An Investigation of Child Centric Design in Urban Indian School Environments

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Abstract— Environ-behavior studies emphasize the deep influence of built environs on users. The tender impressionable minds absorb silent lessons from the spatial experiences of their schools. Investigating with a walk through, photo documentation, creative exercise & questionnaire for students, Post Occupancy Evaluation (POE) identified lacunae, which neglect the child, making him negotiate with his environs. This paper asserts that incorporation of identified child centric parameters can lead to psychological & emotional comfort & should be a basis for spatial configuration & architectural expression in school designs, thus urging for user responsive environs rather than creation of mere iconic forms. The paper concludes that the child user is indeed a marginalized one & emphasizes an urgent requisite response from designers of physical spaces.

***Keywords*—** child- centric design**,** learning environs**,** marginalization, post occupancy evaluation.

I. Introduction

A. Urban Space & Design: The Crucible of Human Experience & Learning

THE entire urban fabric & all the behavior within it are ultimately products of human decision making'.(a- La Gory & Pipkin, 1981)

Different human communities conceive spatial design in consonance with ground situations & cultural responses. But once made, this spatial 'container' regulates human activities & deeply influences the thoughts & actions of the users. In urban centers this cause & effect is more emphatic as the scarcity of land makes the designed 'built' very controlled & specific.

'We shape our buildings & afterwards our buildings shape us' stated Winston Churchill (Churchill, 1948). Human behavior is shaped by the nature of the physical surrounds has been proved beyond doubt. Architects & planners; the sculptors of spaces thus have a very responsible role to play since their creations exert great influence on the people who dwell in them. This constant spatial experience promotes perpetual life long learning. Since the relationship between the built & the living that are nurtured within it is so intrinsic, it goes without saying that positive humanistic experiences promotes learning of enduring human values. At the same time, the contrary also holds true.

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II. Environ-Behavior Relation: Some Basic Assumptions For Physical Design

The user & his needs thus become one of the primary concerns of the physical designer. Although the field of environ- behavior relation is very nascent, significant strides have been made & acknowledged. The social sciences & architecture now share a large common ground. Behavioral design directs attention to the total needs of people, recognizing that a container of activities can never be more successful than the activities themselves. (Heimsath, 1977)

Some basic & universal spatial requirements of the human inhabitants have been identified as the need for 'privacy', which translates as a need for 'personal space'. This defines the concept of 'territoriality'. Once achieved, the need to make this individualized space 'safe & defensible' automatically comes to fore. The need to 'interact socially' is also an acknowledged necessity. (a- Sommer, 2007)

The climate- culture synchronization that affects built environments also condition the nature of spatial experience. This brings in the aspect of symbolism & non-verbal communication as additional parameters of physical design. (Rapoport, 1990)

III. The Mature Human as the Natural Basis for Design

As is obvious, man, the sole initiator of the built environment, becomes the underlying influencer of its nature. With the recent awareness of his intrinsic social & psychological needs, the possibility of making responsive spatial environments has indeed become possible.

A. But these still stop short of being holistic & all-inclusive.

Man in his mature physical & mental dimensions & man as the perfect human with his sphere & scope of activities has been the measure for determination of physical design parameters. Without exception this has always been the most natural & accepted basis in the conception of the built space.

In a world that is getting sensitive to natural aberrations such as being 'differently abled' or 'challenged' & supports & encourages the concept of 'inclusive' design, this basis of 'the perfect man' seems inadequate indeed!

The non-inclusion of the 'growing' young of the human race is a great lacuna in the design parameters! Child sensitivity is as much an ignored aspect of most physical

designs as is the sensitivity to the 'challenged' & the 'restricted'. These value additions are imperative.

IV. Identification Of Their Exclusion From Design Process At Large: Can Children Be Termed 'A Marginalized Population'?

The need for this study was prompted by some routine commonplace observations.

As an integral part of society, children have never been given due importance. This surmise is especially true in the designing of spatial environments, where considerations for their special needs are overlooked or discounted. It has been, for long, an erroneous assumption that, 'they sail along'. A memory recall of our own childhood days, when we had to be 'helped' at each step or managed to 'get it done' clumsily on our own, is urged. Nothing much has changed over the decades that have passed by, although, developmental activities are on the upswing & key concepts such as those enumerated above are emphatically spoken about & debated in the academia.

The actual conception of the physical environments from public places, housing colonies, recreational spaces & educational facilities (the last two meant especially also for the young) are inclusive in the least.

Childhood memories of being intimidated by the sheer size of the spatial volumes of public spaces, of a sense of feeling lost & over powered by the bare stretches of the 'maidans'/playgrounds that dot housing colonies, to a sense of unease & apprehension in the use of public facilities such as toilets & staircases are random examples of some memories tucked in the deep recesses of the human mind; awaiting to be forgotten. Society despite all its advancements, still discounts this phase of human life assuming simplistically 'they shall grow out of it' & 'it is only a transient phase'. Attitudes such as these are writ large on most physical designs sadly underestimating this 'most sensitive & impressionable phase of human life'.

'The influence of our surrounding environs is subliminal & so very potent. And children have less defenses against this than adults. Environment both nourishes & inspires. It shapes human behavior'. (a- Day, 2007)

Keeping in view the deep influence of the environs, & the sheer lack of attention given to their child friendliness, we can say the child is indeed a marginalized one.

V. Background Of This Paper

This paper seeks to study school environs, as a special child-centric typology from point of view of the major users; the students. This study begins by understanding 'the child' as a natural phenomena with unique physical & behavioral needs. A cognizance of its spatial environment is an integral & significant phase of early learning experience of a child. 'Learning refers to acquisition & retention of specific facts about a particular space. Development, on the other hand, describes changes in the organization of behavior, including learning, that produce a capacity to understand space' explain La Gory & Pipkin.(b- La Gory & Pipkin, 1981)

The process of growth is thus inextricably linked to the built environ within which childhood experiences are set. The perception & understanding of the child is vastly different from that of an adult. Developmental psychologists have put forth various theories to understanding the learning processes in a child.

The following tabulation (refer table #1) lists the psychological & emotional needs of the child in the various stages of growth. This classification of the development of spatial imaging abilities in a child into 4 major stages is the contribution of Piaget. (a- http://en.wikipedia.org)

TABLE I

TABLE #1: children as special human beings

#	STAGES IN THEIR GROWTH WRT SPATIAL IMAGING	CHANGING BEHAVIORAL TRAITS	ENVIRONMENTAL NEEDS
1	sensorimotor (0-2 years)	realization of environ being separate from oneself	
2	pre-operational (2-7 years)	learning by experience, active investigation, ability to fantasize	school environs see the child through most of the phases of development. The versatility of design should encompass several aspects making it conducive for development
3	concrete operational (7-11 years)	thinking logically with aids, ability to make rational judgments on visual phenomena around, thinking in abstract terms, development of cognitive & mental spatial operations	
4	formal operations (11-16 years)	ability to make rational judgments free from concrete objects with hypothetical & deductive reasoning just as in an adult	

VI. An Investigation Into The Unique Needs Of The 'Growing Human' & The Shaping Of Appropriate Responsive Environs

Just as every social group has unique concerns, so do children. Most basic requirements are non-physical in nature. At the foremost are; warm reassuring love & a sense of security. These anchor basic development: emotional & physical. This need is the precursor in the evolution of the human & his social environment.

The influence of the physical environment is also deep. 'From environmental experiences, the brain learns how it needs to develop'. (b- Day, 2007) This confers upon the shapers of the built environ great responsibility, especially while designing for the growing.

The natural urge to learn is manifest through the 'exploratory' nature of the young. Their immediate surroundings, which are shaped by the adults, are subject to this urge. Adults shape environs with concerns that are primarily practical, economical & aesthetical, which is logical indeed. But are these environs capable of nurturing the young & supporting their distinctive needs?

'Children use environments to improve themselves; adults use themselves to improve the environment' expresses Paula Lillard. (Lillard,1972) This is the underlying critical distinction in the response.

Designed environs tend to be static & aim at the fulfillment of an end purpose. The exploratory nature of the growing years is dynamic process, seeking opportunities to do things. An ever-changing setting that can support 'fantasy & imagination' as against 'real & known' envisaged by the adults presents contrasting notions indeed.

Exploration, experimentation & hands on experience is the best learning & need not be limited to the very young. The longer this phase; the better. 'A critical progression is thus from 'nurturing to inspiring' environs as explained by Day. (c-Day, 2007) From the protective support for the very young to the motivational for the adolescence, the tone & tenor of the built surroundings have to be stimulating & substantial yet subtle.

Child-centric environs need to revolve around these basic prerequisites.

VII. The School As A Special 'Child Centric' Typology

Schools typify the contemporary learning environs. The foremost preoccupation of the child is initiated in the school. It sees the growing child through the major stages of development. Attending school is a daily routine that is 6 to 7 hours long. It is a sustained preoccupation that initiates as early as 5-6 years of age & continues until school leaving at 16-17 years of age. The support & inspiration from the built environs of the school are understated.

Very unfortunately though, studies carried out on the learning environs across many nations have concluded negatively. In India also, cursory observation points towards children being the marginalized users even in the very environs meant for them. With the exclusion of select 'play schools' for the very young, most regular schools wherein children spend the best part of their day, and most of their impressionable years, have an environ lacking in many vital aspects.

The formal aim of a school is 'systematized education'. The focus is on intellectual development; making the student analytically & practically ready for earning livelihood. The stress on 'intellectual' development is real & obvious.

Logical intelligence is attributed to the computers. They excel at it. The question is of 'being human': which encompasses the emotional in addition to the mental & physical development. An acknowledgement & response to this fact is the inclusion of extra & co curricular activities in the school syllabus. But the impact of the 'container' within which these shall be partaken & its influence on the young users is not fully acknowledged.

VIII. The Methodology Of The Research Study

The research initiated a ground survey to post occupancy evaluate select schools in Nagpur city with respect to the above concerns. For ease of comparison, 15 CBSE affiliated urban schools were studied. The age group of students identified is between 14-17 years (standards IX & X) since they have spend longest stretch of time in the given environment & also due to their ability to communicate on difficult aspects such as 'perception' of environments.

Walk thru' evaluation, photo documentation & a creative exercise for children to express their experience of their learning environs were tools that were employed for this study. A formal POE was also conducted thru' use of questionnaires, the results of which would be compared with the above assessments at a later stage.

Following the sequence of a typical school day in the life of an urban child, pertinent issues were identified & enlisted. A comparative matrix, enriched by photographs & children's sketch expressions, was drawn to identify ground situation of the school environs & the experience the process of learning entails in a typical urban setting. Six representative schools have been selected for this paper. Basic data of schools is presented in table #2 below for ease of comparison.

TABLE II

TABLE #2: basic data for six CBSE schools under study

	Data particulars	1 DPS	2 XS	3 MSK	4 MF	5 JI	6 SOS
1	Distance from zero mile	11 kms	15 kms	12 kms	22kms	18 kms	17 kms
2	Year of establishment	2006	1994	1987	2000	2006	2000
3	Tentative fees for an academic year	Rs. 35,000-40,000	Rs. 17,000-20,000	Rs. 20,000-22,000	Rs. 10,000	Rs. 60,000	Rs. 20,000-28,000
4	Total # of students (i-x stds) 2010-11	1776	2797	2233	3205	299	1821
6	Differently abled students enrolled	Nil	Polio:2	Nil	Nil	Nil	Polio:2
7	Designed by architect?	Yes	Yes	Yes	Yes	Yes	Yes

IX. A Discussion On The Issues Enumerated In The Matrix

Of the many issues that pertain the learning environs of the schools, some that lead to the marginalization of the student user in a direct manner are presented:

A. Context & Location

New schools in urban India are being located on city outskirts for economy of land prices, also space requirements. This involves substantial travel time. Thus a typical school day starts early morning for many children. From being helped on to the school bus every morning while struggling with an over sized bag on the back & a lunch pack in hand, to enduring journeys that last as long as a hour to the distant school, is a strenuous daily activity, especially for the very young primary children.(6-10 years)

Proximity of school is a pertinent issue in the planning of urban centers.

B. Architectural visual expression & Child scale

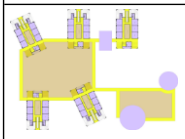
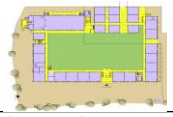
Contemporary schools buildings are the pride of their management. The expression is whimsically addressed by the architect (in his own humor) to please the management. Considered 'subjective & difficult to address', it is nevertheless a pertinent issue.

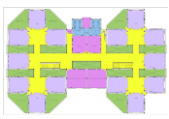
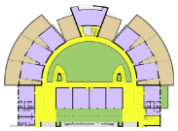
School buildings are made to don a 'smart & contemporary' expression as a marketing strategy. The result is a large, institutional, sterile & monotonous built volume. Styles are a response to a current fashion; they are unconcerned about what the building has to say. They are at best a marketing strategy, for they do produce striking, signature buildings; but make no attempt at encouragement, love & affection; which is a pre-requisite for stimulation to grow.

'What is an aesthetical appeal to the adult, need not be a sense- nourishing experience for the young. Sterile buildings are actively harmful. These say soul-state doesn't matter. They deserve no place near children' emphasizes Day. (d- Day, 2007)

On the other extreme are matter-of-fact 'box' architecture in which any function can be housed; including that of a school. 'Raising children in concrete boxes, without much sensory variation or relationship to nature suggests we believe sterility will not hurt them & that nature is not very important' (Olds, 2001) 'Hard, rectangular, boxed environs encourage box thinking. Ever changing, soft, living; that elude definition increase imaginative opportunities: flexible, living, interpretable, stimulating live thinking.' (e- Day, 2007)

TABLE #3

SCHOOL #1	SCHOOL #2	SCHOOL #3
		
Cluster plan segregates students of different levels. An ideal spatial distribution, yet monotonous as clusters are repetitive. No attempt to provide relief except by means of superficial graffiti work on walls.	Tight fit, double loaded corridors, reducing natural lighting level in the circulation areas. Llight wells are grilled for safety. The result is a claustophobic atmosphere, in the main learning spaces, after the majestic portico space & the entrance foyer.	This spatial organization serves an excellent visual connectivity & helps bind the school community together. The occupancy strength of the school makes for tight space for assembly.

SCHOOL #4	SCHOOL #5	SCHOOL #6
		
A linear plan with no compromise. Makes the circulation rigid & reduces interaction between users to a maximum.	Cluster planning; with minor differences. Central space covered, making for comfortable climatic protection & excellent interactive spaces. The open-to-sky spaces allow for ventilation & landscape to soften the interor spaces.	Wrapped around contours of the site, almost an inon building. Spaces are tucked within the contours making for child scale.

Educational buildings can never feel welcoming to the child student without homely scale. Very unfortunately, attempts at creating visually stimulating, warm & welcoming building friendly to the scale of the child are rare.

C. Spatial configuration

This is mostly dictated by site restrictions. Most buildings are tightly knit to save space for playgrounds etc. & are multi-storied. This urban reality is valid. But dexterity in spatial planning is required to make for visual connectivity, natural light & ventilation & noise pollution within building spaces.

Study brings out some repetitive glaring flaws in spatial planning much to the detriment of the environs' conduciveness to teaching- learning process, as the matrix helped point out.

Table # 3 enlists the varied spatial patterns of the six schools presented in this study. Each was analyzed for its compatibility to the concerns under study.

D. Spatial cognizance & legibility

Learning is the most natural attribute of the growing. Learning occurs at every step & the built surroundings are a powerful yet silent teacher, so much so that it can be safely termed 'hidden curriculum'. Although direct causal links are difficult to decipher, its impact is nevertheless profound. (Marshall, 1999)

Then what lessons do school environs; the classrooms, the corridors, the playgrounds, the creative activity spaces impart to the students in their long association? 'Knowledge does not develop as a linear progression, but as a relationship network, dynamically interweaving connected elements,' explains Piaget. (b- http://en.wikipedia.org) Perception, action, interaction with others & reflection develop, modify & consolidate it' (Ceppi, Gulio & Zeni, 1998)

To make positive learning possible, it is of foremost importance that the students are able to make 'a recognizable connect' of the various spatial elements to a mental whole from the experiential 'parts'. Cognizance by the Webster is 'being aware, or having knowledge of by thought or perception'. It reduces environmental confusion & can encourage confident learning experiences.

Many researchers through children's sketch responses to their environs have studied this aspect. The maps that they draw up of their 'own spaces' are full of information on what they consider important. The way they put it is representative of their feelings, activities & their confusions. The sketches are a very powerful tool & a make for excellent data on the growing users response to their environs. (Lynch, 1977)

E. Defensible Space

This very pertinent aspect of the human environ has been researched & written upon widely in the academia. Oscar Newman's definition of defensible space encompassed territoriality, natural surveillance, image & milieu. This is an intrinsic human need. While most discussions on this aspect deal with housing neighborhoods this concept stands true for the users of every building typology. It is one of the key concepts for learning environs. (Heyman, 1978)

The element of bullying in schools is a task at hand. The segregation discussed solves problems to some extent. In vertical stack schools, the stairs remain common. Also tight spatial planning takes away from visual connectivity. This issue needs much more attention to the advantage of the child user.

F. Interior Aesthetics

Mostly the function of 'maintainable' finishes; the interior spaces of most schools tend to be of stone or polished tiles. The walls invariable have oil painted dado taller than the child. Fabrics & soft furnishings, including display panels are missing in most cases. The lack of absorbing surfaces makes for tremendous noise reflection.

Color that most easy to use finish is the only solace and its use in the 'smaller' classes is already discussed. What amazes is the sudden change of color & setting that occurs in the ambience of the high school classes. The crass colorfulness transforms to dull blue to grey to mauve, the furniture becomes rigid & fixed, the display panels reduce to vanish. The atmosphere is suddenly somber…. as if awaiting doom. The culprit unmistakably is the school leaving examination; that most societally accepted conclusion to school life. Childhood is suddenly lost.

This definitive change in the ambience seems to hold all sensitive, intrinsic humane values to be contrary to that 'ultimate goal' of the last few years of school. Student responses screamed for a more vibrant atmosphere.

The teen years look for motivation. Respect for ones place & work is a prerequisite. Drab, lifeless & 'academically inclined' spaces are uninspiring & can do harm. The instance of vandalism that is on a rise in contemporary schools is a function of the teen years & the surge of energy they experience. Also the lack of attachment to school, which is associated with an increased risk of anti-social conduct. (http://en.wikipedia.org)

The contribution of the current lack luster high school environs could well be a contributing factor.

G. Personal space

This most talked about behavioral aspect cannot be the privilege of the Indian school student. It seems an alien conception for the over populated Indian urban schools. But some 'high end' schools have large classrooms yet do not provide for lockers or shelving for personal items. Most classrooms operate with such space crunch that the aisle between rows are occupied with school bags, resulting in the teacher not accessing the rear benches at all.

This is yet another issue very vehemently pointed out by the students.

X. Towards A Child Centric Design: A Discussion Of The Inferences Of The Study

Much of architecture affects people from beyond the focus of awareness. People are not sure what of the building or its space is affecting them, nor is the expression of their feeling an easy task. But environs are acting upon its occupants & the results are revealed over a longer period. (b- Sommer, 2007)

The design conception of buildings, the major component of the built environments, are a function of the larger & more powerful forces of economics, land issues & functionality. The design for environs for learning also succumb to these pressures. An added disadvantage is also the lack of awareness of the deep relationship between built environs & their influence on human behavior in the society at large.

This paper discusses the concerns related to the development of the 'growing human': the school student. The issue assumes great pertinence given the amount of time that is spent in the physical environs of the school. That neglect & lack of response to child-friendly issues in the design of learning environs leads to the marginalization of the child/ student user is an outcome of this study.

Spatial configuration & architectural expression are significant aspects of physical design. Achievement of visual connectivity, creation of defensible spaces, appropriate design for personal space, hierarchical comfort & pleasurable interior ambience all lead to psychological & emotional comfort of the young user. Respecting child scale & a discretion in the creation of the built envelope is urged.

School environs that offer no solace in terms of a warm, welcoming & comfortable experience fall short of developing within the students a sense of belonging. The recent upsurge in the cases of wanton vandalism of school property, that most Principals complain about, is always attributed to the pressures of the school system. This cannot be negated given the stress that the school-tuition- homework routine most teen students follow. At the same time, one cannot turn a blind eye to the influence that the rather indifferent environs of the schools exert on the growing minds. A sense of belonging is not being nurtured towards ones learning environs. Vandalism is its extreme expression. Attribution of the built surroundings to this menace cannot be under estimated.

On the other hand if benign, positive experiences be imparted, these 'young torch bearers' of the society shall grow to be sensitive individuals, who as adults shall insist on the shaping of humane environs. This is the only saving grace if we have, to save our urban areas from being the callous, faceless & uncared for, as they are at present.

The study acknowledges the immense significance of fulfillment of the primary concerns & needs of the users & urges the incorporation of user's evaluation as a pedagogical tool in schools of architecture, planning & environmental design. This would mean involving the society at large; making for an inclusive process of environmental design; the much-needed alternative to the current whimsical design conception that focuses on making impressive forms rather than inclusive environs.

Respect for the currently 'marginalized' student user in an environ especially meant for him shall go a long way in addressing many larger & seemingly unrelated issues, because the school is the grass root where holistic lessons for the future

need to be imparted; not just of being intellectual, practical & matter-of-fact but subtle, responsive & humane as well.

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