



Appropriate Pedagogical Approaches For Conduct of Site Planning and Built Environment Studio in Spatial Planning Education Programs

Valliappan Alagappan

Department of Planning, School of Planning and Architecture, Vijayawada, Andhra Pradesh India.

Email: valliappan.al@spav.ac.in.

History:

Received: 25 May 2015

Accepted: 14 September 2015

Available Online: 30 September 2015

Keywords:

Site Planning, Space, Design, Housing, Density

Contact Number:

+91-866 2974400 (V. Alagappan)

ABSTRACT

Spatial planning education is multi-disciplinary in nature and particularly site planning needs exposure to Engineering, Architectural, Landscape, Sociological, Economic, and Infrastructural aspects. The curriculum of the spatial planning program introduces the site-planning studio (multi-level design and planning) at the initial semesters without introduction of single space design and planning. Due to inadequate exposure the students find it difficult to plan and design residential layouts in the planning studio. The site-planning studio provides a good understanding of how the articulation of density can modify the built form and environment. There are considerable lacunae in the adopted approaches of site planning studios in various planning schools. The author discusses in detail the varied methodologies and approaches adopted in site planning and built environment studio programs. The two pedagogical studios methods experimented in the site-planning studio were discussed at length. One method discusses from unit level planning and designing to block and neighborhood level and other method discusses from neighborhood to block and unit level. Within these two studio pedagogical methodologies, for conduct of site planning exercises two approaches were generally adopted i.e block-based approach and Design based approach. The characteristic features, outcomes, advantages and disadvantages of each methodologies /approach offer an understanding of how site-planning studios have to be taught in the planning program. The author emphasizes the importance of a gradual progression from a single space design and planning to multi-level design and planning for enhanced comprehension of students.

1. Introduction

Pedagogy is the science and art of education. It aims range from full development of a human being to skills acquisition (Margaret, 2010). The instructors or philosophical beliefs of instruction are harbored and governed by the pupil's background knowledge and experience situation and environment as well as learning goals set by student and teacher. Pedagogy shall be defined as "Teachers can plan, sequence, support and assess learning".

Learning's occur more effectively if teachers are explicit about what is being studied, why it is being studied and what will be expected of students at the end of the course, what Bernstein (1990 p.73) calls a visible pedagogy.

There is particular emphasis on the pedagogy of studio as well as development of creativity, a key skill for planners and other built environment professionals (Higgins and Reeves 2006). The studio is like a workshop, where students develop design solution to a given design briefs that may be defended in classroom or real setting. Skills for practice such as team work, collaboration and interaction, negotiation; dispute resolution, oral and graphic communication can be acquired in studio. The five C's like creativity, criticality, collaboration, citizenship

and contemplation are the key ways that studio teaching in particular can help prepare the students for the challenges for the future (Higgins et al, 2009).

A site plan is a graphical depiction showing the layout of a project. Site plans typically include the location, design, and specifications for roads, streets and parking areas; storm water management systems, wastewater management systems, utilities, and other infrastructure; structures; landscaping and common areas; and other facilities associated with the project (IDEM, 2007). Site planning and design is a process by which they follow a logical sequence of actions or events that must be carried out to arrive at a viable solution. It is a multi disciplinary problem solving operation involving architects, engineers, landscape architects, physical scientists etc. Site planning requires logical objectivity for some steps, but allows room for subjective design interpretation (Regional Research Institute).

Kevin Lynch (1984) outlines eight stage site planning cycle. It includes problem definition, analysis, program schematic design and detailed design development, contract documents, bidding and contracting, construction, occupation and maintenance. Simonds (1998) outlines six-phase planning design process, which includes commission, research, analysis, schematic, contract documents, inspection and

evaluation. Rochdale Metropolitan Borough Council (2009) reports on Design and Planning Process: A guide to good practice remarks that a well-considered design process is essential to developing good quality designs of buildings and spaces. The process will consist of a number of stages, including analysis of the site and its context design development, including exploration of development options and consultation.

Laurie (1985) point's outs inventory and analyses of selected parcel characteristics as well as its relationships with adjacent land uses provide determinants of form, constraints and opportunities for the location of buildings and conservation of amenities. The major components of site planning are site location and existing conditions (regulatory conditions, view, existing structures, micro climate, vegetation, geology and soils, topography, hydrology and drainage).

This paper discusses the studio program of 3rd semester Bachelor of planning course titled Site planning and Built environment. The learning objectives of the studio targets how the varied residential density alters the built form of the settlements and how integration of the subjects, assignments and faculty co-ordination related to it in various semesters leads to gradual progression and greater comprehension and understanding of studio project in the 3rd semester.

There is a quantum jump in the pedagogy from a single space designing and planning to multi-space designing and planning, the students must have an in-depth theoretical knowledge in varied subjects before indulging in site planning exercises. The time limitation for the site planning projects to be carried out in the third semester along with other subjects is three months. The author questions the time limit and the knowledge to be acquired by the students within that semester. This paper addresses the time limitation and the knowledge to be gained by the students for effectively undertaking site-planning projects. This article discussed the two studios pedagogical methodological experimentation and within these methodologies two approaches were generally adopted i.e. block based approach and Design based approach for conduct of site planning exercises. These approaches were compared for understanding the advantages and disadvantages of each approach.

The first part of article narrates the positivity of studio pedagogy in particular and Site planning context. The Second section discusses the curricula of School of Planning and Architecture in India. The Third Section analyzes the pedagogical approaches and methodologies experimented in the studios along with learning's from the projects. Finally the article gives future directions for conduction and integration of subjects/assignments for Site planning Studio.

2. Curricula of Schools of Planning and Architecture in India

The undergraduate program in Bachelor of planning in India are offered by the School of Planning and Architecture, New Delhi, Guru Ramdas School of Planning at Guru Nanak Dev University, Amritsar, Jawaharlal Nehru Technological University, Hyderabad, School of Planning and Architecture, Vijayawada and School of Planning and Architecture, Bhopal. During the Bachelor program, the students are exposed to knowledge of basic theories, techniques, and design concepts for working as experts for preparation of urban and regional planning, housing, transport planning, infrastructure planning, environmental planning and other related disciplines.

The course curriculum of this program is spread over eight semesters to attain proficiency in designing and managing projects of all magnitudes

from micro level unit design to the macro level regional development planning. The key feature of the course curriculum is its multi-disciplinary nature drawing from the fields of architecture, engineering, geography, economics, sociology, management, law, etc.; besides a spectrum of courses from mainstream planning (AICTE 2008). The model curriculum had been developed by AICTE for undergraduate course of planning and in all the institute the site planning studio is taught in third semester after the planning and design lab –I and II (Graphics and presentation techniques). In some institutes the site-planning studio handles the project related to neighborhood plan and cluster design without site planning exercises.

The model syllabus for neighborhood and site planning of All India Council for Technical Education (AICTE) suggests preparation of plan, sections, elevation and working drawings of low rise and high rise apartments units taking into considerations existing byelaws and as a follow up, undertaking exercise related to site layout, rough costing and preparation of model. Some institutes take up introduction to Building design, concepts, issues, preparation of detail studies of different rooms in residence, and then take up site and landscape planning related to site planning. Most of the institutes are taking up the single space designing and planning to site planning projects without multi space planning and designing.

3. Methodologies Experimented in the Site Planning Studio

3.1 Studio Pedagogy 1

The students were assigned a slew of topics related to basic terminologies of housing in order to understand the complexities and potentials of housing, housing policies, programs and projects. The topics assigned include National Housing and Habitat Policy (NHHP), Town Planning Schemes, National Building Code, Housing Programmes like Slum Improvement Programme, Rajiv Awas Yojana, Housing typologies, Housing Finance organization like HDFC, HUDCO, World Bank, Cost effective building technologies and materials organizations like Building Material Promotion Technology Council, Development alternatives, neighborhood theories, computation of housing need, demand and future requirement of housing stock etc. (Figure 1).

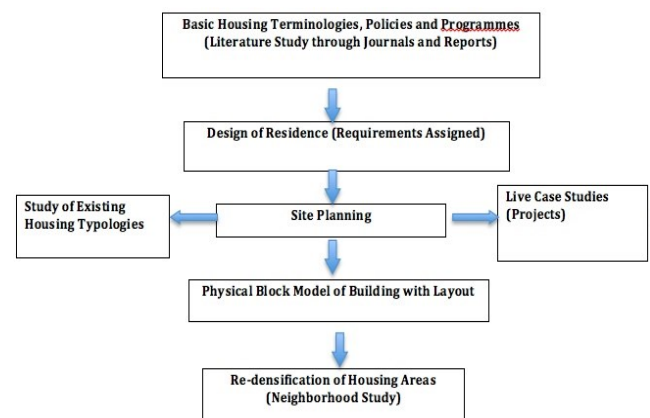


Figure 1 Methodology Adopted for Studio Pedagogy

3.2 Multiple Space Planning and Design

The students in the first year B. planning were introduced to design of a small residence. A plot size of 60'X40' with the requirement of a living room, dining, bedrooms, home theatre, playing rooms with the surroundings site features are provided. The rules and regulations had to be referred from existing building byelaws of the city. The students had to comprehend the various types of spaces like public, private, semi public and private spaces. The students referred anthropometric related standards for understanding human dimensions in usage of various spaces in a residence, while performing activities, sitting and standing, the space required for effective functionality of spaces. From the study they arrived at the requirement of spaces and their dimensions. They did preliminary site study in various aspects like soil, site surroundings, orientation and prevailing wind directions for identifying the constraints and potentials of site. With the help of knowledge gained in the first semester of Bachelor of Planning they develop basic understanding of various materials, construction methods, technology and structures (beams, columns, foundations and types of forces and reactions etc.). Refer to Figure 2.

The Planning and Design Lab of the first semester had given insights in understanding of scales, forms, shapes, drawing objects like trees, human postures and figures, furniture's, proportions by means of sketching live objects, drawing of plans, elevations and views, projections and perspectives. The surveying of land and its topography had been understood through the subject Surveying. The in-depth understanding of various subjects will lead the students for effective planning and design of residential neighborhoods.

The outcomes of the project of design of residence leads to a better understanding, in comprehension of volume of spaces, dimensions, interlocking of spaces, visual and sound privacy, building and land use regulations, minimum habitable room sizes, occupancy of house, location of windows and doors in a house, how the spatial configuration changes in respect to locations of circulations spaces like staircase, lifts and toilet spaces. Requirements of each space like furniture, carpets, material used, paints usage, cupboards, amount of sun lighting,

ventilation received because of one window, multiple windows how it will vary the space utility, volumetric and aesthetics. Minimum and maximum space requirements of individual, nuclear and joint families had been identified.

By combination of two or more spaces/shapes, negative spaces will develop and how it has to be avoided to form a positive space. Understanding the volumetric of spaces while designing of buildings using model act as a tool for pedagogy. Various types of constraints and potentials of site, climatic, regulations, social and financial aspects are to be understood for effective design and planning of spaces. Students develop understanding of functional relationships of spaces and hierarchy of spaces, dimensions, utility and user of spaces; daytime and night time usage spaces in order to have an effective design.

The students had understanding the volumetric aspects of spaces like square, rectangle, polygons, when they are using the shapes in their design. They can understand how many families can be accommodated, per capita space availability, gross and net density for individual plotted and Group development. They can understand the building byelaws aspects like ground coverage, total built up area, FAR, height, set backs, basement and parking norms etc.

The drawings prepared in the first year of Bachelor of planning shall be utilized as base for developing a service layout of a residence in the subject introduction to infrastructure for human settlements. The students will develop an understanding how interior plumbing and sanitation network is connected to exterior street level network. They will have better understanding regarding the flow, density and capacity of pipelines and their diameter, how to segregate the sewage, sullage and rainwater using different pipelines and to collect in respective tanks.

The quantum of water for existing and future had to be computed for design of overhead tanks, underground water tanks, septic tanks, recharge pits etc. The rainwater collected will be utilized for ground recharging and how it connected to storm water drainage. The expected outcomes like plan, elevation, section, views, and a model with exterior and interiors. After this exercise they graduate to next level of site planning with an assigned site, housing typologies and permissible densities.

3.3 Site Planning and Design of Residential Layouts

The site planning exercises involves understanding of various disciplines, multiple stakeholders' participation, constraints and potentials of various aspects. The site planning involves comprehension and understanding of subjects like sociology, economics, architecture, engineering, geology, environment, technological, transportation and cultural aspects. A site chosen for accommodating a large number of dwellers involves people of various behaviors and attitudes. Refer to Figure 3.

The students were assigned a studio brief of site planning with low, medium and high density developments with prescribed housing typologies involve mix of plotted grouped and row housing for all the income groups. Students have to understand the layout regulations, norms and standards, fire fighting regulations, norms related to staircase and lift provision for multistory buildings, provision of 20% land or buildings to EWS/LIG, minimum habitable room sizes, NBO standards/IS: 8888 to low income housing standards, minimum habitable and non habitable room sizes (toilets, kitchen and storage spaces).

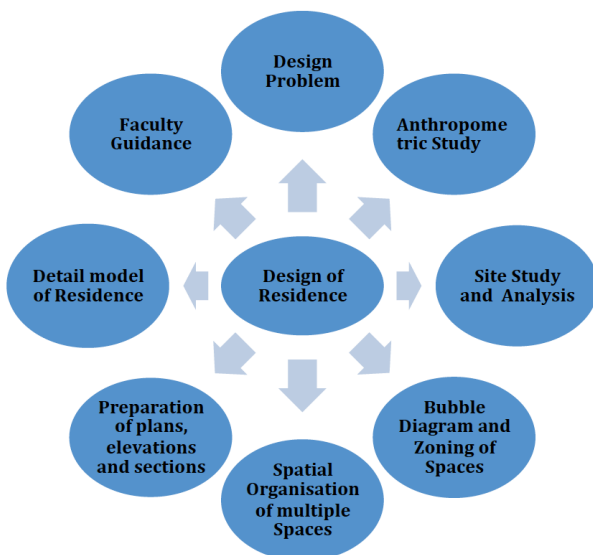


Figure 2 Planning and Design Process of Residence

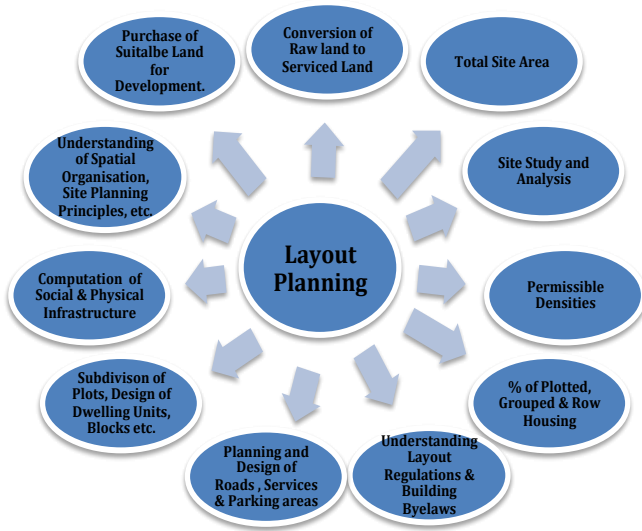


Figure 3 Layout Planning Process

The students are exposed to live residential projects, which are under construction in completion stages and occupied houses, which belonging to different typologies of housing. The typologies include row, plotted and group housing with physical and social amenities. The students had to understand the design of the dwelling, socio-economic aspects, building byelaws, maintenance and safety aspects, circulation routes (minor, major and pedestrian routes), parking spaces, different types of open spaces (public, private, semi public and private spaces), recreational areas for adult and children, service areas like lift, staircase etc, physical and social infrastructure. The students identify the issues related to residential layouts. They identify the strength, weakness, opportunities and threats of residential layouts.

The students start with individual design unit of a building either one type or with combination of one bedroom/two bedroom/three bedroom houses. Each unit of a dwelling is interlocked or attached with other units with common circulation space and service core to form as one block. Each block with other blocks arranged in clustered pattern, linear, semi circular, radial, gridiron and combination of pattern to create usable and incidental open spaces. There is a quantum jump in the pedagogy from a single space designing and planning to multi-space designing and planning, the students must have an in-depth theoretical knowledge before indulging in site planning exercises. Parallel the students had explored the computation of service networks in layouts and placement of water tanks, septic tanks, sewage treatment plants (STP), and electricity transformers. The site study will develop understanding of topography of the site to place the service networks and utilize the gravity for the flow of liquid to its destination.

The students develop an understanding regarding the width of the road to height of building, open space-built up relationship, distance between buildings, ratio of the width of the road to total length, integration of open space with built form, parking norm provision for two wheelers and four wheelers, different types of parking, understanding of gross and net residential densities, provision of facilities norms in relation to the planned population. The students gain understanding regarding the hierarchy of open spaces beginning from tot lots to area level, individual per capita open space, active or passive open spaces. Linkages and interrelations of open spaces from private, semi private, public and semi public. The site planning exercises will pose questions, challenges and answers as below:

- How different densities alter the built form?
- How various factors alter the built form?
- Problems and issues of various densities (related to built form, open space and infrastructure)
- When all income groups are living together as one community (Lower Income Group (LIG), Middle Income Group (MIG), High Income Group (HIG) and Economically Weaker Section (EWS)) it challenges all students to achieve inclusive design and pushes the students for identification of the design and planning tools to achieve the task. (Minimal requirement of LIG/EWS and maximum requirement of HIG/MIG).
- The site planning issues and problems are totally different if only HIG and MIG is the requirement of the layout.
- The site planning and design for LIG and EWS, achievement of density is more and differential norms and standards for facilities to be adopted for these income groups, to make it effective and implementable.
- Students develop understanding how different densities across the spectrum of planned and unplanned will give insight into nature of planning problems in the settlements.

Based on the available land, finance, infrastructure, social acceptance, context of development, material and labor availability, policies and program of government, the students will decide the nature of residential development to be proposed.

3.4 Factors affecting achievable density

In plotted housing development, the students will learn planning/subdivision of plots, plots width to depth ratio, number of plots in a row, each plot will have only one major access from roadways, setbacks for each plot, area available for development after setbacks, minimum frontage requirements, minimum width of plot requirement for better access and minimum habitable room sizes.

Different types of layout pattern create usable and non-usable spaces. The students gain insights regarding the pros and cons of patterns like radial, gridiron pattern, linear pattern, combination of all these patterns how it will influence the built form and density. The entire site must have setbacks for fire fighting or emergency purposes. The design of buildings has one solid block with intermediary service core will leads to more achievable densities. Block by block design leads to wastage of spaces between blocks and less achievable densities. The students gain understanding related to achievable densities.

Achievable Density is Affected by Six Factors (Refer to Figure 4):

- Land (available of serviced land for residential development)
- Housing typologies (Plotted, Grouped and Row housing)
- Plot and Dwelling size
- Layout pattern (Grid iron pattern, linear pattern, radial pattern, mix of patterns, clustering pattern)
- Shape and form of building
- Climatological factors
- Regulations: layout regulations (open spaces, facilities provision, roads) and building regulations.

The outcome of the site planning exercises they develop a site model, site layout, individual block plans and a design of respective units and various layers of site layout.

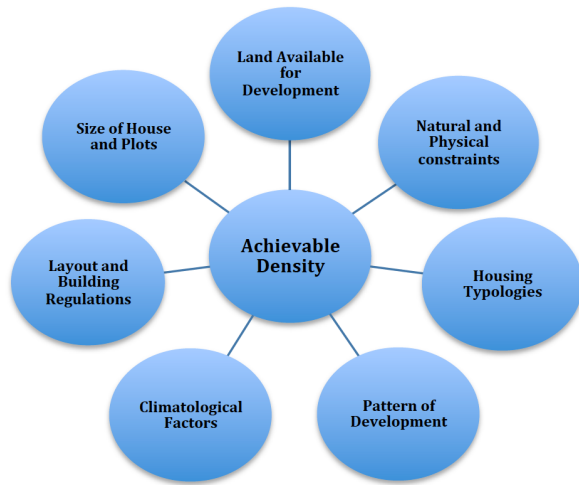


Figure 4 Factors Affecting Achievable Densities

After completion of site planning layout, a third project related to re-densification of housing areas is taken up. Three areas were identified on the basis of criteria like low density, FAR, ground coverage and height in order to have a scope for future re-densification and re-development. Through these exercise students will identify each plots scope for further re-densification in terms of FAR, ground coverage, plot size, frontage, road width, infrastructure availability like existing OHT, capacity of sewage and water supply lines, age of building, ownership of plots, rented accommodation structural stability and measure the available land and scope for horizontal and vertical development.

They develop three scenarios one with existing norms and another development with increased FAR, ground coverage, height and development regulation for merging/pooling of land/plots, minimum size of plots for group/apartment development. With the support of these exercises the students identify the space availability for residential development and increased number of dwellings for future population. Third type of scenario is complete re-development by demolition of existing houses because of age, land price, dilapidated buildings and selling a part of land abutting the roads for remunerative purposes and developing the inner areas with

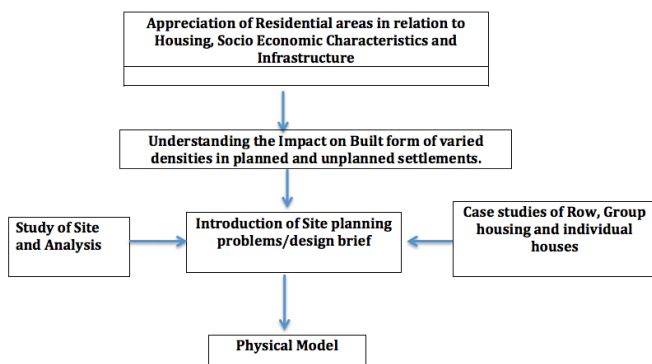


Figure 5 Methodology Adopted For Studio Pedagogy Two

increased FAR with high-rise and high density for accommodating the existing and future population with new dwelling units and enhanced facilities. The development can be public, public private partnership with relaxation of fees, taxes, etc.

3.5 Studio Pedagogy Experimentation 2

The first project assigned to students in this studio is Appreciation of residential areas in Vijayawada. The settlements identified were in old part of town, along slope of the hill and riverbanks, Andhra Pradesh Housing Board colony, planned posh residential areas. The aspects like socio economic characteristics, housing characteristics, infrastructure facilities availability, comparison with standards, identification of issues, proximity analysis and SWOT analysis and proposals for the area.

The students learnt sampling techniques and based on simple random sampling, they collected information through household survey samples. Analysis were carried out based on employment profile, occupations, classes of income, expenditure pattern of H/H, average income, per capita income, housing characteristics (plotted and grouped development, average plot sizes, occupancy rates, net and gross residential densities and parking aspects) infrastructure facility availability (physical and social), recreational aspects, and priority issues are identified. Trips performed and modes chosen to carry various activities of the town, accessibility of certain modes in the settlements are also studied.

What are the problems of planned and unplanned settlements in terms of settlement pattern, socio-economic aspects, housing characteristics, physical and social infrastructure availability, proximity to facilities and amenities, issues and problems, etc. Few stretches of commercial street are identified to study nature of commercial activity, types of commercial activity, mixed use activities and survey undertaken to understand the number of employees, income generation of shops, facility requirement, and distance travelled from home to shop, location requirements of godown. Customer shopping behavior and issues, etc.

How temple activities influence the settlements surrounding it and related activities (Area of influence). The students understood how to carry out land use survey, household survey, stakeholder consultations etc.

In continuation to the appreciation studies, the Site planning brief were assigned in three groups based on high density, low density and medium density with mix of housing typologies and layout regulations of the city were provided. Theoretical inputs like elements and design principles, Site selection consideration and analysis, parking, open space, circulation patterns, privacy, security, streetscape, acoustics, scale, building modulation, architectural elements, building material, color, neighborhood computability and spatial organization, layout regulations, building byelaws were delivered to students. The student developed understanding of various densities impact on built form. Some students able to achieve more open spaces with provision of facilities, less open spaces and provision of facilities and in some cases achievement of dwellings is a big task with circulation and minimum basic facilities.

From the second studio pedagogy the students were able to understand the issues of planned and unplanned development in the settlements and addressed those issues in the site planning exercise by planning and design solutions. The case study approach to various residential layouts in the first studio pedagogy is less effective than the appreciation of residential areas in planned and unplanned areas.

4. Pedagogical Approaches to Site Planning Studio

The two approaches are Block based approach and Design based approach. The characteristic features, outcomes, advantages and disadvantages of each approach, offer an understanding of how site-planning studios had to be taught in the spatial planning programs.

4.1 Design Based Approach

The design brief for the site-planning project indicates the requirement of housing typologies, number of dwelling units, minimum area, layout and development regulations and the expected outcome of the project. The student had to understand the elements and principles of design, spatial organization of blocks, utility and facilities, norms and standards for effective designing and planning of plots and dwelling units.

4.2 Building Block Based Approach

The drawings of building blocks of different income groups are distributed to the students and a permissible site density (gross residential density) and Floor Area ratio (FAR), ground coverage, height restrictions had assigned to the students. The students had to compute the housing mix of income groups, number of blocks required to fulfill the permissible densities with the fulfillment of layout regulations like

required internal road width of major and minor roads and the facilities like physical and social infrastructure and the requirement of landscape aspects for planning and design of residential areas.

4.3 Comparison of Approaches

The approaches were compared with respect to volume of spaces, spaces requirements, habitable room sizes, design flexibility, climatic aspects, site conditions, lighting, ventilation, interlocking patterns, spatial configuration of built patterns, views, finance, fire norms, etc.

5. Students Feedback

A list of questionnaire as given below was prepared and focus groups discussion were conducted among Bachelor of planning students of various schools regarding the conduct of site planning and built environment studio. A sample of bachelor of students from various planning schools whose Grade point average ranges from 5 to 8 were taken into consideration and questionnaire were circulated and made into groups and discussed the pro and cons of site planning studio exercises.

Table 1 Comparison of Approaches

No.	Design Based Approach	Block Based Approach
1.	Comprehension of volume functional and spatial hierarchy of spaces.	Difficult to understand the Volumetric functional, spatial relationship and hierarchy of spaces.
2.	Design flexibility shall be achieved in terms of alteration of shape and form of buildings.	Design flexibility is non achievable
3.	Requirements of each space with furniture, utility and user can be designed.	Each space utility and function is same for all users.
4.	Space requirements for single and multiple families (per capita space availability) shall be calculated.	Per capita space availability of families shall be computed.
5.	The pattern of blocks and interlocking can be widely varied.	Monotonous pattern of blocks / interlocking of blocks
6.	Minimum habitable room sizes shall be achieved.	Hard to achieve minimum size of habitable and non-habitable rooms because of rigidity of building plans.
7.	Climatic requirements can be achieved.	Climatic requirements can be fulfilled to certain extent.
8.	Amount of lighting ventilation and privacy, sound aspects can be understood space wise.	Difficult to ascertain the lighting, ventilation, privacy and sound aspects.
9.	Maximum density, Ground coverage, FAR, built up area, height and basement and parking norms shall be achieved.	Two wheelers and four wheelers parking norms difficult to achieve.
10.	To interlock combination of units, circulation areas and service core to form as one block or continuous building with intermediate service cores shall be planned and designed with slight modification in	The interlocking of units, circulation areas and service core to form as one block or continuous building with intermediate service cores shall be done without modification in the original building plan.
11.	The Single, doubly and clustered loaded corridors and building blocks on one, both and multiple sides with service core functionality shall be understood.	Building blocks, service core functionality shall be understood in case of single doubly and clustered loaded corridors.
12.	Spatial configuration of linear, clustered radial and grid or combination of built patterns/built forms shall be achieved.	Spatial configuration of clustered built pattern shall be achieved with wastage of incidental spaces.
13.	Fire fighting regulations, emergency exit provisions, norms related to staircase and lift provision	Fire fighting norms and exit provisions achievable but with wastage of circulation space and area.
14.	The site conditions internal and external, climate, building regulations, financial and society acceptance alter / change the built form.	The density affect the built form can be understood but not other factors related to it.
15.	Utilization of views from external and internal of site is achievable.	Utilization of views from surroundings is difficult to achieve.

- What have you learnt from site planning exercises? List out any five important learning's.
- How case studies to various housing typologies help in understanding and executing site-planning exercises?
- What are the difficulties faced in site planning exercise?
- What do you suggest to overcome the above-mentioned difficulties?
- How in general have you used or applied the above knowledge in understanding of planning projects/exercises?
- What are the subjects that are essential and required to be taught in order to do an effective site planning exercise?
- Any other relevant observations/suggestions/remarks.

The important learning's suggested by the students include computation and understanding of densities, housing typologies, site analysis, usage of building bylaws (setbacks, FSI/FAR), allocation of housing to various categories of Income groups, accessibility, circulation aspects, built up open space relationship, climatological aspects etc.

The case studies of similar characteristics must be chosen for site planning exercise. The field case studies chosen must reflect the planning and design problem brief assigned to students for better understanding and designing. Case studies gives an insights into various typologies of housing, socio economic types and sizes of land available to various income groups, density distribution, utility planning, affordable and low cost housing.

The difficulties/challenges faced by students, include allocation of space for EWS/LIG, Vastu shastra and traditional restrictions, achieving the open spaces (tot lot level to area level) with provided density, integration of HIG, MIG, LIG and EWS (housing mix) with common facilities, overlapping of building bye laws and policies and giving justice to EWS and LIG section. The challenges can be overcome by taking more case studies, workshops and effective reviews.

The knowledge gained in site planning is utilized by students in the neighborhood, area and master planning preparation tasks, how by altering various types of densities and housing typologies alter the built forms internal and external environment. The subjects to be taught for effective site planning exercises included infrastructure planning, real estate planning and management, planning practice, planning techniques, affordable housing, energy efficiency, technologies related to housing.

6. Conclusions and Future Directions

The site planning is a multi-disciplinary problem solving operation involving disciplines like architecture, engineering, landscape, sociology, economics, geology, physical scientists etc. There are various layers of site planning like building layers, circulation network, landscape aspects, service network, design of individual buildings/blocks, facilities etc. These layers are to be integrated in an effective manner to make it functional. The site planning of a residential layout, when it is taken to higher semester and with the theoretical backup of subjects like introduction to infrastructure for human settlements, utilities services and planning, the water supply and sewer network shall be planned for various residential layout planned by students to understand the constraints, problems and issues in designing and planning of utility lines. The subjects in higher semesters like landscape planning and ecological planning learning shall be integrated with the site planning exercises to understand the environment related issues and to quantify the ecological impact on the site and surroundings because of the proposed developments. The landscape elements can be suitably

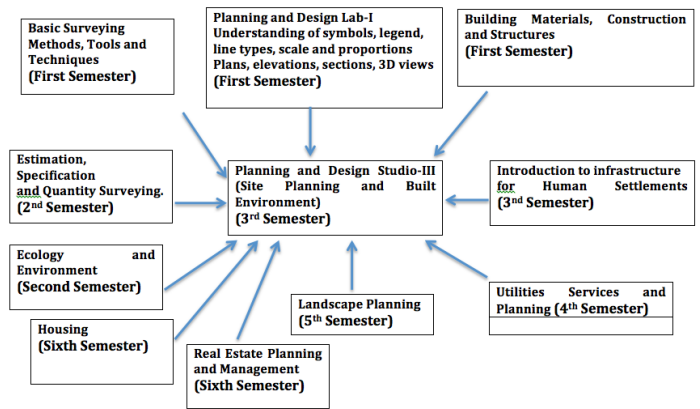


Figure 5 Essential Integration of Subjects For Effective Site Planning Studio

integrated in the proposed residential layouts to integrate the built form with the landscape.

The students through site planning exercises will gain an understanding how density will affect the built form. The Scenarios shall be developed based on the amount of developed land available for urban development. The Master plan of any city computes the available land necessary for existing and future development for each type of land use. In case of residential land available for development, students will compute the existing shortage of dwellings and the future need and demand will be estimated. Depending on the amount of land and shortage in various income groups, and the demand of various housing typologies will lead to fixation of residential densities in urban areas. Students can fix the typologies of housing mix and permutation and combination of typologies like row housing and plotted development, plotted and group housing development, group housing and row housing or only plotted, grouped or row housing based on demand and affordability. The students understand the nine categories of densities and rise like 1. High rise high-density developments, 2. Low rise high-density development, 3. High rise low density development, 4. Low rise low density development, 5. Medium rise medium density development, 6. Low rise medium density development, 7. High rise medium density development, 8. Medium rise low-density development, 9. Medium rise high-density development.

The projects and assignments to be introduced in various semesters have to be decided and brainstormed along with the respective faculty members and Head of the Department before the start of the course to create interlinking of subjects. The interlinking of assignments at various semesters leads to better comprehension and understanding of the subjects from parts to whole in a gradual progression shall be achieved.

Acknowledgements:

The author would like to thank the passed out Bachelor of Planning students of batch 2009, 2010 and 2011 and existing batch 2012 for encouraging me to adopt different pedagogical methodologies in the Site planning and design lab/studio of 4rd and 3th semester of B. Planning course. I acknowledge the support and encouragement of the former Heads of Department of Planning for allowing me to pursue different pedagogical approaches in Site Planning and Design studios.

References

All India Council For Technical Education (2008). Model Curriculum for Undergraduate Course in Bachelor degree of Planning. Government of India.

Bernstein Basil B (1975). *Class and Pedagogies: Visible and Invisible*. Washington. Organization for Economic Co-operation and Development Publications.

Higgins, M and Reeves, D. (2006). Creative thinking in Planning: How do we climb outside the box? *Town Planning Review* 77(2): 221-244.

Hyland, K (2007). Genre pedagogy: Language, Literacy and L2 writing instruction. *Journal of Second Language Writing* 16:148-64.

Indiana Department of Environmental Management (IDEM). (2007). *Planning Principles and Design Considerations*, Chapter 4. Accessed September 10, 2015. www.in.gov/idem/files/chap4.pdf

Lalenis, K. and Sapounakis A. (2010). From Decay to Opportunity: Planning Education as a Means for Reversing the Impacts of Economic Crisis. *CEBE Transactions* 7(2): 70-94

Laurie, M (1985). *An Introductory to Landscape Architecture*. Upper Saddle River: Prentice Hall Publications.

Lynch, K. ed. (1984). *Site Planning*. Cambridge, MA: MIT press. Regional Research Institute. *Site Planning and Design*. Accessed February 15, 2015. <http://www.rri.wvu.edu/webbook/mcbride/section3.html>.

Malloch M, L. Cairns, K. Evans and Bridget N O Connor. (2010). *The Sage Handbook of Workplace Learning*. London: Sage Publications.

Mc Conatha et al (2014). *Mobile Pedagogy and Perspectives on Teaching and Learning*. Hershey, Pennsylvania. IGI Global Publications.

Rochdale Metropolitan Borough Council. (2009). *Design and Planning Process: A guide to good practice*, Greater Manchester, England.

Simonds, J.O. (1998). *A Manual of Site Planning and Design*. New York. McGraw Hill Professional Publications.

Woyseth, D.H. (2007). Design Studio Pedagogy: Horizons for the Future. *International Journal of Architectural Research* 1(3): 194-206.