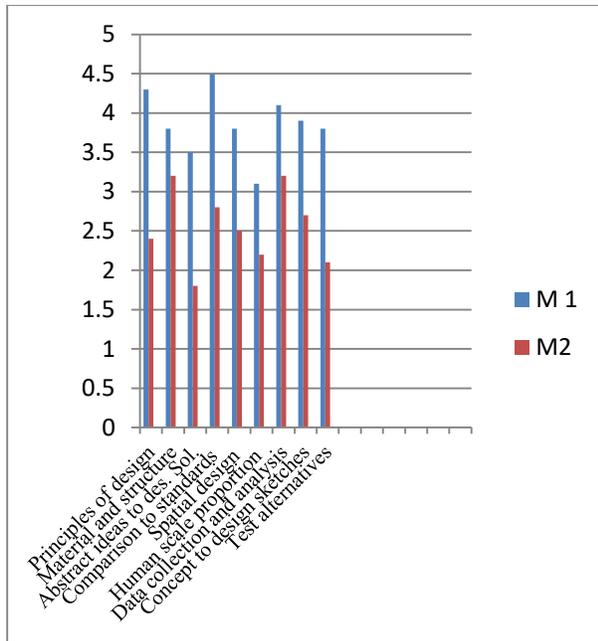


Fig 8: Faculty evaluation model based on Rubrics

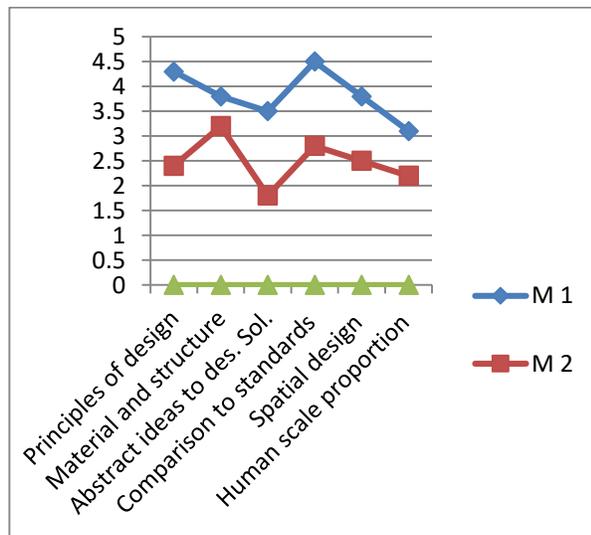


Fig 9: Peer-to-peer evaluation model

The student response was corroborated by evaluating their experience on a scale of one to five in Methodology 1 and Methodology 2 considering the class average. (Referred as M1 & M2 in Figures 8, 9, 10 & 11.)

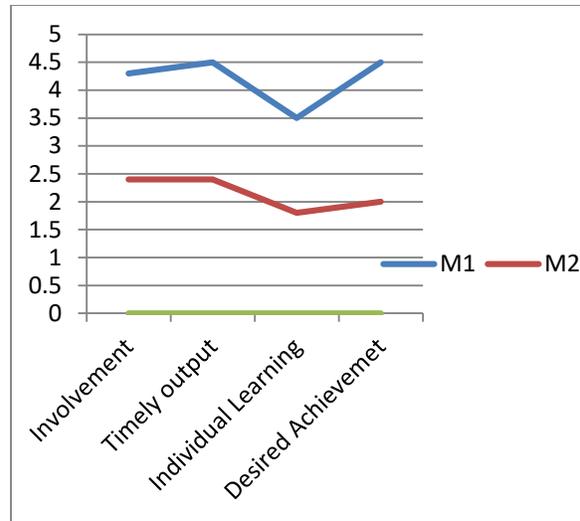


Fig 10: Self-assessment model by student

The collaborative methodology was analyzed concerning the traditional studio methodology and it was observed that the project delivery in the first case was much more diverse in output, creative, and timely. The students enjoyed the process and the benchmarks were decided after group discussions.

Also as evident in the graph, the students' ability to form clear, precise, and thoughtful inquiries increased much more in the first methodology of learning by doing. They could visualize better and were able to find out their mistakes faster so that an iterative process could be adopted for rectification and finalization.

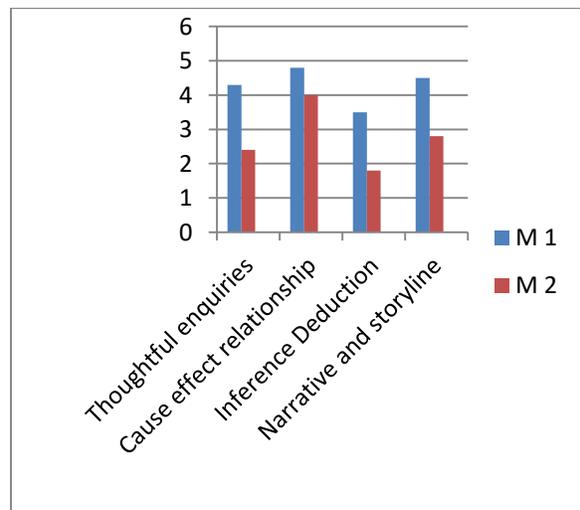


Fig 11: Evaluation of learning outcome

Also, the design output in terms of functional plan, integration of material and structure, following principles of design and aesthetic requirements, study of proportions, and analysis of site context were achieved with a much deeper understanding following this methodology.

5. Conclusion

A collaborative studio adopting a learning-by-doing ideology involving playing, understanding, rectifying, and implementing can make the process of teaching-learning interesting not only for the students but also for the teachers who can experiment in various capacities and dimensions to achieve the final goal.

The results have found that the methodology is efficacious in educating students on the process of design in a cooperative ecosystem. Additionally, it signifies that the collaborative assimilating approach is a tool to increase motivation and creativity and help them form clear, precise, and thoughtful inquiries. Additionally, it encourages students to accept learning and form the ability to understand cause-effect relationships as well as formulate valid inferences. The inquisition has established that the learner-centric blueprint has emphatic consequences on the student learning capacity.

Thus, identifying the problems in learning and trying to address them with an innovative and collaborative teaching methodology, helps to improve teaching methods and learning outcomes.

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