



**INTERNATIONAL JOURNAL OF CREATIVE
RESEARCH THOUGHTS (IJCRT)**
An International Open Access, Peer-reviewed, Refereed Journal

INVOLVING INQUIRY-BASED & REFLECTIVE PEDAGOGICAL APPROACHES IN ARCHITECTURE EDUCATION

Ar. Sadaf Haleem Khan

M.Arch [Architecture Pedagogy]
Faculty of Architecture & Ekistics,
Jamia Millia Islamia University, New Delhi, India.

Abstract: The study is focused on the combined use of Inquiry based & Reflective pedagogical approaches in complex theoretical lectures in Architecture to gain maximum learning outcome of the learners as Inquiry based Teaching is an excellent path for achieving a goal based partly on the philosophy that “Humans are born Inquirers,” the method focuses on student discovery over pushing information from the instructor. Along the way, the students explore multiple sources and contexts, ask questions and pursue hypotheses, and work to apply their theories to new and diverse situations. In doing this, they actively discover the interrelatedness among concepts, topics, and theories. Inquiry-based approaches are intended to foster critical thinking. By supporting students in their initial Conceptual explorations, more in-depth analyses, and synthesizing processes, these pedagogies deepen the students learning. The next and extreme step of inquiry based teaching leads to Reflective Teaching where self-analysis and evaluation play a very important role. The study will be following empirical approach and will incorporate only direct or indirect overview over Inquiry Based & Reflective Teaching Approach towards the students of B.Arch 1st Year and the focus will be on the complex theoretical classes; the concepts of which in Architecture students find quite inconvenient to understand.

Index Terms - Active Learning; Architectural Education; Conceptual; Facilitator ; Inquiry-Based Teaching; Pedagogy.

I. INTRODUCTION

As per the Latest research 2019 Researcher Sibel Acar in his study suggested that we humans have a tendency to get to understand that for complete understanding of design correct merging of technical information (basically in terms of structure ; material & technology)along with style studio categories is extremely abundant needed .Students are educated with technical subjects like structure ; construction etc.. in their syllabus however “while they’re combating calculations; fail to grasp the that means of all this information to A style.” As per the author whereas teaching technical subjects; theoretically to the scholars , information received cannot be perceived in terms of style or its Application.

The analysis provided helps the scholars in developing understanding of structure / materials and technologies and the way to use all three in their style. Thus the author concludes that the utilization of other education approaches could integrate study style with technologies by providing many examples within the paper in addition as conducting experiment with structure within the room setting.

II. VARIOUS PEDAGOGICAL APPROACHES

Avci Ozan also in 2019 tries to demonstrate his subject field teaching expertise that he have come through taking his students to totally different parts of the town and tries to show that state of affairs into studio setup whereas taking privilege of the encircling a part of the town to create his students perceive the complete thought which he's attempting to show .In order to link Perception with universe live setting he used this sort of education Approach. The analysis explained that in learning our different senses conjointly play effective role and in construction he demonstrates the technique as he converts any random a part of the town into a studio and build students perform the room actively.

The scholars acted sort of a flash mob during this whole activity and locals conjointly gets interested in them and want to take active part in discussions and lectures which facilitate correct understanding of the thought / theory.

Earlier in 2012 an analysis was conducted by Catherine Wetzel within the Illinois Institute of technology by the investigator for the amount of six years within which the education approach of desegregation Structures with style studio in first year of Masters was worked upon. Many giant scale structural models were being created by the scholars underneath the direction portraying correct usage of structural members and systems within the models that facilitate proper understanding of the structural style in students .Apart from the Analytical skills of structure needed by the engineers. The scholars World Health Organization have participated during this program in their 2d semester have proven larger success in their third semester yet as in their Masters Project compared to the last batches. 138 students have completed twenty six comes of various scope / quality / material composition & structural designs . The analysis was initiated keeping in mind the read of Mario Salvadori (acclaimed structural engineer & educator).The aim of the program was that the scholars ought to be ready to perceive the language of engineers & succeed data of advanced structural ideas in an exceedingly restricted time by providing them probability to develop visual knowledge of structural style.

The study performed by Wei Li in 2018 in Huizhou ; China Aims at integration practices of branch of knowledge style teaching with cooperative branch of knowledge history teaching that has been quite separated because of presence of varied previous philosophies. The author offers numerous philosophical evidences that shows that there exist a desire for an innovative integration education approach which may be a part of these separated inter-dependent tutorial subjects. Because of totally different philosophies on program, teaching ways, branch of knowledge style teaching and architectural history teaching are long separated, that semiconductor diode to a disjunction between theory and follow. A replacement teaching approach supported integration and system improvement of branch of knowledge style and architectural history is extremely demanded, that is of nice significance to teaching. Research worker projected new teaching Approach within the college of design and applied science, Huizhou University, China . By coming up with whole Teaching components ; Teaching Procedures and Teaching Methodology. The aim of the program was that the scholars ought to be ready to perceive the language of engineers & bring home the bacon information of complicated structural ideas in an exceedingly restricted time by providing them likelihood to develop visual knowledge of structural style.

Another research in 2017 by Prof. Neha Kolhe focused on the usage of audio-visual aids and other modern teaching methods / softwares in order to enhance

- Memory Retention ;
- Attention Span ;
- Comprehension ;
- Better & deeper understanding of Concepts.

According to Kolhe teachers must also use softwares like 3-D max / Rivet. etc. to demonstrate the Joinery details ; Complex Construction concepts like trusses / flooring etc....Teachers can also make CDS of these modules and keep up in libraries which could be further utilized by students & other teachers while delivering their lectures for enhanced understanding .The survey performed was not such reliable and the author has limited the study to be only software oriented and the use of 3-D MAX was much focused upon.

In 2018; The research based on the works of Aigerim Mynbayeva and other Kazakhstani ; Russian and Foreign Scholars on Didactic; UNESCO recommendations on the developments of teaching Strategies and discusses about the result of practical study on the use of innovative teaching methods by teachers. The study is perform to understand that how much do teachers take a positive attitude to innovation ; accept them and improve their skills. The results of the survey performed in the research help us to understand as how dynamic is the improvement of teachers 'pedagogical skills and mastering of innovations in teaching or do teachers like to upgrade their own pedagogical skills. A comparison is performed based on the work of other Russian and Kazakhstani scholars as what are the changes Pedagogy as come across while moving from 20th Centaury to 21st Century .By keeping in mind the authors perspective further latest pedagogical innovations can be compared from previous ones and their merits and demerits on the curriculum and the students can be analyzed further.

One of the different Pedagogical Approach in Architecture Pedagogy was introduced by Chad Schwartz in 2014 who defined Design/build as a classification of architectural study in which students generate a conceived design and actively participate in transforming that design into a real structure or space.“In some cases, design/build involves small structures built in and around

the school; in others, the students spend weeks or even semesters living and building in places very remote from and very culturally different than their university classroom. In all cases, however, these courses involve the hands-on making of place by the students participating (Schwartz, 2014).”The first project involved the exploration of wood joints. The joints, built from 2x4s, were inspired by connections found in the students 'everyday life (doorknob, necktie, bra strap, etc.).The second project was the design/build component and the subject of this paper..The third project centered on the generation of a small set of BIM manufactured construction documents for a single family residence. Each group completed the design of the wall, generated a parts list from their design, created a cost estimate from the parts list, and, finally, developed a storyboard detailing the construction sequencing and scheduling. After completion of the construction project, each group was required to submit a photo narrative of the process. The course took 3 yrs [2012-2013-2014] including 3 different batches. The course is offered in 2 programs Architecture and interior design . The motive behind the course was to create understanding with wood joints .The course took [2] one hours lectures & [2] 2 hour Labs. Design/build projects operate in the real world of material and assembly. Each group paid for their own construction, which averaged around 300-400 dollars after a generous discount provided by a national home improvement chain. The phenomenal work coming out of the established design/build programs in this country is the result of strong leadership and vision, positive relationships, and hard-working students.

2.1. Previous Research Analysis

Tab. 2. Earlier Researches on Inquiry-Based Pedagogies [Source : Author]

| RESEARCH PAPER | AUTHOR | REVIEW | FINDINGS | RECOMMENDATION /GAPS | COMPARITIVE ANALYSIS |
|--|--|--|---|---|---|
| [1] Alternative Pedagogies integrating architectural design and technologies [2019] | Sibel Acar [Department of Architecture ; TOBB University of Economics & Technology ; Ankara, Turkey] | <i>Through this paper we get to know that for complete understanding of architecture proper merging of technical knowledge (basically in terms of structure ; material & technology) along with Design studio classes is very much required.</i> <i>The research provided helps the students in developing understanding of structure / materials and technologies and how to apply all 3 in their design.</i> | The research tries to integrate both design and technology by experimenting through various structures along with the design process . | <ul style="list-style-type: none"> o The research was <u>not flawless</u> ; it was just an initiation in the direction of finding pedagogical approaches of similar nature which combines Academics with Professional Practices. o Further research can be done on finding more innovative & integrative pedagogical approaches. | The author have initiated a Research through which She tried to connect both the Projects in Design Studio and the Structure for collective understanding and knowledge of Architecture Students which is very required Pedagogical approach for upcoming Architects. |
| [2] The city as a studio : Architectural education through bodily experience [2019] | Avci, Ozan [MEF University Faculty of Arts, Design and Architecture, Department of Architecture, Istanbul, Turkey] | <i>In this paper author tries to demonstrate his Architectural teaching experience which he have came through taking his students to different part of the city and tries to turn that situation into studio setup while taking privilege of the surrounding Part of the City to make his students understand the whole concept which he is trying to teach .</i> <i>The research explained that in learning our other senses also play effective role & the concept of muscle memory provide new approach to learning.</i> | This pedagogical approach was used to narrow the gap between restricted studio environment and actually watching the live examples of lectures been taught. | <ul style="list-style-type: none"> o Through this research the author presents the discussion of his own teaching approach / creation of muscle memory using any part of the city as a live Studio. o Students Learning responses were not collected which will make research quite unpredictable if the knowledge delivered is properly received or not. | This paper is all about the experiential teaching / learning technique involved by the Author by making his students able to relate Studio knowledge and Concepts with Real World Environment or Live Locations. |
| [3] Integrating Structures and Design in the first-year studio [2012] | Catherine Wetzel [Illinois Institute of Technology] | <i>This research was conducted in the Illinois Institute of technology by the researcher for the period of 6 years.</i> <i>The aim of the program was that the students should be able to understand the language of engineers & achieve knowledge of complex structural ideas in a limited time by providing them chance to develop visual knowledge of structural design</i> | The research choose to make structure a fundamental component within structural knowledge / integrating design in the beginning design-studio to equip students to confidently navigate the space between architecture and engineering throughout their professional education and careers. | <ul style="list-style-type: none"> o This approach locates Architectural Domain within structural knowledge / integrating various logic of material / construction / site structure / experience / composition etc.... o The models made were time taking due to larger scale almost take 6 yrs to complete. | This research incorporated the Structural Model Making process with different batches of Architecture students keeping in mind the Design Concepts and related theories taught to them in other classes but their main focus remain in the Understanding of How an actual Structure is made which is wholly a different experience / Teaching Approach altogether for the students coming out of sheets and theories. |
| Category :- Inquiry-Based Pedagogical Approach ■ | | | | | |

Tab. 2. Earlier Researches on Reflective Pedagogies [Source : Author]

| | | | | | |
|---|---|--|--|---|---|
| [4] A Research on Undergraduate Architecture Teaching Approach based on integration of Architectural Design and History Teaching [2018] | Author : Wei li [School of Architecture and Civil Engineering, Huizhou University, Huizhou, China State Key Laboratory of Subtropical Building Science, South China University of Technology, Guangzhou, China] | <i>The study Aims at integrating practices of Architectural Design teaching with collaborative Architectural history teaching which has been quite separated due to presence of various previous philosophies.</i> <i>Researcher proposed new teaching Approach in the School of Architecture and Civil Engineering, Huizhou University, China . By designing whole Teaching Elements ; Teaching Procedures and Teaching Methodology.</i> | <ul style="list-style-type: none"> o The research provide new innovative approach through Teaching Elements (architectural design, architectural history, theories ; architectural appreciation , professional practice) o 4 step Teaching Procedures o Teaching Methodology | <ul style="list-style-type: none"> o The research proposed a proposal of an innovative pedagogical approach based on philosophical theories by previous researchers but don't actually evaluates its validity . o The research talks about theoretical proposal and no further validity was established through some experimentation. | In this paper Author tries to correlate to streams of Architecture which is History and Architectural Design which have lost tracks with each other as per his opinion , which might be true upto some limit . So He has Developed a Proposal Of Curriculum through the research for 4 year program for Architectural Bachelors . In which the major focus is Architecture Design , History & Professional Practice mainly. |
| [5] Innovative Tools and Techniques to Teach Architecture [2017] | Prof. Neha Kolbe [Assistant Professor, Priyadarshini Institute of Architecture and Design Studies, Priyadarshinicampus, Dlgdoh Hills, Hingna, Nagpur, Maharashtra, India] | <i>This research is focused on the usage of audio-visual aids and other modern teaching methods / softwares in order to enhance Memory Retention ; Attention Span ; Comprehension ; better & deeper understanding of Concepts. According to the author teachers must also use softwares like 3-D max / Rivet etc., to demonstrate the Joinery details ; Complex Contruction concepts like trusses / flooring etc....</i> | Teachers can also make CDS of these modules and keep up in libraries which could be further utilised by students & other teachers while delivering their lectures for enhanced understanding . | The survey performed was not such reliable and the author has limited the study to be only software oriented and the use of 3-D MAX was much focused upon. | This paper is about the use of innovative teaching methods in architecture to make the design studio more interactive ; more interesting for the students using various audio-visual aids which eventually helps students in better understanding of concepts . |
| [6] Pedagogies Of 21st Century : Innovative teaching Methods [2018] | Author : Aigerim Mynbayeva ; Zukhra Sadvakassova ; Bakhtykul Akshalova [Al-Farabi Kazakh National University, Almaty, Kazakhstan ; International Education Corporation, Kazakh leading Academy of Architecture and Civil Engineering, Almaty, Kazakhstan] | <i>The research is based on the works of Kazakhstani ; Russian and Foreign Scholars on Didactics ; UNESCO recommendations on the developments of teaching Strategies and discusses about the result of practical study on the use of innovative teaching methods by teachers.</i> <i>The study is perform to understand that how much do teachers take a positive attitude to innovation ; accept them and improve their skills?</i> | The results of the survey performed in the research help us to understand as how dynamic is the improvement of teachers pedagogical skills and mastering of innovations in teaching or do teachers like to upgrade their own pedagogical skills. | <ul style="list-style-type: none"> o A comparison is performed based on the work of other Russian and khazakistani scholars as what are the changes Pedagogy as come across while moving from 20th Century to 21st Century . o By keeping in mind the authors perspective further latest pedagogical innovations can be compared from previous ones and their merits and elements on the curriculum and the students can be analysed further. | The author has compared the difference in between the pedagogy of 2 centuries / generation as what were the methods / styles of teaching previously followed and what innovative ; dynamic Education Technologies are being used in the present scenario by the present generation in their design studio and other architectural educational practices. |
| Category :- Reflective Pedagogical Approach ■ | | | | | |

Tab. 3. Comparative Study of Earlier Researches [Source : Author]

| RESEARCH PAPER | AUTHOR | REVIEW | FINDINGS | RECOMMENDATION/GAPS |
|--|---|--|--|---|
| [7] REFLECTIVE TEACHING [2017] | Author : Diah Wulan Hudaya | Describes five phases in the process of reflective teaching. Tools to be used by the teacher in reflecting their teaching practice : -Teacher's Journal -Peer Observation -Student's Feedback -Audio / Video Recording | The teacher who is critical in their thinking about what happens in classroom lessons and about alternative means of achieving goals or aims is a reflective teacher. | Uptill now there has been no research which co-realizes Teacher's reflective skills with Teacher's Success in doing their Teaching Practice in their Classroom. |
| [8] Gibbs Reflection Cycle by Graham Gibbs [Article : 2018] | Author : Fatty Mulder | Steps Of Gibbs Reflective Cycle Model : -Description -Feelings -Evaluation -Analysis -Conclusion -Action Plan | Gibbs Reflection Cycle involves : -Occuring of actual event -Thinking about it Later -Forming reflection | Reflective Cycle is a good tool to make a person aware of his/her actions. |
| [9] Blogging it : Encouraging Reflective Thinking for Architectural Practice. [Article : 2010] | Author : Jennifer Barnett [Lecturer in Architecture School of Built and Natural Environment, University of Central Lancashire, UK] | This paper reports upon an assessment technique using an online blog which was used to capture students' real-time and reflective thoughts. The result includes the learning experiences which were planned as the outcome of the technique as well as some which were not predicted. The blog was carried out over a period of one semester (September to December) involving 28 students with input from the lecturer only by way of defining a blog group within the software. The entries were assessed using a prepared rubric | Overall, there was a clear progression in students' reflective thinking skills. Some students demonstrated that they were already skilled in reflection on their actions whilst some struggled in the initial weeks. | The students' developing reflective thinking skills should be encouraged beyond the assessment to class discussions. By taking advantage of the parallels in experience and use reflections on actions, a deeper learning experience is more likely. Could the reflective blog be developed to provide a more educationally valuable and more accessible, userfriendly, alternative? |
| [10] The Phases of Inquiry Based Learning [Article : 2016] | Author : Eric Kyle [PhD ; Published JUNE 10TH, 2016 at Faculty Focus] | In this Article author discusses the phases of inquiry based teaching as what role the facilitator or teacher has to perform in a classroom to make students better understand the concept by using the information they previously have in addition to the knowledge they get while performing some activities or tasks collectively with their fellow mates. Inquiry-Based Teaching can be described as the Cycle or spiral which follows: Formulation of Questions → Investigation → Creation of solution/response → Reflection as Result | It is a student centered and student lead process. Students are engaged in active learning ideally based on their own questions which arises while performing the tasks. Learning Activities are organized in cyclic way Each Question → Creates new Ideas → which arises further New Questions. | The Author has talked about following 2 phases which are implemented during Inquiry based Approach : Phase 1: Formulating Questions and Initial Understandings Phase 2: Exploration & Analysis |
| [11] Delivering theory courses in architecture: inquiry-based, active, and experiential learning integrated [Special Volume: Design Education, 2010] | Author : Ashraf M. Salama [Published at Arch.net-IJAR, International Journal of Architectural Research - Volume 4 - Issues 2-3 - July and November 2010] | In this paper author has tried to deliver the Inquiry Based Approach a new direction by bifurcating it into 2 streams that are: 1) Socio Behavioral (Socio-Cultural factor) 2) Community Design Workshop In the end of the Class the Questions were asked from the students about the learning of the students from those 15-30min. activities to analyze the learning of the students while working on the tasks with their own sets. | Students are teamed up in the group of 2 and 4 as well as individual activities are also been facilitated by the facilitator in the class. Exercise was performed. → In the Group of 2 / 4 / Individual → followed by Class Discussion. | The author perceives the incorporation of Critical Inquiry through Active and Experiential Learning into architectural education integrates Real with Hypothetical; Process with Product & objective with Subjective by introducing tools and techniques which can utilize Built Environment as an Open Text Books for enhancing capacities of Future Architects. |

2.2. Inquiry Based Pedagogical Approach in Architecture

Inquiry-Based teaching or learning process is based on constructivist Ideology or philosophy which enhances the learners ability to Gather ; Filter ; Analyze & Reflect the piece of knowledge on info gathered by the learner .

Inquiry based Learning is an Approach or Process in which Learner understands the World around him through the self-exploration ; raising Questions & discovering the Concepts behind the things happening to understand everything clearly related to the topic.

The Author Henri Poincare has discussed 5 stages of Inquiry Based teaching in the Article which include :

- **STAGE 1: ENGAGE**

In this Stage the teacher tries to pick a topic for the students that personally interest them and involve them in that topic exploration while prior knowledge of the student pertaining to that certain topic is assessed by the teachers.

- **STAGE 2: EXPLORE**

Then in this Stage the teacher provide the chance to the students by including all the students in the topic and make them understand the logic ; concept & knowledge of that certain topic on their own.

- **STAGE 3: EXPLAIN**

In this Stage Teachers Communicate with the students about the extent of learning / knowledge achieved by the Students after Self-exploration of the topic.

- **STAGE 4: EXTEND**

Later in this Stage teacher ask the students again to explore the topic further again with new knowledge along with prior understanding.

- **STAGE 5: EVALUATE**

In this Stage both the Teachers & Students evaluate as how much knowledge ; Understanding & Learning has taken place .

Inquiry learning doesn't include remembering actual events ; it is more about asking (framing) Questions and searching proper solutions to that problem and barriers . Inquiry can be a complex process and therefore it need well designed instruction procedure and guideline to provide so that experiences of students should have level of excitement in searching solution to a problem or question . A well defined learning environment which facilitate inquiry approach can assist students in collecting ; interpretation of data and information into useful understanding.

Inquiry Based Learning can also be stated as Continuous process or cycle or spiral which include Question formation ; continuous exploration ; creation of an answer to that question or a solution to a problem and reflections in regards to the solution. Inquiry Based Learning is a Students-oriented approach which is also lead by students only. The whole aim of the approach is to involve the students in spontaneous learning which is based on the problems or questions framed by them only . Learning exercises are formulated in a cyclic way . Each problem lead to the formulation of a new concept and other problems . IBL because of its Collaborative Work scenario is a socio-construction design which facilitate that students to find resource ; tools and the concepts driven by co-investigators of that inquiry . That's how a student's cognition develops by mutual work distribution ; communicating and adding on to collaborative work as a Whole.

2.2.1 Inquiry Based Pedagogical Models

Many models have been described in the literary works one of its example " Cyclic Inquiry Model " of chip Bruce. Model was authentically treated at university of Illinois . The reason for the development of this Inquiry model is the framing of new concept and

ideas and their overall reach to each individual student within the classroom. The cyclic process of this Inquiry Based Learning [IBL] is a process that involves students to raise and answer questions on the aspect of retreated information on knowledge and that leads to the development of new concepts . The exercise finishes by the development of a written data which tries to solve question which were there right from the start.

Inquiry Cyclic process involves 5 universal steps : Ask ; Investigate ; Create ; Discuss ; Reflect . As discussed by Villavicencio in 2000 during his research work quoting example of "Rainbow" as he was the person who use to work with 4-5 years old children on light & colours.

When the activity initiates Teachers must think about the no. of cycles to be ensured during the exercise and how the activity will come to an end . Here are the 5 steps of Inquiry Model:

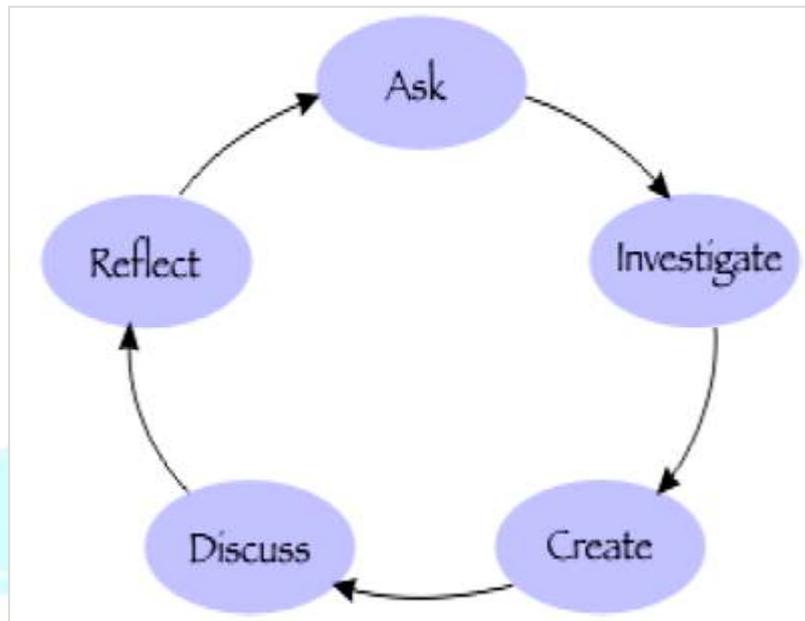


Fig 1 .Phases of Inquiry Bases Approach [Source : The Inquiry Page (<http://inquiry.uiuc.edu>)]

Step 1: Ask

Ask begin with Learner's desire for some information about the world, preferably with their very own inquiries. The instructor can invigorate the interest of the understudy by giving an acquaintance talk related with ideas that must be obtained. It's significant that understudy define their very own inquiries since they at that point can unequivocally express ideas identified with the learning subject. This progression centers around an issue or an inquiry that Learners start to characterize. These inquiries are re-imagined over and over during the cycle. Step's outskirts are obscured: a stage is never totally left when the understudy starts the following one.

Step 2: Investigate

Ask normally prompts Investigate which should abuse introductory interest and lead to look for and make data. Learners or gatherings of Learners gather data, study, gather and adventure assets, analyze, look, meet, draw,... They as of now can rethink "the inquiry", make it more clear or take another course. Research is a self-propelling procedure completely claimed by the dynamic understudy.

Step 3: Create

Gathered data starts to combine. Understudy start making joins. Here, capacity to orchestrate significance is the flash which makes new information. Learners may produce new contemplations, thoughts and speculations that are not straightforwardly motivated by their very own understanding. They record them in some sort of report.

Step 4: Discuss

Now, Learners share their thoughts with one another, and get some information about their own encounters and examinations. Such information sharing is a network procedure of development and they start to comprehend the significance of their examination. Collaborating, talking about ends and sharing encounters are a few instances of this dynamic procedure.

Step 5: Reflect

This progression comprises in setting aside effort to think back. Reconsider the underlying inquiry, the way taken, and the genuine ends. Understudy think back and possibly take some new choices: "Has an answer been found ?", "did new inquiries show up?", "What would they be able to ask now ?"

In the early 1999 Archer ; Anderson & Garrison demonstrated a model which was based on Dewey's practical Inquiry concept. That Practical inquiry model states : "The reflective phases of practical inquiry or critical thinking presented here are grounded in the pre- and post-reflective phases of the world of practice. The two axes that structure the model are action-deliberation and perception-conception. The first axis is reflection on practice. The second axis is the assimilation of information and the construction of meaning. Together, they constitute the shared and personal worlds. The quadrants reflect the logical or idealized sequence of practical inquiry (i.e., critical thinking) and correspond to the proposed categories of cognitive presence indicators."

Later Pedaste and colleagues framed 5 parts model relied on planned review of 32 chosen articles on inquiry based learning which elaborate or explains inquiry phases and cycles . The review procedure Initially left the series of 109 terms for inquiry phases which were than minimized to 34 terms which were than mingled into 11 phases. " Orientation, Questioning, Hypothesis Generation, Planning, Observation, Investigation, Analysis, Conclusion, Discussion, Communication, and Reflection ".

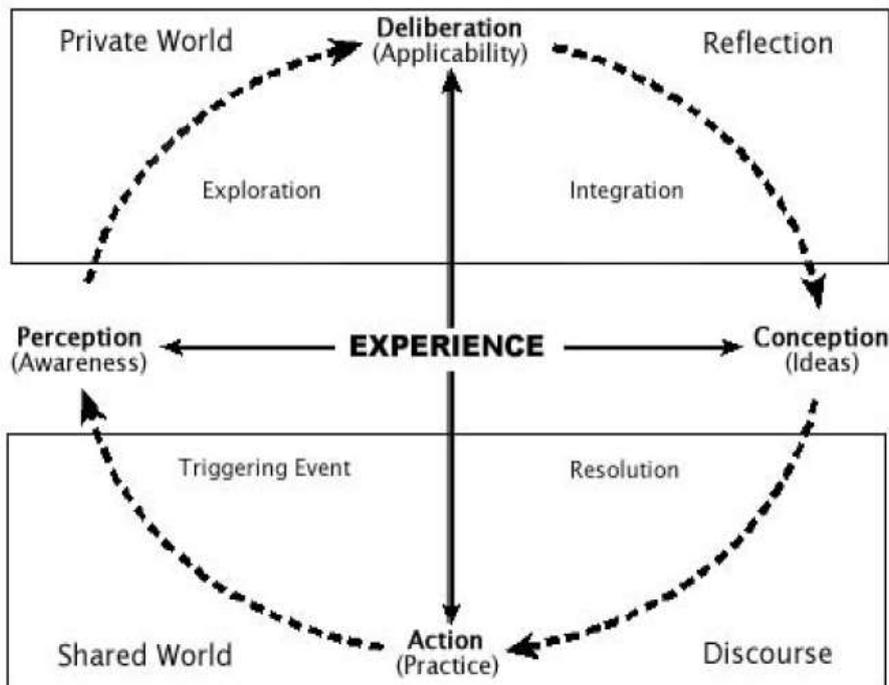


Fig. 2 Phases of Reflective Approaches [Source : edutechwiki.unige.ch/en/Inquiry-based_learning]

However, it was not execution able to restrain 11 phases ; as Inquiry Learning process is often termed as complex and tough learning process for the learners . Than these 11 phases were arranged into groups also named as "general phase ": Orientation, Conceptualization, Investigation, Conclusion, and Discussion.

- Orientation
- Conceptualization
- Investigation
- Conclusion
- Discussion

2.3. Reflective Pedagogical Approach in Architecture

In 2012 in his research Maryellen Weimer explained that Reflection is an aim admired by many educators . They feel that Learners need to enhance their ability which will enable them to visualize a piece of work they generate or an aspect of their professional practice and make specific judgment about it . While it is not a simple ability to take command over and practice is must for its enhancement . If educators are providing Learners with circumstances to reflect , they must be able to evaluate how well the learners are reflecting and facilitate them with response that strengthen the ability of the learner.

- The concept of reflection is really hard to elaborate ; even when there is widespread interest in promoting it . David Kember and their group go through the reflection and eventually proposed the definition . “Reflection operates through a careful re-examination and evaluation of experience, beliefs, and knowledge.” “Reflection most commonly involves looking back or reviewing past actions, though competent professionals can develop the ability to reflect while carrying out their practice.”
- These reflective practices help a Learner to achieve self judgment and evaluation about up to which level stand and whatever information they are getting by the side of the instructor are they actually going to retain that information in the form of wisdom or knowledge . and if they are going to retain than up to which level.
- Most of the time educator promote the Learner's reflection through written assignments .They utilize assignments in the form of Journals and have learners response to case studies or involvement in online discussions .
- Kember and his colleagues have a well planned strategy which can be used to evaluate the level of reflection seen in these kinds of textual work . They expressed that this is not a specific measure but can facilitate standards that will avoid purely subjective evaluation of task .

They also proposed that these reflection levels are best applied to complete paper instead of one individual section of it . they formulate 4 levels of reflection elaborated in detail in their article and highlighted here further :

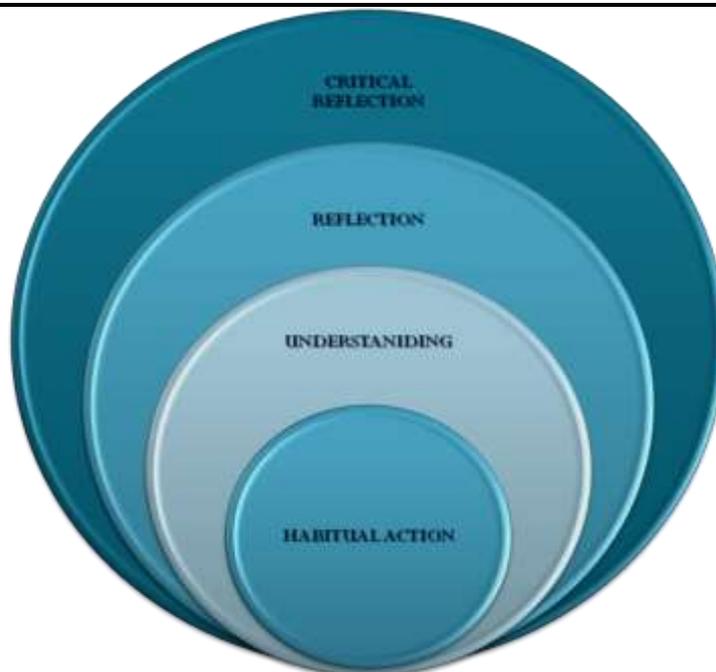


Fig.3 Four Levels Of Reflection [Source : Author]

1. Habitual Action — "In proficient practice, ongoing activity happens when a strategy is pursued without huge idea about it." For the situation of Learners it happens when an understudy offers an answer without endeavoring to get it. Learners represent this level when they attachment and-chug a recipe or pursue the means in a lab manual with no thought of what they are doing or why. Recorded as a hard copy, at this level Learners search for material that answers the inquiry. Now and again they copy that answer; all the more frequently they reword or outline it, however with no genuine comprehension. When asked, they can't clarify what they have composed.

2. Understanding — For this situation, there is an endeavor to comprehend the point or idea. Despite the fact that Learners may look for hidden importance, at this level, there is still no reflection. "The ideas are comprehended as hypothesis without being identified with individual encounters or genuine applications." . Most Learners start at this level. In their composing they depend intensely on what the course reading or instructor has said. They will report that substance precisely and with seeing however don't add any close to home reaction to it.

3. Reflection — At this level, Learners not just have exact comprehension, they think about that comprehension and can relate it to individual encounters, or they can make handy applications. On the off chance that Learners are expounding on proficient encounters, those encounters "will be considered and effectively talked about in relationship to what has been educated. There will be close to home bits of knowledge that go past book hypothesis."

4. Critical reflection — This most significant level of reflection suggests the change of a viewpoint. "A large number of our activities are administered by a lot of convictions and qualities that have been unknowingly absorbed from our encounters and condition. To experience an adjustment in context expects us to perceive and change these assumptions." Teachers ought not expect this degree of reflection early or frequently as Learners are creating intelligent abilities. Indeed, even experts don't change what they accept on a week by week premise. Instruction causes trans-developmental changes in Learners all the more regularly in light of the fact that at an opportune time Learners don't have imbued ideas about a field or information area. In any case, basic reflection is a procedure that by and large happens after some time. Learners start by perceiving their convictions and going with presumptions. Something (new data, new encounters) upsets that conviction framework, along these lines compelling Learners to reproduce or change it.

2.4. Analysis Derived

Through this Chapter this can be Analyzed that both the Inquiry Based & Reflective Teaching approaches follow Phase wise Model and the very Last phase of Inquiry Based Approach is Reflection which means both of them are very closely linked in a Cyclic Process . So a Common link must be established from this View that Inquiry Based teaching-Learning approach must be inducing some impact on the Reflection Process of the Learner and hence it would be Very fascinating to understand the Level of Reflection of the students achieved after Inquiry Based teaching.

III. RELATION BETWEEN LEVEL OF REFLECTION IN STUDENT'S INQUIRY BASED OUTCOME

3.1. Higher the Level of Reflection Higher will be the Inquiry Learning Outcome.

As per the Latest Study conducted in 2016 by the researchers Mario Maeots et al. in order to investigate relation between a Student's reflection level and their inquiry learning outcome. After that they go through complete inquiry cycle in an online Go-Lab Inquiry Learning Space [ILS] . A Sample Size of 43 students was taken in the study all of them belong to 9th Grade with an Average age of 15 yrs. All the students worked on chemistry -based ILS and they all were asked "What does pH measure ?" . The students were provided with a well defined problem for solving through an inquiry cycle. On each Step Students were assigned task to do which led to concrete learning outcome. When the task was over they were asked to answer open ended reflective questions to reflect on their study process.

The results demonstrated " Students who reflect at a higher reflection level are more successful in formulating higher quality inquiry outcomes such as hypotheses, observations and conclusions." Therefore ; Authors in their recommendations suggest that " reflection should be part of the learning process in order to support students to achieve higher quality inquiry learning outcomes."

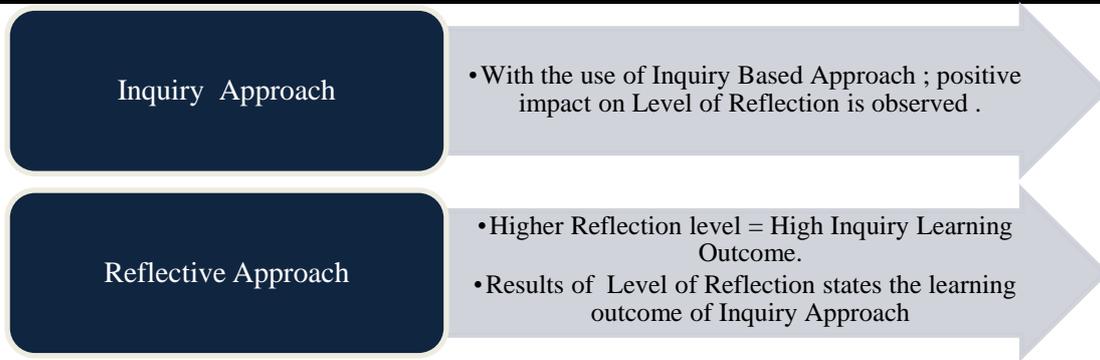


Fig.4 Parallel Approaches Inquiry Based Approach & Level of Reflection [Source : Author]

3.2. Level of Reflection and Inquiry Learning as Inter-Dependent Processes.

Reflection is one of the components of the classroom Inquiry as explained by Van Manen (1991) as a mental action that distances an individual from the situations in order that they are being visualized in an objective manner. Reflection include Thought Process about past or current experiences or events ; scenarios ; or actions to make appropriate sense of them ; with a concept of informing future selections ; decisions or performances as described reflection as a problem solving for the reason of giving information into a problem and therefore developing a plan of Strategy to solve peoples problem and also make sure proper course of action is performed by an individual in order to solve the problem.

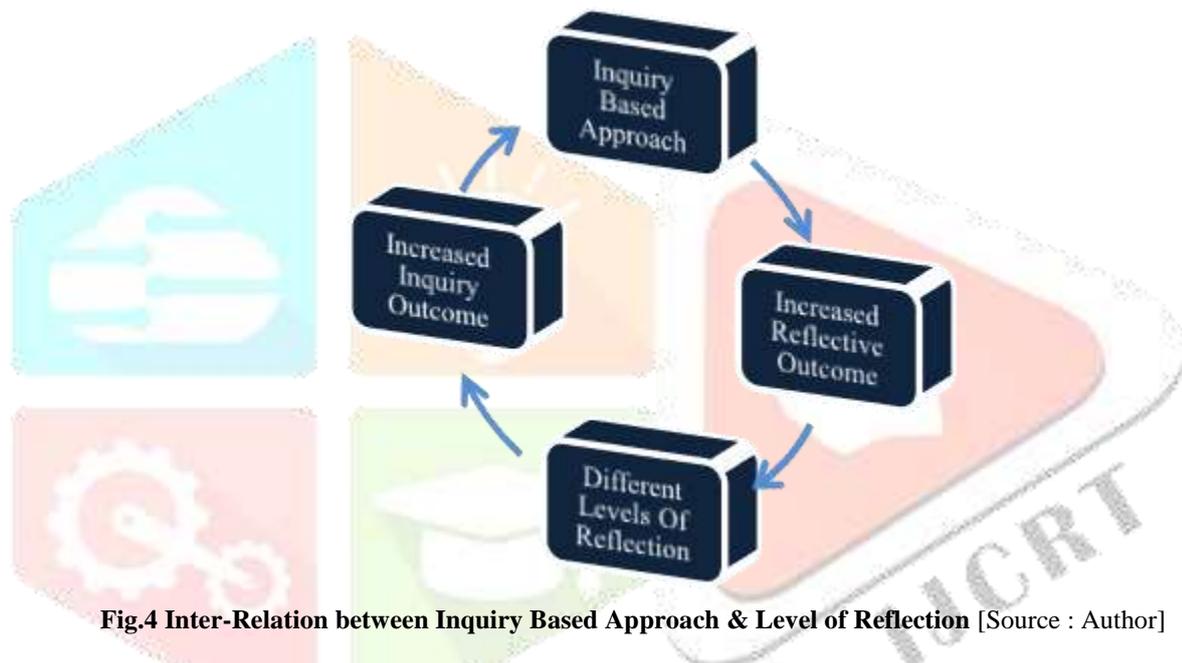


Fig.4 Inter-Relation between Inquiry Based Approach & Level of Reflection [Source : Author]

Further, a few creators have depicted typologies that might be utilized to order reflection . Ward and McCotter (2004) proposed a structure comprising of four degrees of reflection as a methods for inspecting and understanding the advancement of PSTs' appearance. The primary degree of reflection is normal in which the emphasis is on oneself and fault is ascribed to other people or on brief period and scarcely any assets. There is an absence of addressing and little awareness of other's expectations for change. The following level is specialized and is focused on the best way to improve the usage of a procedure or method. There is no scrutinizing of the fittingness of the training or the points of view of understudies. While the PST is focused on progress, reflection is constrained to how the individual can improve the execution of a methodology. The third degree of reflection is dialogic in which the perspectives and points of view of others are considered. At this level, the PST is regularly worried about the accomplishment of a battling understudy and grows new bits of knowledge about educating and learning. The fourth degree of reflection is transformational and includes a long haul, continuous request in which individual convictions are addressed, prompting major changes by and by. PSTs infrequently arrive at this degree of expansive reflection since they are so regularly involved constantly to-day undertakings of educating (Ward and McCotter, 2004).

Focus in instructor training projects ought to be put on utilizing study hall request and reflection to take care of valid issues experienced during work on educating or entry level positions. Instructor teachers ought to be accessible to help PSTs as they work through the way toward turning out to be analysts and be happy to demonstrate the intelligent segment. As appeared in this investigation, instructor instructors can bolster PSTs' homeroom request and reflection and assist them with creating specialized ability and understandings about the connection between the nature of their educating and understudy learning. Future research ought to incorporate longitudinal investigations of PSTs into their years as starting educators in schools to analyze the further improvement of aptitudes in homeroom request and reflection, especially at the transformational level. The outcomes will advise instructor instructors how they may best plan PSTs become educator scientists who create individual, commonsense information about their very own study halls.

3.4. Analysis Derived

This Chapter establishes relationship between Inquiry Based Approach & Level of Reflection of the Learners in the Classroom on the Basis of Earlier researches . The use of both the Approaches together in a classroom will Facilitate holistic learning of the Learners in the Class .Hence ; increase in the Level of reflection is observed whenever Inquiry based Approach is used either at elementary level or primary level of education . The question which arises is that whether this relation established also Validate for the Higher Architectural Education ? For the Class of B.arch ??

IV. DATA COLLECTION

4.1. Executing Inquiry Based Activity (Exercise) in a Classroom : B.arch 1st Yr[Theory of Structure AR-106]

In a Class of B.arch 1st year comprising 40 students ; A Lecture of Theory Of Structure [TOS] was taken by the researcher regarding Beam & Column Types ; Types of Loads and their transfer mechanism to the ground along with Introduction to Shear Force & Bending Moment. An Inquiry Based Exercise of 30 min. was introduced to the students Post-Lecture which was framed as follows :

STEP 1 : All 40 students were first divided in the groups of 4 . Each Group was provided 1 Match-Box ; Cotton Tie Thread & an Adhesive.

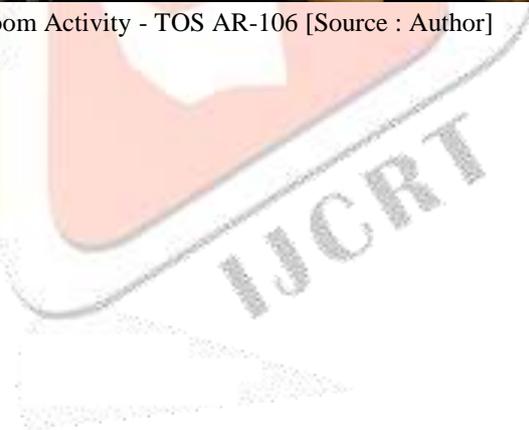
STEP 2 : Every Group was asked to make a very small scale model of a Load Bearing Structure using their own Intellect & Creativity (which involves Inquiry Based Approach) taking into account its Load Transfer & stability at the time of any seismic activity.

4.1.1 Objectives of the Classroom Exercise :

- To develop students Inquiry Based approach of Understanding of Theoretical Concepts of Structures .
- To find the Level of Reflection of students through this Inquiry Based Exercise which can further provide the evidence of validation for the Research Hypothesis
- This exercise aims at developing among students better Understanding and Critical Reflection which forms highest level of Reflection.



Fig. 4. Models made during Inquiry Based Classroom Activity - TOS AR-106 [Source : Author]



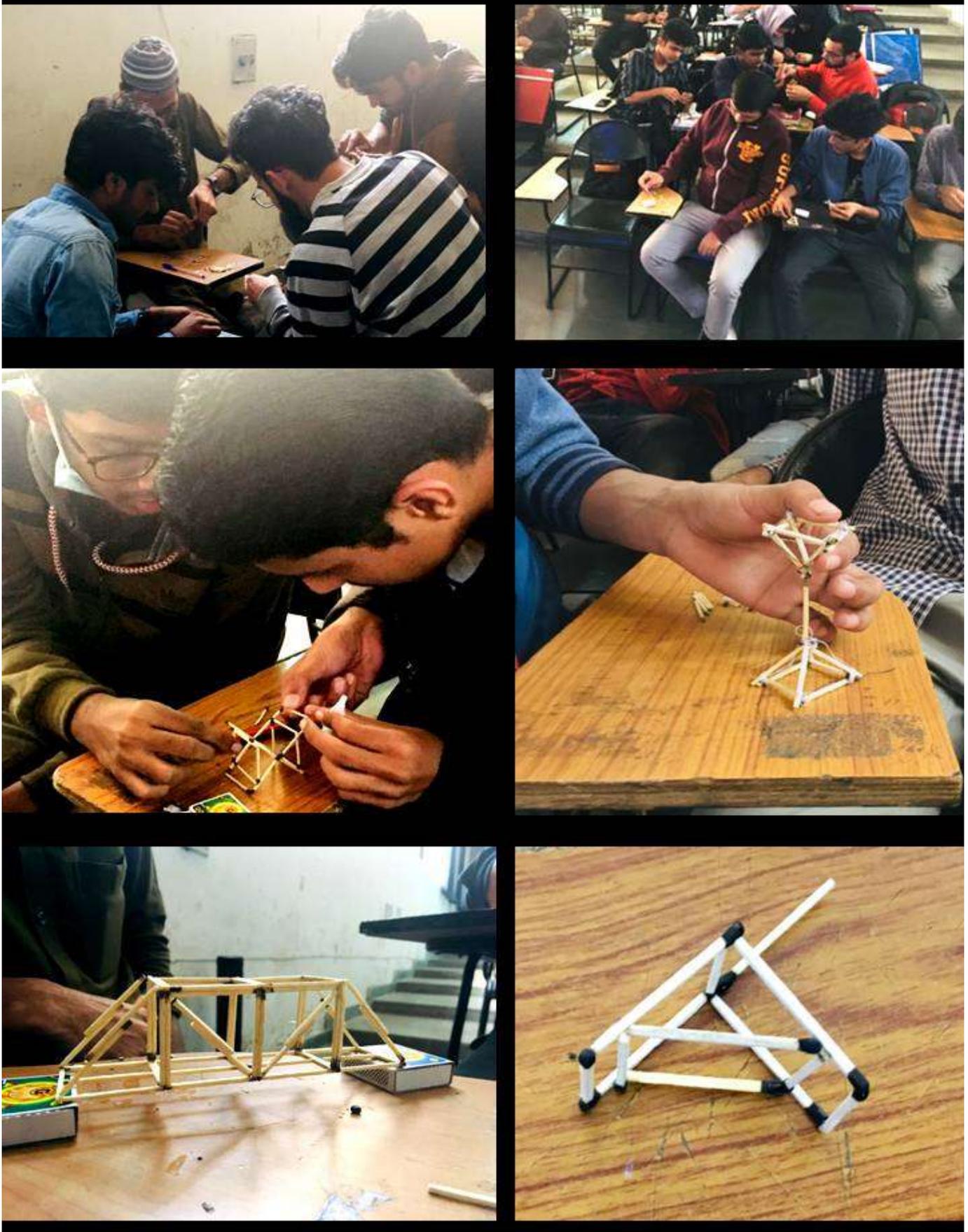


Fig. 5 . Models made during Inquiry Based Classroom Activity - TOS AR-106 [Source : Author]

- The Students made various Small Scale models out of Match Stick & also explained Load Distribution in their respective models.

4.1.2 Outcome of the Exercise :

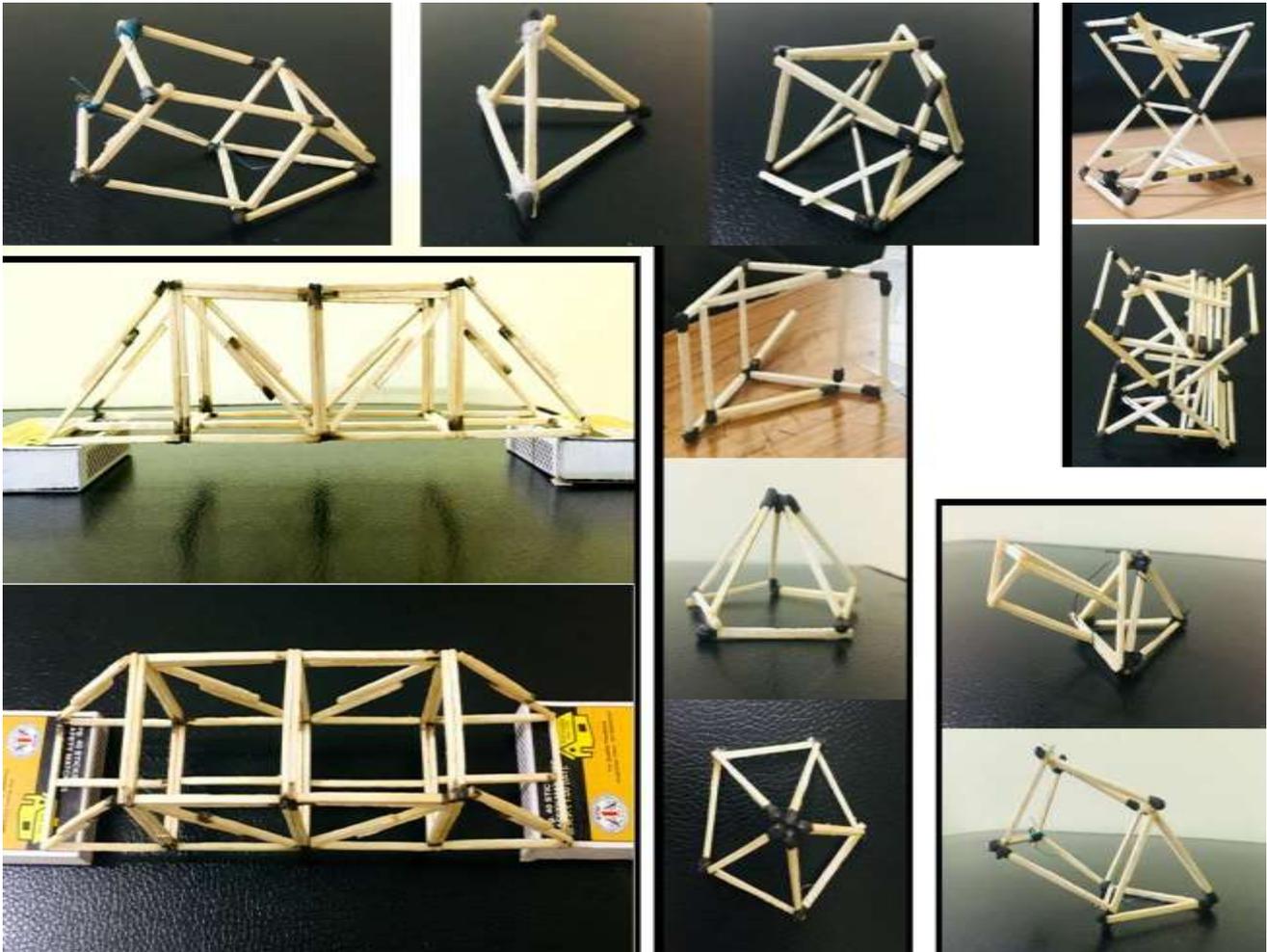


Fig. 6 . Models made by All groups during Class Activity [Source : Author]

- Students were able to explain the Load Distribution of their models by using their own Intellect ; knowledge & Understanding .
- Models made were combination of both abstract & meaningful design forms.
- This Inquiry Based Exercise of Theory of Structures also give strength to the Visual Perceptive skills of the students in regards to the mutual holding of Column & Beams or Structural Frame as a Whole.

4.2. Investigating Level of Reflection of an Individual Student :

A Post-Activity Questionnaire was circulated within the Class to All the Students in order to Evaluate Level Of Reflection of an individual Student after being involve in this Inquiry Based Approach of Learning Theoretical Concepts. The Questionnaire is based on the Research Paper (David Kember, 2000) [The questionnaire is developed in 2000 by David Kember, Doris Y.P. Leung, Alice Jones, Alice Yuen Loke, Jan McKay, Kit Sinclair, Harrison Tse, Celia Webb, Frances Kam Yuet Wong, Marian Wong and Ella Yeung.]

As Per Author : Readers are invited to use the questionnaire e for evaluating their teaching and for genuine research purposes . The condition s are that they acknowledge the source as the present paper and accept that the copyright on the questionnaire is owned by the authors.

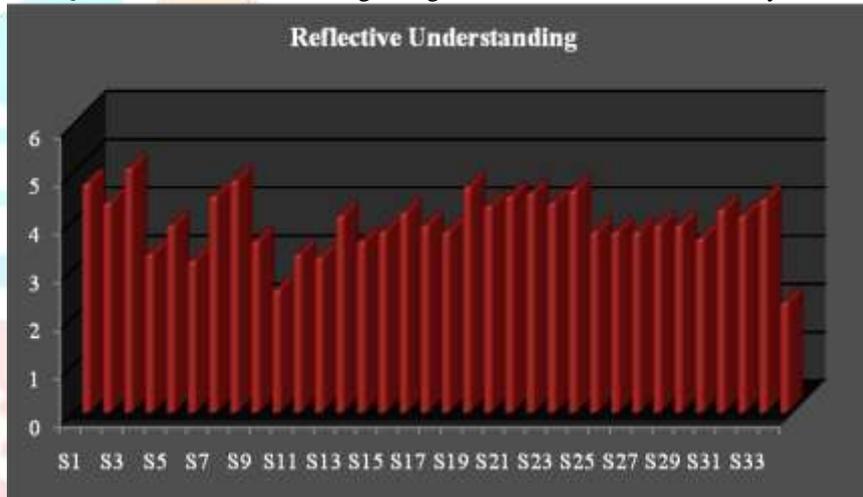
V. DATA COLLECTION & ANALYSIS

On Analyzing the responses of the students obtained after circulating Post-Activity Questionnaire among students . Following Categorized responses are being evaluated on the basis of which level of reflection of an individual students can be stated as well as Level of Reflection or Reflective Learning Outcome of a Whole Class can be Analyzed after performing this Inquiry Based Activity in the Classroom. [N = 34]



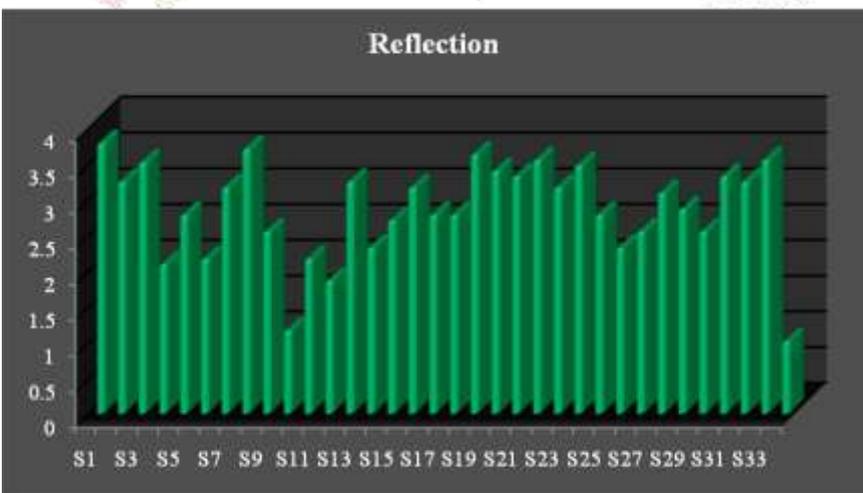
Graph 1. Habitual Actions

Graph 1. Habitual Actions explains: Individual responses of the students involved in the classroom activity (following Inquiry Based Approach) with relevance to the Questions in an interview regarding Habitual Actions which is very First Level of Reflection.



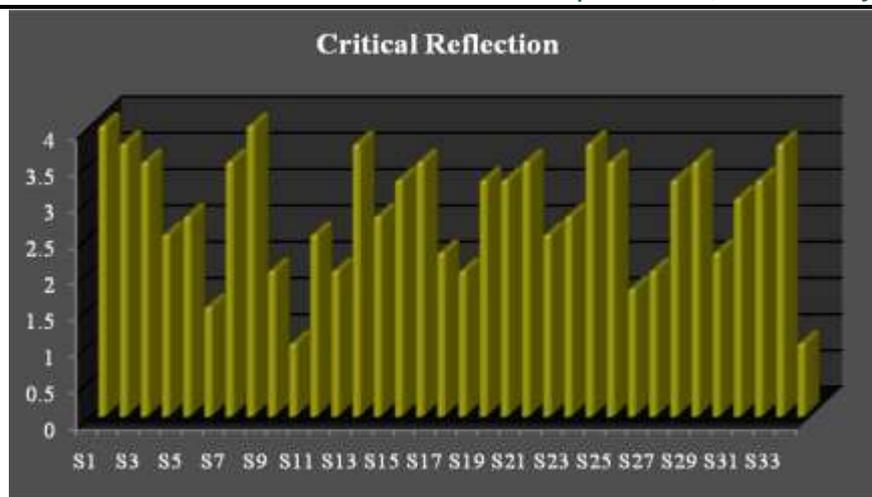
Graph 2. Reflective Understanding

Graph 2. Reflective Understanding explains : The level of reflection of the students involved in the (Inquiry Based Classroom Activity) which is derived from the individual responses of the students to the questions relating to the Reflective Understanding of the students which is 2nd Level of Reflection or Reflective Learning.



Graph 3. Reflection (Self-Reflection)

Graph 3. Reflection (Self-Reflection) explains: The level of reflection of the students involved in the (Inquiry Based Classroom Activity) which is derived from the individual responses of the students to the questions relating to the Self Reflection of the students which is 3rd Level of Reflection or Reflective Learning.



Graph 4. Critical Reflection

Graph 4. Critical Reflection explains : The level of reflection of the students involved in the (Inquiry Based Classroom Activity) which is derived from the individual responses of the students to the questions relating to the Critical Reflection of the students which is 4th Level of Reflection or Reflective Learning.



As the Earlier Graphs clearly indicate the Level of Reflection of the Students individually . The Graph above shows the collective response of the total 34 Students in all 4 Levels Of Reflection. Therefore after investigating individual responses in 4 different Ranking of Level Of Reflection . This Graph Shows that the highest learning outcome achieved through inquiry based approach is "Reflective Understanding" and the second highest learning outcome achieved keeping in mind the result of Whole Class is "Habitual Actions" which are 1st & 2nd Level of Reflection.

VI. ANALYSIS AND FINDINGS :

As per the Data Collected through Post-Activity Reflective Feedback students after performing Inquiry Based activity in class of Theory of Structures (AR-106) Scored higher in First 2 Levels of Reflection ; among which Students scored highest in "Reflective Understanding" & second highest in "Habitual Actions" .

- However the Later and the highest Level Of Reflection which is "Self-Reflection " also known as only Reflection and "Critical Reflection" respectively cannot be achieved up to Satisfaction Level for theoretical subject like structure (AR-106)
- It may or may not produce the same results with the change in Subject or the Sample Size .
- Use of Inquiry Based Pedagogical Approach in Theoretical Lectures of Architecture Leads to better Reflective Understanding in Students.
- If Inquiry & Reflective Pedagogical Approaches are combined together Better Reflective Understanding can be achieved for Holistic Learning Outcomes.

VII. RECOMMENDATIONS & CONCLUSION

As Per the study performed and the Analysis of response generated after conducting Inquiry Based Academic Exercise in Theory of Structure class (AR-106); it was found that there was a rise in the students score of "Reflective Understanding" and "Habitual Actions" which are Levels Of Reflection or Reflective Learning. As per the Findings of Analysis it was achieved that :

- Use of Inquiry Based Pedagogical Approach in Theoretical Lectures of Architecture Leads to better Reflective Understanding in Students.
- If Inquiry & Reflective Pedagogical Approaches are combined together Better Reflective Understanding can be achieved for Holistic Learning Outcomes.

- Therefore; it can be concluded that the Relation Established between Inquiry based Learning & Reflective Learning with the review of the opinions of earlier researchers was right .
- There exist a Co-relation between both the Pedagogical Approaches . As well as With the use of Inquiry based Approach the score of Level of Reflection of each student increases which means increases knowledge retention and understanding.
- **Statement :** Therefore the above analysis proofed the hypothesis that Phase wise involvement of Inquiry Based & Reflective Pedagogical Approach acts as better tool for Complex theoretical Lectures.

ACKNOWLEDGMENT

I offer my Sincere thanks to my Guide, Ar. Mohammad Amir Khan , Assistant Professor of Faculty of Architecture, Jamia Millia Islamia University who guided me during this whole study with all his strength, patience and dedication making this research possible to conclude well in time and also would like to thank Dr. Shehla Riaz who by her immense support, motivation and diverse thinking style helped me a lot in my research and was always there for me.

I am heartily thankful to all the adorable B.Arch Students from different Universities & Architecture Colleges who have participated in the Survey. They were great help as well as motivation for me and I am really thankful for their honest views in the survey which enabled me to conduct my research accurately.

REFERENCES

- [1]Acar, S. (2019). Alternative Pedagogies Integrating Architectural Design and Technologies. Ankara ; Turkey: Department of Architecture; TOBB University of Economics & Technology.
- [2]Avci, O. (2019). The City as a Studio : Architectural Education through Bodily Experience. Istanbul, Turkey: MEF University Faculty of Arts; Design and Architecture, Department of Architecture.
- [3]David Kember, D. Y. (2000, December). Development of a Questionnaire to Measure the Level of Reflective Thinking. Assessment & Evaluation in Higher Education . www.researchgate.net.
- [4]Mynbayeva, A., Sadvakassova, Z., & Akshalova, B. (2018). Pedagogies of 21st Century : Innovative Teaching Methods . Almaty, Kazakhstan: Al-Farabi Kazakh National University, Almaty, Kazakhstan, International Education Corporation, Kazakh Leading Academy of Architecture and Civil Engineering.
- [5]Schwartz, C. Debating the merits of Design/ Build : Assessing Pedagogical Strategies in an Architectural Technology Course. Southern Illinois University Carbondale School of Architecture.
- [6]Wezel, C. (2012). Integrating Structures and Design in the First-Year Studio. Illinois Institute of Technology.

