Analyzing Evolving Methodologies & Teaching Pedagogy for Building Construction Taught in Architecture

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***Abstract*— Architectural in itself creates and surprise everyone with every passing day. Methodologies adopted for knowing the in depth about architectural education are continuously a vibrant topic for discussion among the researchers. This article deals with the evolving methodologies and teaching pedagogy for building construction subject. The true essence of a design is only justified by good construction which can be achieved by mastery over the subject. These days so many issues are demotivating the students of architecture in this subject. Analysis has been done on present pedagogy and teaching methodology, also various new methods are discussed for a better change.**

Index Terms: **Rote learning, collaborative learning, pedagogy, program outcome, cognitive learning.**

I.INTRODUCTION

Building construction is an action of building something. Building Construction is a field of Engineering Science, which skills us with the technique of construction of buildings. In Building construction, A building is defined as an enclosed space covered by a roof. The subject has 3 subdivisions

-Building materials & sciences,
-Building construction technology,
-Workshop/construction yard practice & site exposure

The history of teaching Building construction in architectural education was initiated from the famous Ecol de Beaux College, Paris, which is the oldest and historical school of 19th century. Later in 20thcentury the German design School - Bauhaus school also imparted the education of modernism through design, construction and workshops. In India, Sir J.J. college of architecture (originally govt. college of arts) structured the curricula of architectural education with building construction as one of the major subject.

II. APPROACH TO TEACHING

With present scenario, Building construction today is beyond the rankings, because construction evolution is shaping tremendously on a faster pace .Traditional teaching was a linear method of teaching. Each teacher is unique in the way he/she approaches the subject or teaches construction based on his/her set of ideologies and analysis which is distinct from others. The need for new approaches and alternative thinking in imparting architectural education in a pedagogical manner of the construction studio will provide us the best opportunity to shape the quality of architectural education.

Teaching pedagogy of this subject is always a topic of discussion for the researchers.

With the advancement of technology, the present methods of teaching need to be addressed and evolved to meet the challenges of the students as well as profession.

III. PEDAGOGY

Pedagogy is the method and process of teaching. It is a strategy where the study and practice of how best teaching and learning process happens with all the available resources and technology to meet the future needs. It is to teach and to learn through coordinator.

IV. GOAL OF THE SUBJECT -BUILDING CONSTRUCTION CURRICULUM (RATIONAL APPROACH TOWARDS SUBJECT)

In five years of architectural curriculum, this subject is thoroughly divided as per the technicality in every year. Goal of the subject is to pursue an overall understanding of material science & construction skills in every scholar.

- First year is dedicated to Brick Masonry, Types of walls, Wood (timber)Engineering, Clay& clay products, mortar, Lime and cement concrete, Damp proof courses .
- Second year is dedicated to Surface (wall,floor) Finishes, painting & polishing , Roof coverings, Stone work, Details in Timber (Doors, Windows, trenches),Glass and ceramics ,Adhesives
- Third year hasmetals & non metals (ferrous & non-ferrous), Floor & floor finishes, reinforced brick work, Various shutters, Door & windows(Metal, Structural Steel works, Additives & admixtures, construction Equipment's, Partitions, temporary construction and most Important RCC.
- Fourth year deals with special construction joints, seismic joints, water proofing compounds, Plastics and Rubber.
- Final year comprises of Steel for Industrial construction, Advance structural concrete materials for pre-stressing, Speedy construction (forms & materials), Modular coordination, Prefabrication & precasting.

This data has been taken from Abdul kalam Technical University syllabus of year 2016. Various other university courses were also studied but this outcome is largely taken on account of studying curriculum of northern colleges of the country.

V. CONVENTIONAL TECHNIQUES USED IN TEACHING THE SUBJECT

5.1 Classroom Teaching

Almost in every architectural school, there is a clear definition of the lecture and studio. From much architectural literature reviewed, a "Lecture" is defined as teaching or giving the student by formal discourse general principles or fundamental bodies of knowledge which guide and inform all aspects of the designing activity, whereas the "studio" is defined as the place where students apply the knowledge and solve a particular design problem. Effective communication can be quite challenging, especially when you are delivering a theory or giving a speech. In order for the communication to be effective, you must keep the attention of the listeners and deliver the information in such a way that it is fully understood. Lectures taken by teachers with chalk &Duster and White boards and markers are not very effective due to least interest of the students in listening to theory.

Unfortunately, the experience of many lecture and studio teachers suggests this supposedly symbiotic relationship does not work as it claims to be. Many often complaint that "essential concepts they have taught about say, building construction do not seem to show up in the students' design project" (Gelernter, 1988: 46). It follows that these lectures are treated as separate courses having their own time and space allocations.

Little effort is consciously exerted to coordinate or synchronize on-going design projects with construction assignments.

The rapid development of modern construction and material technology greatly influences the way students think and design. Their exposure to the modem building forms and available information from the internet, television, magazines, etc. influence these students to design complex building forms for example, following the ideas from famous architects like Frank Gehry, Norman Foster and many others, whose designs use most advanced technology of construction and materials. The schools should be fully aware of these changes required by the students, unfortunately, the syllabus has remained unchanged for years and does not incorporate the latest developments.

VI. PROBLEMS RELATED TO CURRENT LEARNING PEDAGOGY

For a meaningful and effective learning experience three ingredients are essential

- the learning methods adopted by students
- the prior knowledge (the experience) of the students
- the teaching methods employed.

Architectural learning systems were reviewed and analyzed showing that the problems are largely due to students' failure to grasp the basic principles of construction technology and relating them to the

design process, in respect of forms and functions, time and places, and proper adaptation of design with art, history, philosophy, culture and technology.

6.1 Problem no.1- Lack of Motivation tends to shift towards Rote Learning

There are differences in the individual learning characteristics of the students. Those who have difficulties in understanding construction technology tend to associate themselves with rote learning, practicing sequential designing process, learning for passing examination and lack of motivation. Obviously, they are lacking in understanding the principles of construction technology thus, unable to relate these knowledges when he or she is working on a design. This empirical evidence revealed the first step in identifying key causes to the problems of learning and understanding construction technology in relation to the designing process.

Rote learning is a memorization (often called mugging, cramming, parrot fashion) technique based on repetition. The idea is that one will be able to quickly recall the meaning of the material the more one repeats it. Rote learning is widely used in the mastery of foundational knowledge.

6.2 Problem no. 2- Studios without reference material labs

The rapid development of modern construction and material technology requires Construction Studios to be fully equipped with those 3d articulation of technology & material. Only charts and models and no Proper guidance about the structural mechanism and lack of material knowledge makes them ineffective, dilute and meaningless.

6.3 Problem no.3 – No scheduled site visits

Site visits play an important role in the teaching curricula as they get the students intact with the theory part and learn and absorb it more consciously with the practical exposure. But with no scheduling of those visits in the academics create a vast gap between the theory and application. Deriving a meaningful information content from every visit and making it an active part of the subject pedagogy can only fulfill the purpose of those visits.

6.4 Problem no.4 – Lack of co-relation between Design & Construction

Significant relationships were found between understanding construction technology and the performance of the students in the designing process in the aspect of: the ability of the students to think construction and design (theory and practical) concurrently, to relate construction method, techniques and materials into design, to relate construction technology with the whole design requirements and to use construction technology as one of a design generator and hence, resulting in a superior design results and producing a more confident students . This implies that understanding construction technology is interrelated with understanding on the practical application of construction technology into designing process as a whole.

6.5 Problem no.5 Lack of practical exposure knowledge

1. Exposure to professional field in terms of Building Material Knowledge and Building technology is very important for construction.

2.Lacking of which may lead to problems in identifying and placement of right kind of material according to need and estimation.

3.Estimation/Budget is also a very important factor for building construction due to it ,a construction can be done in number of ways using n number of materials, so without having proper knowledge and in-depth market survey of different materials it is hard for a designer to give the best output to fulfill the client requirement.

4.Lack of market visits and factory and outlet visits create a gap between the current trends of market and designer tool. It is duly recommended for an architect/designer/scholar to be strictly aware of the market trends and new technologies.

5.Material selection is very important in building construction as it may lead a project budget to rise or fall. So conscious material selection can only be done when the students will genuinely understand the material science by going on sites and understand the texture and material and get familiar to its use and advantages thoroughly.

6.Only the studios and web research cannot be helpful in getting familiar with the building material , for example for quality control and site monitoring a good knowledge of material is very important. As these days every material is available in second copy

or lower standard in cheaper rates, you cannot easily judge the material in one go.

VII. PROGRAM OUTCOME

Program outcomes are narrower statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviours that students acquire in their matriculation through the program.

- The outcome derived from first year is to familiarize the students with constituents, properties and uses of traditional building material used in construction.
- To understand the usage of the traditional building material in simple building works. To make students familiarize with the basic building construction practice on site.
- Second year inculcates material science of finishing materials and elements of carpentry to the fullest extent.
- Third year is dedicated to direct the students towards the usage of diverse materials in the field and learn about various detailing specific to construction.
- Fourth & final year lays the foundation of working with structural steel and R.c.c. in both residential and industrial scale with accordance to seismicity and speedy construction.
- The overall programme outcome of building construction is to skill the scholar to constructivism rather than just conventionally training the basics and material knowledge.
- Constructivism is constructing knowledge rather than just passively taking information.

VIII. SYNCING DESIGN WITH CONSTRUCTION

The lack of coordination between design courses and construction technology courses (including working drawing, detailing, specification, contract documents and professional practice etc) has resulted in the establishment of the idea that design is the only creative and enjoyable process in architectural education.

This has resulted in students becoming more appreciative in the creative aspect of designing and less concerned about technical matters which are equally important, when one is given the task of designing a building. However, this is further aggravated, by the fact that construction technology is essentially mechanical, even boring which makes the understanding of such subjects from its practical and theoretical aspects difficult to be understood by these students (Fethi, Mahadin et al., 1993)

Therefore a very major aspect in which we are lacking is synchronizing other subjects especially design with construction. Personalizing construction with other subjects leads it into a playful activity and rationalize the subject more creatively.

IX. LEARNING BY DOING (CONSTRUCTION YARDS & WORKSHOPS)

Construction in itself suggest –the action of building , so in that fashion Activities form an integral part of learning. Learning by doing refers to a theory of education expounded by American philosopher John Dewey. It's a hands-on approach to learning, meaning students must interact with their environment in order to adapt and learn.

Learning by doing is the process whereby people make sense of their experiences, especially those experiences in which they actively engage in making things and exploring the world.It is both a conceptual designation applied to a wide variety of learning situations (in fact, as some would argue, to all learning), and a pedagogical approach in which teachers seek to engage learners in more hands-on, creative modes of learning. Construction Yards & Workshops play a very Important role in the overall understanding of the subject by doing experiments on the field and sites.

All Architectural Colleges in different parts of the country are promoting these Workshops and construction Yards as their integral part of curriculam. Various activities Promote the technical understanding of the various construction systems used in current scenario of the world. Material specific Knowledge and factory visits enhance the student’s skills on different material selection and their usage in the field of construction.

X. COGNITIVE LEARNING

Cognitive learning is a style of learning that focuses on more effective use of the brain. To understand the

process of cognitive learning, it's important to know the meaning of cognition. Cognition is the mental process of gaining knowledge and understanding through the senses, experience and thought.

Every individual has the tendency to forget. Proper use of visuals aids helps to retain more concepts permanently. Students can learn better when they are motivated properly through different seminars, construction videos, films etc.

COGNITION is Intellectual Development where the following parameters are to be used

1. Knowledge – The student should remember or recall whatever has been learnt
2.Understanding – He/she should be able to explain what he/she has learnt
3. Application – Should explore or discover ways to apply the learning to their own work
4. Analysis – He/she should decipher the learning components into smaller simpler components for further synthesis
5. Synthesis – Should be able to summarize or combine the entire process of learning through process.

Audio visuals aids provide complete example for conceptual thinking. Being able to view the person speaking gives his words more power than if the individual was merely heard. After all, facial movements and gestures are a valuable addition to the communication process.

XI. COLLABORATIVE LEARNING

Collaborative learning is stated as Superior Learning from Individual learning.

In this learning students are asked to participate on collective task in small groups to complete a collaborative activity and learn by socio-interaction and experience of interaction. Learning in group is far better than learning in isolation (stated by various scientists). Best method of learning is when students will teach students. It has a important relevance with the subject Building construction and construction industry. This gives opportunity to organize an individual to work in collaborative team of people in academics and professional field and learn more aptly by shared experiences of other individuals.

Group working is a way of empowering students to perform wider academic goals and develop a cooperative and highly advance skills of performance.

This learning enhances the results of performance and excelling standards. This will direct us to give more attentions to Construction Workshops, construction yard activities and Site visits. By allowing this learning in construction subject will greatly show better results in the architectural education and surely in practice.

XII. CONCLUSION

More focus in teaching Building construction to the students must be given to “Learning by doing” means more power to be given to Workshops, construction Yards & site visits because the nature of the subject itself promotes the involvement of the learners by some activity.

This will add more clarity in construction detailing and working drawings which are lag behind in present context of education. We have to understand that for a aesthetically pleasing design the construction methodology should be smart & functional and its detailing should not be putted into some other hand. Construction details are as playful as design is. We need to just sync the theory into practicality.

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