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Realizing participatory model of teaching in architectural education: Towards participatory building services studio from theory based classes

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Abstract*— The basic function of a building is to provide comfort and functionally sound shelter to its occupants for which building services plays an important role as it provides an environment controlled spaces. The limited theoretical exposure of the subject for a semester results in lack of complete knowledge of the subject, which results in poor performance of built environment designed by young graduate architects. There are various teaching models that have been defined by different theorist like Black box approach (by Christopher Jones, 1970), Glass box approach and participatory model (by Sanoff 1978, 1988, 1992) as a community design or action research approach. Moreover, these models also require effective tools to execute education for better adaptation of subject integration. A study had been done to derive the appropriate teaching methodology by comparing traditional approaches with innovative participatory teaching approach for this subject in order to upgrade the design skill of students. The research paper explains the application of participatory teaching model and efficient tools viz. Full scale modeling and user-centered approach for teaching building services i.e lavatory design in architecture education. Recommended Teaching methodology can be seen as an alternative method for the academician to deliver the knowledge and enable them to enhance the understanding of the subject in the students.

***Index Terms*— Building services, Teaching model, Architectural education, Full-scale model.**

I. INTRODUCTION

Architectural education is a unique branch of education that requires creative education system to enhance performance of the students. In any academic institution that offers a professional degree in architecture, the question of the relationship between the design education provided and the skill required for the successful practice is of prime importance. Therefore, the design studio and overall philosophy of architectural curriculum requires attaining high level of integration and application of social science, spatial arrangement skills, technology, engineering etc.

Learning of building services is regarded as indispensible for architecture education. It has been observed that this subject is generally taught to architecture students to a limited extent which results lack of in depth knowledge of the subject and thereby poor performance of building services is observed. The overall aim of this paper is to illustrate the methodology adopted by the author to test the tools of learning as a participatory model of teaching, for the building services education (lavatory design); and to enhance the value of the subject amongst the academician and enable them to enhance the understanding of the subject in the students.

II. LITERATURE SURVEY

Teaching architectural subject has been criticized in the last three decades. A growing dissatisfaction with the current situation in design education is the main concern of researchers and academicians who have voiced thought that the education of future architects needs to be more responsible to the social demands of contemporary societies (Banham, 1981; Boyle, 1977; Wolfe, 1981; Juhasz, 1981; Bowser, 1983; Mayo, 85 & 1991; Ozkan, 1986; Cuff, 1991; Schon, 83,84,85 & 1988; Gutman, 68,84,87,88 & 1992; Gerlenter, 1988; Dagenhart, 1993; Watson, 1993; Weber, 1994, Ashraf Salama; 1995 and others). Ashraf Salama; 1995, identified one of the major problems in architectural education is; subjects in architecture does not simulate the interaction with clients, and users, which characterizes the real life situations. As a result, there is a gap between what student learns, and how he/she will practice. Diekmann and Nelson (1985) examined 447 construction claims in the united stated government and found that 46% of the claims were due to design errors. An evaluation study has been conducted to assess the quality of a large numbers of buildings in the UK; 15 housing projects, with a total of 779 housing units. An average of 28 faults per housing unit have been found, where half of the faults have their origin in design and the other half are site related. The Seely (1987), study also showed that 58% of defects are caused by faulty design, 35% are from poor operation and installation, 12 % from poor materials and systems, 11 % from unexpected users requirements. Design deficiencies are major contributors to latent defects and such deficiencies can only be prevented by improving design skills (Low and Chong, 2004). The above studies indicate that, design skills can be improved by selecting right models of teaching.

Bruce joyce, Marsha Weil, Emily Calhoun, 2011 stated models of effective ways of teaching is a key to enhance capability of students to become more powerful learners. A well-designed model can helps student to build effective

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knowledge as it is rightly said "a good teaching is ¼ preparation and ¾ theater".

Information processing model, social family model, personal family model and behavioral system models are explained comprehensively in various literatures. These models have its own advantages and also limitations. Salama in New trends of architectural education analyzed some generic design decision models for teaching architectural design as a conventional approach of viz; the intuitive model as "Black box approach" (Jones, 1970) characterized as design occurs inside the designers brain and act of design is completely out of logic. The Rational model referred as "Glass box approach" (Jones, 1970); where design may not be having convincing reasons of all decisions. The participatory model referred as "Community design or Action research approach" (Sanoff, 1988, 1990 & 1992) with the introduction of users in the process of decision making. This satisfied needs and value of end users and should be added in conventional design approach.

Slama explained the participatory model as to develop design by engaging people in the process of making decisions. A systematically, and consciously articulate methods of transforming behavioral information in to architectural form by giving exposure of management of the design project from inception through programming, encountering users and environmental constraints. However, it is very important in participatory model to understand the purpose and context of the tools and techniques and to customize them accordingly. (Elizabeth B.- Sanders N., Brandt Eva and Binder Thomas, 2010)

Full scale simulation is a user centered participatory tool that uses real life people to learn about how environment contributes to safety, usability and independence, and it has been used successfully in environmental design research, in facility planning, and in accessibility (Mullick 2012; Danford and Steinfeld 1999).

III. INTEGRATION OF PARTICIPATORY MODEL INTO ARCHITECTURE EDUCATION

Salama, 2005, stated that to design; one should undertake a series of activities that lead to desired and results. To achieve this capacity of designing; architectural education and classes should be well equipped with the advance models of teaching and practice. As a pilot exercise an initiative was taken by School of planning and architecture Bhopal by organizing a workshop on full scale simulation in a National design competition in the year 2014 to comprehend the basic need of participatory model in architecture. It has been observed that by adopting participatory methods in the workshop had significantly increased the learner's skill and interest. After achieving desired result in the pilot exercise, there was a question that what would be the implications; if the same model and tool is introduced in the curriculum of building services to design an efficient lavatory fit in with all accessories required and resulting zero defect design as an end product accepted by the user groups. In view of drawing inferences, a research based studio had been conducted to test the result of participatory model and full scale simulation tool in a six monthly (one semester) building services classes. The aim of entire exercise was to test the participatory teaching model in architecture education and full scale simulation model as a tool to execute the same. Prior to the respective exercise, building services classes were exclusively based on theory and lectures.

This research shall consequently add to the body of knowledge for space design in architecture that uses expected functions and lifecycle. This exercise based research was conducted with the following objectives:

- To understand well established participatory teaching model and its benefits for building services education in an undergraduate program of architecture.
- To test and develop; tool and techniques of learning building services in Architecture through participatory model.
- To develop innovative and contextual research tools to investigate effective design learning.
- To validate the model and tools in architecture education as an example by comparing its end result and draw conclusions on theoretical and practical implications of employing this narrative teaching approach.

In view of the above mentioned objectives, following were the stepwise strategy outlined and executed over the entire semester of second year B.Arch students.

a) Firstly the core concept of building services i.e plumbing design and layouts were made clear to the students with complexity and difficulties of design process. Students were asked to prepare a comprehensive single line diagram (SLD) for a high-rise residential building to understand the entire concept of plumbing, refer (Fig. 01). Further, a literature and market survey was conducted to enquire about the architectural requirement and about advancement in plumbing fixtures. Students had also referred various reports and brochures of international plumbing brands to enquire about the current as well as future sphere of plumbing services. The result of first stage Field exercise was, students began to understand the basics of plumbing services and specifications with an ease and also the gets an exposure of plumbing fixtures available locally and globally which shall help them in planning for plumbing services.

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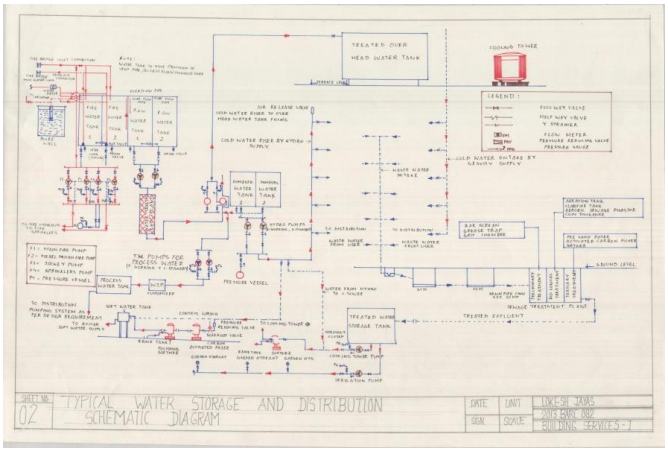

Fig: 1) Single line diagram of high rise plumbing.[9]

b) The second step was to introduce the participatory model by transforming the theory based class in to activity based studio. In this studio, students were asked to design a bathroom area in a group of 5 as per their own choice equipped with all basic requirements. As a result of this exercise not only the improvement was found in terms of design but also advance fixtures and accessories were specified by them. To complete the exercise a detailed area programming were made by each student by referring various literatures and guidelines. Interestingly, various designs had emerged with creative ideas and use of advanced sanitary fixtures. Some of the design was based on universal design for all and others on high-end interiors (Fig. 02). The second step was ended with the assignment on a lavatory design by referring literature and other design guidelines.

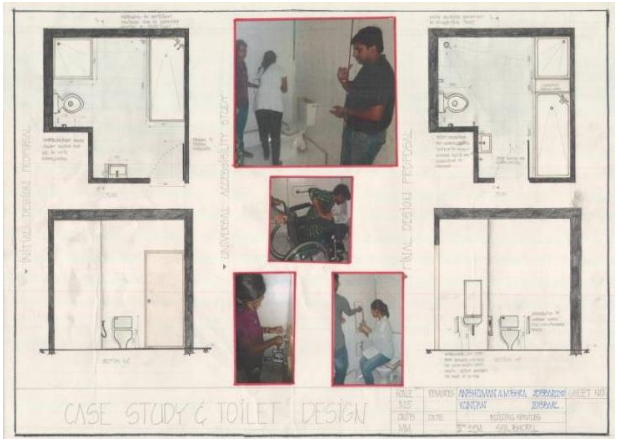

Fig: 02) Designing of a lavatory for a residential unit[9]

c) Adding value to the design process; a tool of Full scale simulation tool were adopted to support the participatory model. Full scale simulation tool provided an opportunity to the students to visualize and experience their design ideas in actual physical form in 1:1 scale (Fig.03). Full scale simulation tool also provided an opportunity to create physical environment flexible enough to dismantle and erect easily; and to place design elements in the spaces with ease and convenience; as per desired placement in the 3 Dimensional environments. This exercise had provided a systematic understanding of the spatial arrangement through interactions and investigated how enabling environments for the user can be achieved through participatory model, user input and full scale simulation tool. Further, students were asked to analyze the entire structure as a user. The third stage was ended with the assignment of comprehensive analysis of strength and shortcoming of their design.

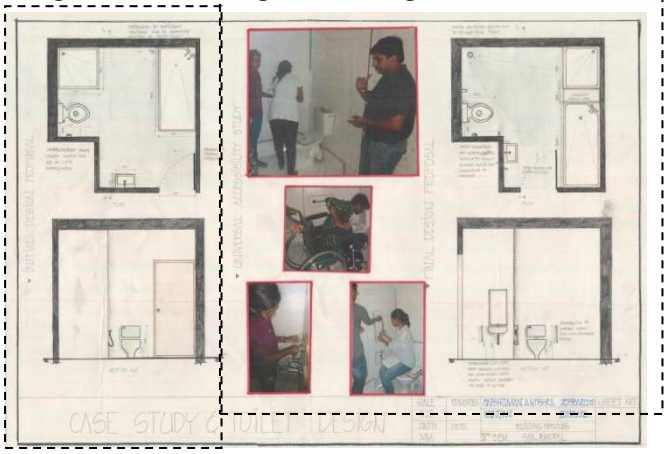

Fig: 03) Redesigning of lavatory space after user participation and use of full scale model.[9]

d) The last step of the entire exercise was to review their original design and to eliminate the shortcoming from the same. Students were asked to re draft the same with the corrections whichever they identified. By using full scale simulation tool for lavatory; analytical user centric data were well executed on accurate form by the students and it has been proved that by participating in the design process and use of effective tool are create improved and better design.

IV. CONCLUSION

Learning of any subject can be enriched by developing new frame work, approaching subject intent through systematic method of teaching. Architecture educators should adopt the new dimension of teaching methodology to engage the students in learning process. Learning activity using participatory teaching model with the application of full scale modeling and user centered approach as tools; would certainly increase the retention and comprehension of intended subject. Participatory model along with proposed tools are tested in this paper and finds that this pedagogical

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technique and exercise revitalize the energy of designing as it is not only stimulating the interest of students but also justify the design.

This studio exercise provided an intense and experiential design understanding to the students for the designing of a lavatory. However, participatory model along with its tools for effective execution viz. full scale model and user centered approach can be applied for design, teaching and learning of other physical environment.

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[9] Fig. showing student works during whole teaching process at school of planning and architecture, Bhopal, building services class, sem-iii, second year, batch-2013.

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