CHAPTER – 2

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Considering the multidisciplinary approach of the research; review of literature is focused in three categories – The educational perspective, the psychological perspective, the architectural perspective which will give a theoretical base for the study. The review will try to understand the interrelationship that exists amongst educational pedagogy, child psychology and learning environment.

2.1 Introduction:
Education is an investment and a major component in the transformation of society. “Primary education provides the foundation for all subsequent advancement in the education system. The most formative years in a young person’s development are spent at primary school” (Dubhslaine). Education is valued as it is very important in developing the human capital of India. Primary education forms the basis for the same.

School is a blueprint of the society, in terms of investment, maintenance and quality of built environment it offers for its future to the end users. Schools are a decisive element in human development, community living, participation, knowledge acquisition and in creating better citizens of the country. The school is an institution which is intended to nurture, care for and educate children within the framework of structured age-related class groups (Dudek, 2000). Everybody has memories of school days and spaces form a part of these memories, as a lot of activities happen in various spaces inside and outside classroom. They shape the human personnel at a delicate stage of growth and assist in personality formation. Hence children need sensitive care, careful encouragement and imaginative management.

2.1.1 School:
Physical environment of school plays a great role in determining the quality of teaching and learning in school. It also helps in developing inquisitiveness and imagination of the children by teaching them about how to interact together. Considering use of these public buildings for years ahead; schools buildings need to be looked from a different perspective. Though classrooms offer the purpose in bare minimum, attention should be given to classrooms especially considering the time spent by users in that space for
years.” Much of architecture affects people from beyond the focus of awareness. People are not sure what it is about a building or room that affects them, nor are they able to express how they feel in different surroundings (Robert, 2007).

**Figure No. 2.1: The Built Environment**

![Diagram of the Built Environment](Source: Primary Source)

Schools are systems in which the environment is just one of many interacting pedagogical, socio-cultural, curricular, motivational and socio-economic factors (Higgins, 2005). Building is the most expensive physical asset of a school. Maximum educational value should be derived from them. The way we design our schools provides the necessary facilities to students, portrays a figure about how the government and people value the education and have views about education.

Creative and practical solutions can be used to maximize this educational value while repairing or upgrading existing schools or making new buildings. The enhancement of the physical environment through this can bring about not just a cosmetic change but also an inherent transformation in the way that physical space connects with the pedagogy and the child (Pal). Therefore, the school and classroom, supporting learning spaces and end user’s behaviour constitutes the learning environment, supporting educational activity.
2.1.2 Classroom:
A classroom in any of the school is a happening place where a lot of activities are constantly happening like sitting for structured class, drawing, and standing, talking, seating quietly, writing, playing with chalks, whispering and many more. Teacher is also a part of this with activities like giving verbal or written instructions, singing along with students, drawing for students, controlling class etc.

Classroom is one of the most important elements in teaching and learning processes. Collins English Dictionary states that a room in which classes is conducted, spatially in a school or college is known as a classroom. Based on Word Net 3.0, a classroom is defined as a place in which all students in a particular grade (or in a division of a grade) meet at certain times under the supervision of a teacher who takes attendance and does other administrative business.

Traditionally, it is a space which is designed by the architect to accommodate various elements such as chair, desk, cupboard, whiteboard, and audio-visual equipment and required comfortable environment. Classroom is a system. Classroom is both physical and decision-making units for the teacher as well as for the students and so this environment can influence both the users. There is a relationship building in that space with student – student, student – teacher, class arrangement – student and teacher together. A clear figure of a classroom is very essential to understand the daily working in this space. The layout and environment of classroom is an expression of pedagogy, it is an active part of educational process. It forms an image in the minds of users and onlookers also.

Students have to spend lots of time in listening and understanding lessons, remain seated at their desk, perform several other activities such as discussing, and writing to a certain extent. Hence the classroom space becomes more complex and needs to be understood, well planned and designed in order to meet the demands of teachers, pupils and the community at large (Tiburcio).
Classroom design is big challenge now a day. The designer should be aware of the technological advances, psychological mindset, social context and ultimately the users. Students are also longer treated as consumers of education. It is necessary to understand the learning environment and research related to learning environment and student outcome, and trends in classroom design. The challenge is to investigate how classroom can be used for enhancement of teaching and learning.

When children are asked about the kinds of space they like, very often they want to be in a place that is colourful, friendly and peaceful, with lots of open space offering with small nooks and corners, animals, plants, flowers, trees, and toys (National curriculum framework, 2005). There are few basic qualities which should be present in classroom; that students should be able to see anything that is present visually, student should be able to hear anything that is presented audibility and free from noise and distortion. Students should be comfortable in their learning environment, including air flow, room temperature and proper furniture. A concern for classroom design is that it should be flexible, adaptable to technology and users need also.

2.1.3 Emerging Classroom Typologies:
Traditionally, a standardized classroom plan was designed to maintain order and control a student behaviour. Silence was encouraged in order to keep students more focused. The classroom was designed and spatially arranged to reflect this belief. At the beginning of the 20th century the bleacher-style seating and sloped floors was envisioned to aid the teacher’s supervision of the classroom. By the mid twenties rectangular classrooms had become universal (Salama, 2007).

It is an agreeable fact that not all children learn the same and a little variation is observed in different schools. Children learning needs are different as some need more pictorial, more verbal or with some actions and doing it themselves. Classrooms need to be designed to reflect a particular form of teaching behaviour and to represent a teaching / learning process that achieves specific pedagogical objectives. Education and architecture enter into a relationship where if everything goes according to the stakeholder’s vision
and proposed plan, the complex system evolves to create child friendly school which enables student to learn and in turn society to prosper. The use of classroom space linkages with supportive spaces and activities form behaviour. The amount of space in a room for an individual gives a silent message to its occupants. This needs to be addressed in a systematic way for future classroom as well as schools if significant association is found between classroom characteristics and student behaviour, learning. School architects need to develop comprehensive understanding of the wide range of prototypes and the effect they have on achieving desired educational outcomes and behaviour.

Accompanying the recent increase in school design and construction expenditures has increased the insight in related research. Laying the foundation, McGuffey (1982) identified a number of studies that examined the possibility of a relationship between building condition and student performance on standardized tests. (Earthman & Lemasters, Review of Research on the Relationship between School Buildings, Student Achievement, and Student Behavior, 1996). The findings synthesized across a number of studies and linked student achievement with building quality, newer buildings, improved lighting, thermal comfort and indoor air quality, as well as specific building features such as science laboratories and libraries. More recent research has continued to add to the evidence of a direct relation between the quality of a school’s physical environment and student academic performance.

2.2 Learning Environment – Primary School:

Air, water, food and shelter are the basic physical needs of humans and other than these physical needs human being have certain other basic needs. These needs are indentified as survival, security, love and belonging, power, knowledge etc. Knowing these, a solid institutional base needs to be framed at the initial developmental years in human life and the learning environments can play a role at this stage. Learning environments inspire effective teaching and support cognitive learning. It also helps to increase joy of learning and ensures feeling of self belongingness and security.
Students, teachers and supporting staff and physical environment shape the learning environment. The environment of a classroom and the end users (teachers and students) are constantly interacting in that space for eight hours per day; creating an organization. Schooling is one experience that children remember. This image includes friends and teachers. The classrooms also have place with desks, writing on walls and many memories to cherish. School building, classroom and other spaces shares experiences of learning. This directs to indentify a link between architecture and the learning.

Buildings that are well designed and equipped and beautifully decorated will exercise their potent, but unspoken influence on those who use them from day to day. This is true education. The physical environment can be considered as the second teacher since space has the power to organize and promote pleasant relationships between people of different ages, to provide changes, to promote choices and activities (Rivero, 2004) and for its potential for sparking different types of social, cognitive, and affective learning. The school, classroom, play spaces, overall maintenance i.e. school as whole reflects the ideas, philosophy and values of the people using it or providing it. Surveys regarding current school environment have not been so specific about inter relationship between physical environment and learning especially in Indian context; Reggio Emilia’s notion for physical environment as a third teacher needs more attention from this point of view.

2.2.1 Learning Environment:
The learning environment of a primary school can be conceptualized as a series of relations between educational administration and administration procedures, teacher – student interaction, student – student interaction and school building within which all these happens.

Dutch Architect Herman Hertzberger whose contribution regarding school architecture is valuable puts it as a thing exclusively made for one purpose suppresses the individual because it tells him exactly how it is to be used (Herman, 2008). If the object provokes a person to determine in what way the person wants to use it, it will strengthen his self identity.
During the typical school day, primary school students (5 - 9 years) are quite mobile. The school provides opportunities for interaction, navigation in and outside of the building with opportunities for encounters and social experiences. The conditions for advancement of the intellectual and psyche growth need to be created. Interaction between children and teacher with each other within the context of physical environment is a concern from environmental psychology point of view but environmental design approach talks about the comfort of users issues related to physical dimensions.

2.2.2 Learner Centered Educational Theories:
Through history we can trace links for optimal conditions for learning in the world's religious and philosophic traditions throughout the world. In the Analects of Confucius (551-479 B.C.E.), there are repeated references to the importance of cultivating a ‘fondness’ or love for learning as a primary condition for success in life (Bernard, 2012). (unesco pp.18). At present, this might be interpreted as the necessity to achieve measurable learning outcomes. Regarding the physical aspects of learning environments, the Buddhist Vinaya 8 lays down the exact specifications for rooms in which religious teachings are to be conducted. Pedagogical methods associated with modern social theories of learning (including physical environments) have early roots in these religious educational traditions (Bernard, 2012). There are many philosophers from 15th century till today who have expressed their opinion about child education and development. To name a few who have put across thought about educational philosophy for age group of
4-6 years are as follows: Initially Czech philosopher John Comenius (1592-1650) expressed educational principles insisting necessity to learn through the senses; the individual learn through senses and learning is a lifelong activity. John Heinrich Pestalozzi (1746-1827), John Freidrich Herbart (1776-1841) and Herbart Spencer stressed their views about education. But 21st century educational philosophies are influenced by Rousseau’s thinking as child centered learning environment. In a similar vein, American philosopher, John Dewey (1859-1952) considered two fundamental elements i.e. school and society, to be major topics needing attention.

Different perspective from Rousseau and Dewey, Edward Thorndike (1927) established the theory of connectionism, which put forward that learning, is the result of association between stimuli and responses. Like many psychologists of his time, B.F.Skinner built on Thorndike’s Law of Effect in his research on learning and behaviour. Skinner developed the theory of radical behaviourism through scientific analysis of both humans and animals in carefully constructed settings. In the experiment, skinner attempted to control the number of influential variables at play in order to study specific stimuli response relationships.

Piaget’s most influential contributions to teaching and learning based on his psychology were the ideas of naturalism and constructivism. Naturalism centered on the fact that during each of the cognitive stages, thinking of a type appropriate for that stage is shown to emerge in children naturally, through merely living and going about daily activities (Dupakosk, 2007). Piaget considers that during the development stage during 7-12 age, logical reasoning and organization of thought are accompanying physical and psychological growth. LevVygotsky (1896-1934)’s social development theory argues that social interaction precedes development and consciousness and cognition are the end product of socialization and social behaviour. Three main themes indicate Vygotsky’s social development theory i.e. Social interaction plays a fundamental role in cognitive development.
The more knowledgeable other (MKO) refers to anyone who has a better understanding or a higher ability level than the learner with respect to a particular task process or concept. The zone of proximal development (ZPD) is the distance between a student’s ability to perform a task under adult guidance and/or with peer collaboration and the student’s ability solving the problem independently. According to Vygotsky learning occurs in this zone. ZPD can be achieved through social interaction. To attain ZPD, areas facilitating interactive and cooperative facilities among students and teachers are required in addition to structured classrooms, for group interactions with teachers and peers planning for spaces in schools.

Froebel’s important contribution to education is kindergarten which implies a children’s garden. Froebel conceived the school as a garden, the teacher as a gardener and the student as tender plants. As Froebel describes child as a plant grows within an environment same as with a child as the child needs an environment that will foster growth. The atmosphere in the kindergarten should be of freedom, play and joy which in turn develops self-expression. Froebel broadened the school as an essential social institution; his influence is also seen in modern education. Nursery primary education has taken its roots with emphasis on education through play and nature study1.

Dr. Maria Montessori, founder of Montessori system believed that education of a child is from within. The view expressed is that education must help individually. Suitable environment should be offered so that the children may grow and develop the potential they possess. Dr. Montessori believed that children’s minds are absorbent, and that they pass through “sensitive periods” of intense learning during which they change the physiology of their own minds through interaction with their environment. Dr. Montessori developed specific areas of activity to appeal to the child’s natural urge to learn (Dupakosk, 2007).

Waldrof education was founded by Rudolf Steiner (1861-1925), an Australian scientist and philosopher who envisioned a new kind of school that would educate human beings

1 Ref.: http://www.froebelweb.org
to create a just and peaceful society. Philosophically this was an alternative approach. Steiner’s school was co-educational, open to children from any background, comprehensive (from preschool level through high school) and independent of external control (a self-governing administrative control).

2.2.3 Indian Perspective:
Indian educational philosophers have a deep orientation towards spirituality and living traditions. Earlier the traditional teaching and learning methodology was followed i.e. knowledge transfer by oral way, for e.g. chanting, singing etc. The colonial India saw a different method of knowledge transfer. J. Krishnamurti believed that the purpose of education is to bring about freedom, love, “the flowering of goodness” and the complete transformation of society even though schools has pre decided its goals, attention to students, various activities shaping the young minds. It is also helpful to examine what things like the use of space, who and what determines pedagogic activities, the use of time, and what is assessed, by whom and for what (Scotth, 2014).

Rabindranath Tagore’s ideas on education reflect great faith in naturalism and humanism. Tagore believed in education through a vernacular medium and gave importance to the child’s creative expression. Tagore’s idea on education was put into practice at Shantiniketan, and became a paradigm for alternative education system in the country. Tropical climate of India allowed use of open space and teaching under the tree.

As per Mahatma Gandhiji’s view point, the present system of education does not meet the requirements of the country. For the all round development of boys and girls all training should be as far as possible through a profit – yielding vocation. Nai talim established by Gandhiji in vardha is based on Gandhian educational ideas, which was founded on certain eternal principles and will not lose their fundamental relevance in the years to come. The learning environment may reflect the school’s mission and may be based on certain teaching pedagogies to encourage active participation of the users. The school especially classroom needs to be versatile (students can do many activities in that space) and flexible (easily modified as per teaching learning requirements).
An ecological frame of reference as suggested by Bronfenbrenner and adopted by several researchers to study the complex relationships of children and their environments (Chatterjee, 2006). Bronfenbrenner envisaged the child’s environment as a multi-level dynamic system where each level within the system comprised of a set of physical and social structures that combined to form a particular environmental system. Bronfenbrenner proposed four dynamic environmental systems, which were nested, each inside the next higher level.

**Figure No. 2.3: Bronfenbrenner’s Ecological Model of Child Development**

![Bronfenbrenner's Ecological Model](Source: www.online.uncg.edu.)

Microsystems are represented by settings and structures in the children’s immediate environment. The physical places comprising the micro system would be home, and the social environment would be the family and immediate caregivers. But as the child grows older, more places, and more people are added to the child’s socio-physical array through
a process by complex mutual connections with persons, objects and symbols in its immediate environment.

Mesosystems are represented by settings and structures in the world beyond home, with which a growing child comes in increasing contact. The relationships between the child, and school, child and the local community form important meso systems. In assessing this ecological framework from the perspective of children’s environmental experience, Matthews writes: “in essence, the stronger, the more diverse, and the more positive the links between settings, the more beneficial and influential will the resulting meso system be upon a child’s environmental opportunity (Chatterjee, 2006).

Exo systems, Macro systems are characterized by further interaction with peers and community. Bronfenbrenner’s model allows perceiving the wide local-global connections of most place-based experiences of children in their everyday environment. The school provides opportunities for interaction, way finding in and outside of the building with opportunities for encounters and social experiences.

The Reggio Emilia Approach to preschool education was started by the schools of the city of Reggio Emilia in Italy after World War II. There is much about Reggio Emilia's approach to child care and education that distinguishes it from other efforts both inside and outside of Italy, and attracts worldwide attention. The Reggio Emilia approach to education talks about three educators as being in the classroom at any time: the teacher, the child and the environment.

The organization of the physical environment is crucial to Reggio Emilia's early childhood program, and is often referred to as the child's "third teacher". Major aims in the planning of new spaces and the remodeling of old ones include the integration of each classroom with the rest of the school, and the school with the surrounding community. The preschools are generally filled with indoor plants and vines, and awash with natural light. Classrooms open to a center piazza, kitchens are open to view, and access to the surrounding community is assured through wall-size windows, courtyards, and doors to
the outside in each classroom. Entries capture the attention of both children and adults through the use of mirrors (on the walls, floors, and ceilings), photographs, and children's work accompanied by transcriptions of their discussions. These same features characterize classroom interiors, where displays of project work are interspersed with arrays of found objects and classroom materials. Throughout the school, there is an effort to create opportunities for children to interact.

2.2.4 National Curriculum Framework 2005 School and Classroom Environment:
Learning takes place within a web of social relationships as teachers and pupils interact both formally and informally. Schools are institutional spaces for communities of learners, including both students and teachers. Play and scuffle with one’s friends on the school grounds, free time to sit on the benches and chat with one’s friends during breaks, gathering together for morning assembly and other festive and significant occasions in the school, studies carried out in the classroom, anxious turning of pages before a class test, and trips made with one’s classmates and teachers to places outside the school all these are activities bring the community together, giving it the character of a learning community.

Behind the scenes, but still significant in giving the school its character are the teachers and the head master, planning and carrying out daily routines, examinations and special events that mark the school calendar. How can the environment in the school and classroom be organised so that such interactions support and enhance both teaching and learning? How can the space of the school be nurtured as a context where children feel safe, happy and wanted, and which teachers find meaningful and professionally satisfying? The physical and psychological dimensions of the environment are important and are interrelated. It is important to examine these environments to understand how they significantly influence children’s learning.

Children are constantly interacting with the physical environment of their schools during structured or unstructured time, consciously or unconsciously. Yet not enough attention is paid to the importance of physical environment for learning. Often classrooms are
overcrowded, with no alternative spaces to learn, nor are they attractive, inviting or sensitive towards children’s needs. Inappropriate school design may drastically affect the teacher’s productive output and classroom management. In fact, the role of this all encompassing, physical environment has been restricted merely to shelter the educational activity.

2.3 Student Behaviour:
Behaviour can be viewed as any action of an organism that changes its relationship to its environment and provides output from organism to the environment including the range of actions. Behavioural component consists of the tendency, to act or react to the object in a certain way. Any action to external stimuli is referred to as behaviour. Dusenbery, stated that “Behaviour can be regarded as any action of an organism that changes its relationship to its environment. Behaviour provides outputs from the organism to the environment” (Naz, et al., 2013).

Similarly, school and classroom together as a system, form an environment, which shapes the student’s behaviour, through learning (academic performance) and activities. Student’s actions are a response, which an individual shows to the environment at different times. They can be positive or negative, effective or ineffective, conscious or unconscious, overt or covert, and voluntary or involuntary.

Physical facilities available in any school provide opportunity to students to interact, demonstrate their skills and to socialize. The research carried out by Arab Naz et.al to investigate student’s academic performance, behavioural component’ development and teacher –student relations; demonstrates that availability of physical facilities decreases apprehension, anxiety and increase student’s confidence to a greater level that improves student’s output to the instructional environment (Arab Naz et.al pp.468). Schools are the primary social settings aimed to teach and provide opportunities for students to interact with the peers and teach by means of academic and social practices (Pasalar, 2006). Every school has its own culture, environment that create sense of belonging, sense of
community through various activities conducted by the school; even imbibed through daily routine of school.

In order to meet healthy development, students require certain needs to be met, learning is one of them. While learning in schools, students are a part of Meso System (Bronfenbrenner’s ecological cycle). One could not expect students to constantly sit quietly on desks, instead in schools students would be engaged in different learning activities as well as allowed to move in school without much of restriction. Free play during recess time, passively observing the activities will give a sense of self exploration. They should have opportunities in school to interact with friends, with physical environment forming a backdrop.

Vygotsky claimed that most learning happens through a complex process of social interactions. Participation in classroom activities in which students worked together and helped each other learn was significantly related to how engaged students were in school a year later. The school hours are full of activities including curricular and extracurricular activities. There are indoor activities like reading, writing, listening, use of computer, painting, art, music, dramatic play, eating and outdoor activities like listening, playing, eating and resting in physical environment. Mentioned activities in the environments are correlated and have to be taken into account while discussing behaviour. Howard Gardner’s theory of multiple intelligence (1996) defines eight different intelligence, where it is said that the interpersonal and intrapersonal intelligences are the needs of an age group which can be initiated through communication.

The opportunity for social interactions with others is very important for the development of all children. Through social interactions, children begin to establish a sense of “self” and to learn what others expect of them. Although social interactions for very young children primarily occur within the family, as children grow and develop, they become more and more interested in playing and interacting with other children. When playing with others, children learn appropriate social behaviours, such as sharing, cooperating, and respecting the property of others. In addition, while interacting with their peers in
school-immediate setting next home; there are phase of learning that happen best during
peer interactions, rather than interactions with adults. Students learn communication,
cognitive, and motor skills. Peer interaction is essential for language, cognitive, and
social development. The students must have the opportunity to play together to become
friends which increases peer interaction. Children acquire language and vocabulary
during interactions with others. They find out how to argue, negotiate, and persuade.
They must know to say things without hurting feelings. They must resolve conflicts,
apologize, and support.

Peer interaction serves as the foundation for many vital aspects of emotional development
such as the development of self-concept, self-esteem and identity. Children learn about
themselves during interactions with each other and use this information to know-who
they are. Within schools, physical setting is meshed within a complex network of
organizational and behavioural factors, all contributing to the learning environment as
experienced by students and impacting on their success.

2.3.1 Measuring Student Behaviour:
Many of the studies consider student behavioural aspects, although this is not easily
measured quantitatively. Studies draw on a range of statistical data on behaviour such as
vandalism, early school leaving, absenteeism, suspensions, expulsions and disciplinary
incidents such as being ‘out-of-bounds’, violence, disruption in class, lateness, racial
incidents and smoking. Flinders University is currently extending the knowledge base on
these issues through a number of qualitative research studies in collaboration with
selected South Australian schools (Fisher, Building Better Outcomes: The Impact of
School Infrastructure on Student Outcomes and Behaviour).

The earlier studies try to find out the understanding of behaviour through incidences
occurred, in depth interview, focus group interviews and also by observation. A thorough
planning in creating conducive social environment for learning is important to produce
students with potentials parallel to the government’s mission in developing human
resource as a pre-requisite to the development of knowledge based economy (Shamsuddin, Bahauddin, & Aziz, 2012).

2.4 Learning:
Environment influences human beings, where the environment comprises of both the physical and social characteristics, and the humans perceive the environment holistically in terms of the social and physical aspects of the environment. Research shows that the positive correlation between school building quality and math test scores is congruent with previous research (Al-Enezi, 2002). The physical environment can be considered as the second teacher since space has the power to organize and promote pleasant relationships between people of different ages, to provide changes, to promote choices and activities, and for its potential for sparking different types of social, cognitive, and affective learning.

2.4.1 Education in India:
Ancient India, with its long and rich traditions, had education under the supervision of a guru referred to as Gurukul. Later urban centers of learning were Takshshila and Nalanda who pioneered in spreading knowledge. With the entry of the British colony this was replaced by schools which are in practice till date.

Education is a key to economic and social development of a country. The principle institutional mechanism for development of human knowledge and skill is the formal education system. Most developing nations can be seen having rapid expansion of educational opportunities due to population increase and diverting their fiscal budgets towards education. Education is also one of the important services provided by local government in almost every country.

Bertrand Russell said ‘the educational system we must aim at producing in the future is one which gives to every boy and girl an opportunity for the best that exists’. This is something very true, and the Government of India is following directives from the Constitution of India, assuring compulsory primary education to all citizens. In 1950s, the
constitution had resolved in Article 45 under the directive principles of state policy that the state shall make an effort to provide, within a period of ten years from the commencement of this constitution for free and compulsory education for all children until they complete the age of fourteen. Since then in every five year plan, the 1968 national policy on education, the revised 1992 National policy on education up to Sarva Shiksha Abhiyan (SSA), have tried for efforts towards Universal Elementary Education (UEE). The 42nd amendment to the constitution in 1976 brought education which was largely a state responsibility into concurrent list and made universalizing elementary education the responsibility of both central and state governments (HRD).

**Measuring learning:**
In the Indian education system, the term evaluation is associated with examination, stress and anxiety. All efforts at curriculum definition and renewal come to nil if they cannot engage with the barricade of the evaluation and examination system embedded in schooling. Examinations have ill effects on efforts to make learning and teaching meaningful and joyous for children. Currently, the board examinations negatively influence all testing and assessment throughout the school years, beginning with pre-school. At the same time, a good evaluation and examination system can become an integral part of the learning process and benefit both the learners themselves and the educational system by giving credible feedback. The evaluation and assessment are relevant to the normal course of teaching-learning in the school, as a part of the curriculum (Pal).

Hence academic performance is evaluated by continuous and comprehensive evaluation (CCE). Under RTE Act, section no. 29; Curriculum and evaluation procedure under subsection (1), have taken into consideration child's understanding of knowledge and his or her ability to apply the same. CCE seeks to replace year-end examinations with a series of ongoing assessments that provide teachers with continuous insights into students’ needs, throughout the school year (Windlass, 2015). The act also necessitates
that the schools maintain a complete record of every child during the years of his primary education.

2.4.2 Right of Child to Free and Compulsory Education (RTE) Act 2009:

In 2002, the Government of India took another significant step by making elementary education a fundamental right through its 86th constitutional amendment in 2009, by passing the right of child to free and compulsory education. With this the Government of India took a very admirable step. The 86th amendment in 2002 inserted article 21-A in the constitution that every child has a right to full time elementary education of satisfactory and equitable quality in a formal school which satisfies certain essential norms and standard.

Many positive steps have been initiated since independence, especially after 1990 after which the demand for primary education continued to grow with increasing awareness towards education in all strata of the society. Parental involvement has also increased regarding the child’s education and so in number of schools, teachers’ appointments have increased and also infrastructure facilities have improved.

In 2010, the country reached a historic milestone when article 21-A and the Right of Children to Free and Compulsory (RTE) Act, 2009 become operative on 1st April 2010. The enforcement of article 21-A and the RTE Act represented a momentous step forward in our country’s struggle for universalizing elementary education. The RTE act believed that the values of equality, social justice and democracy and the creation of a humane society can be achieved only through provision of inclusive elementary education to all.

The title RTE Act incorporates the words free and compulsory education. Free education means that no child, other than a child who has been admitted by his or her parents to a school which is not supported by the appropriate government shall be liable to pay any kind of fee or charges or expenses which may prevent him or her from pursuing and completing elementary education. Compulsory education throws an obligation on the appropriate government and local authorities to provide and ensure, attendance and
completion of elementary education by all children in the age group of 6 to 11 years. The RTE Act provides for:

- The compulsory education ensures availability of a neighbourhood school as specified in section 6.
- It clarifies that compulsory means obligation of the appropriate government which means that no child shall be liable to pay any kind of fee or charges or expenses which may prevent him or her from pursuing for a non – admitted child to be admitted to an age appropriate class.
- It specifies the duties and responsibilities of appropriate governments, local authority and parents in providing free and compulsory education, and sharing of financial and other responsibilities between central and state governments.
- It lays down the norms and standards relating inter alia to pupil teacher ratio (PTRs); building and infrastructure, school – working days, teacher working hours.
- It provides for appointment of appropriately trained teachers i.e. teachers with the requisite entry and academic qualifications.
- It prohibits physical punishment and mental harassment, screening procedures for admission of children, capitation fee, private tuition by teachers and running of schools without recognition.
- It provides for development of curriculum in consonance with the values enshrined in the constitution, and which would ensure the all round development of child, building on child’s knowledge, potentiality and talent and making the child free of fear, trauma and anxiety through a system of child friendly and child centered learning.

With this, India has moved forward to a rights based framework that costs a legal obligation on the central and state governments to implement this fundamental child rights\(^2\). The objectives placed by RTE act are intended to be achieved through various

\(^2\) Ref.: www.mhrd.gov.in
major programs of the education like Sarva Shiksha Abhiyan (SSA) and Mid Day Meal (MDM), model schools at secondary education, vocational education for girls etc.

2.4.3 Sarva Shiksha Abhiyan (SSA):
Sarva Shiksha Abhiyan (SSA) has been operational since the year 2000 to provide for a variety of interventions for universal access and social category gaps in elementary education and improving the quality of learning. SSA interventions include opening of new schools and alternate schooling facilities, construction of schools and additional classrooms, toilets and drinking water; provisioning for teachers, regular teachers in-service training and academic resource support, free text books, uniforms and support for improving learning outcome.

With the course of RTE Act, changes have been incorporated into SSA approach strategies and norms. The changes encompass the vision and approach to elementary education, guided by holistic view of education as interpreted in the National Curriculum Framework, NCF 2005 principles as follows:

- Implications for a systematic revamp of entire content and process of education with significant implications for curriculum, teacher education, educational planning and management.
- Equity means not only equal opportunities but also creation of conditions in which the disadvantaged sections of society can avail opportunity.
- Access means not to be confined to ensuring that a school becomes accessible to all children within specified distance but implies an understanding of educational needs and predicament of traditionally excluded categories, girls in general and children with special needs.
- Other principles also include gender concern, centrality of teacher, moral conclusion, convergent and integrated system etc.
2.4.4 Whole School Development Planning in SSA:
National level government education programme in India since 1990’s including District Primary Education Programme (DPEP) and later i.e. after 2000, Sarva Shiksha Abhiyan (SSA) has brought in huge inputs in school infrastructure development. A large number of classrooms has been added in existing schools in the last one and a half decade. The amenities of drinking water, toilets and urinals, ramp for special needs children have been provided in numbers like never before (National construction workshop on WHOLE SCHOOL DEVELOPMENT PLANNING: compilation of proceedings and outcomes, 2010 September).

2.4.5 A Missing Interface:
Schools are not just arrangement of classrooms. If by and large scenario in schools are observed, a classroom is usually thought of as just four walls and a roof with doors and windows and perhaps a chalkboard with little thought about the fact that young, developing minds will not only use it, they will grow there in one of the most important phase of their life and carry these images along with them. Thus it is important to link this space with active teaching learning space and seating arrangements, display, inclusion of Information and Communication Technology (ICT) etc.

There are various interdisciplinary people involved in this process like educationist, school management people, school architects and end users. Currently the end users are normally not included at design stage. There has to be a common meeting ground between the three so that a common consensus can be developed so that huge investments in school will not be a waste but it will be used for creating child friendly schools. Each School Management Committee (SMC) has to have a School Development Plan to obtain any grant from the government for developing its infrastructure in future (RTE Act 2009). If exemplars are created then it will be a guide for others and the existing can be modified. Schools may be developed and enhanced considering educational and child psychological perspectives and many more. Quality of classroom space gets connected to norms also to National Curriculum Framework 2005. After sixty eight years of independence and in new era of technology and globalization existing schools should be
upgraded and construction of new schools, keeping in mind child friendly schools contributing to student behaviour and learning, is a requirement at this phase. As Prof Krishna Kumar, explains Relationship between curriculum and architecture is that – curriculum is architecture of mind. First human beings create buildings and then buildings shape human beings who create them. Hence design of building should be done carefully, since it lasts for hundreds of years (Vinyas, 2010).

School building is no ordinary matter for a student as it is noticeable for brilliance and recall of the experiences. Re-conceptualizing each part of the building is important. Various pedagogies are followed and are reflected in the school’s built form like Shantiniketan by Rabindranath Tagore and Nai Talim by Mahatma Gandhi. Between ‘settings’ and ‘actions’ there is a relationship; this needs to be harmonious. Utilitarian aspects of school and classroom space need more thought as association between classroom space and student may bring out change.

Central to the original thinking of the early educators, John Dewey and Vygotsky, the notion of learning and the community in school environments suggests that students learn as much from each other and from their environment outside the classrooms as they do in their classes (Dudek M., 2000). Thus, schools can be considered as settings where students socialize and learn from each other both inside and outside of their classrooms. School environments maintain a complex character in its formation with its differentiated areas and its connecting circulation paths providing both physical and visible relations between spaces, thus, between students and teachers (Celen, 2003). Schools are the institutional spaces for communities including both students and teachers, playing with friends on school ground, free time to sit on the benches and chat leisurely during break, festivals celebrated and of course study, all gives a character to the school environment. How can this environment be organized so that it would enhance interaction, support, teaching and learning?

The space of school has to be nurtured as a context where children feel safe, happy and wanted. School environment means a constant interplay between earlier / ongoing
experiences in their locality and the new experiences at the school. The physical and psychological dimensions of the environment are important and are interrelated. So Spatial Environment is a major component of school environment.

2.5 Social Characteristics:
Every school provides to its students a social environment in addition to the physical and the psychological environment. A learner is not alone in a school. He is surrounded by other learners as well as the influential adults i.e. the teachers. The social surrounding of a school constitutes its social environment. A learner is in constant interaction with the peers and teachers for a significant part of the day he spends in the school. Be it studies, playing, quarrelling or simply gossiping, the learner has someone around. Every interaction and interpersonal relationship of a learner occurs in a social environment. It is the process whereby individuals are learning in the School Environment. Many social skills, habits, attitudes and prejudices of individual students are tried out, tested and refined in the social environment of the school. To understand the ways in which school buildings, classrooms have relation or effect on students and teachers; it is necessary to consider a number of key elements of the learning environment like school size, classroom size, light and ventilation, proportions, colour etc. The next part of literature review discusses the independent variable i.e. social characteristics in detail.

Considering the multidisciplinary approach of the research the literature review is focused in three categories i.e. the educational perspective, the psychological perspective and the architectural perspective which will give a theoretical base for the study. Although designers, educational facility planners and management may be aware of the research but the review will try to understand the interrelationship that occur among educational pedagogy, psychology and learning environment.

2.5.1 Significance of Social Characteristics:
The education system does not function in isolation from the society. Hierarchies of caste, economic status and gender relations, cultural diversity as well as the uneven economic development that characterize Indian society also deeply influence access to
education and participation of children in school (Pal). With effective enforcement of SSA, this disparity is lowering down majorly due to access to education. As per Early Childhood Care and Education Scheme (ECCE) it is a need to address the five basic dimensions of quality namely, developmentally appropriate curriculum, trained and adequately rewarded teachers, appropriate teacher-child ratio and group size, infrastructure supportive of children's needs and an encouraging style of supervision.

Variables often indentified as influencing student achievement such as attendance, parental background, involvement, parental educational background, quality of instruction, socio-economic factors, dropouts, grade-retention ratios, gender disparity, teacher’s preparation, and principal’s administration are referred in various interdisciplinary (education, social sciences, psychology) researches. But none of the studies have attempted to find the relationship between social, spatial characteristics and student behaviour, educational performance of students in the primary schools in Indian context. Keeping this in view and with references from literature review following social characteristics has been chosen for this study:

- School Management Type
- School Size
- Student Teacher Ratio
- Daily Attendance
- Mid Day Meal

2.5.2 School Type:
In urban areas, the school system itself is stratified and provides children with strikingly diverse experiences because schools are categorized by their type of administration. In Maharashtra, schools are classified into three types as aided, non aided and school run by local administrative authority. Schools range from the high cost ‘public’ (private) schools to the truly ‘free’ functioning local body run primary schools where children from various educationally deprived or different social strata predominate.
2.5.3 School Size:
Research on relationship between school size and student achievement that can be generalised or correlated, is yet to be rigorously explored. However studies do indicate an effect on behaviour. Studies conducted in US and European countries differ as minimum school size changes. The research seems to indicate that large school sizes may benefit more affluent students but can have an adverse effect on more impoverished students, and vice versa. Bigger schools are cheaper to run with much shared facilities between students but moderately sized schools (with 300-500 students) may be beneficial considering the cost and student outcome. Schools limited to 300 – 600 students may be as effective in improving student learning as special programs do although there is some difference in findings across regions (Fisher, Building Better Outcomes: The Impact of School Infrastructure on Student Outcomes and Behaviour).

2.5.4 Student Teacher Ratio:
The student-teacher ratio measures the number of students per teacher. Number of students per class is an important factor that influences the choice of desirable methods and practices that the teacher uses in the process of curriculum transaction. National and international experiences have shown that a ratio higher than 1:30 is not desirable at any stage of school education. Way back in 1966, the Kothari Commission Report had warned that large classes would do ‘serious damage to the quality of teaching’ and that ‘in crowded classrooms, all talk of creative teaching ceases to have any significance’ (Pal).

The lower the student-teacher ratio, the higher is the availability of teacher. The student teacher ratio is used as a common measure in evaluating performance of schools. It is generally used to determine the school quality and state effort, on the one hand, and inefficiency, on the other (Abbi, 2013). It is also a very decisive factor as Space Norms are related to the teacher – child ratio, group size, and to the nature of teaching pedagogy. If the building is being designed to accommodate particular student strength, there being more number of students will give a feeling of overcrowding. It is a pressure on facilities, teachers and administrators in day today working. Research shows that overcrowding
causes a variety of problems and the findings indicate that students in overcrowded schools and classrooms do not score as high on achievement tests as students in non-overcrowded schools and classrooms (Earthman G., 2002).

2.5.5 Attendance:
Prior research shows that relationship does exist between attendance and school facility condition (O’Neill, 2000). Research conducted by the Research Evaluation and Studies Unit Technical Support Group for SSA in 2006 shows that the overall average attendance rate of students was 68.5% at primary levels. The main reasons for children absenting from schools given by head teachers, teachers and management; were lack of adequate facilities in school, teacher shortage and overcrowded classrooms, children being required for household work or sibling care at home and children required to help parents in agriculture or occupational work or participation in other income generating activity and parents’ indifference or lack of interest in child’s education. Parents mostly felt that lack of facilities in school and child’s unwillingness to go to school was the main reason for child’s frequent absence from school.

2.5.6 Mid Day Meal:
Mid Day Meal in schools has had a long history in India. In 1925, a Mid Day Meal Programme was introduced for disadvantaged children in Madras Municipal Corporation. By the mid 1980s three States viz. Gujarat, Kerala and Tamil Nadu and the Union Territory of Pondicherry had universalized a cooked Mid Day Meal Programme with their own resources for children studying at the primary stage. By 1990-91 the number of States implementing the mid day meal programme with their own resources on a universal or a large scale had increased to twelve states. In September 2004 the scheme was revised to provide cooked mid day meal with 300 calories and 8-12 grams of protein to all children studying in classes I – V in Government and aided schools and Education Guarantee Scheme (EGS) / Alternative and Innovative Education (AIE) centers. 10.45 Cr. children were covered in 11.58 lakh Schools during 2013-14 under MDM Scheme. Construction or provision of kitchen-cum-stores in school campus, provision of kitchen
and kitchen devices as per local cost should be done and it is also included in budgetary provisions by government.

The next part of review of literature discusses independent variable i.e. spatial characteristics in detail. The review focuses on those codes specifications standard and studies investigating the relationship between the variables.

### 2.6 Spatial Characteristics:

The Child Friendly Schools approach, developed by UNICEF, puts the child at the centre of a holistic learning and teaching environment with six key dimensions. These dimensions are firmly embedded within these standards with the aim of creating an enabling physical environment fit for every child’s education. The six key dimensions considered are as follows:--

1. **Inclusive of children**: Respects diversity, guarantees opportunities and meets the needs of children (based on vulnerability level).
2. **Secure and protective**: Helps to defend children from abuse and aggression; promotes psycho-socio-emotional wellbeing of teachers and learners.
3. **Healthy**: Assure proper hygienic condition, adequate water and sanitation facilities, and implementation of healthy practices.
4. **Effective with children**: Uphold good teaching and learning processes; define quality learning outcomes; provides approved content, materials and resources; support teachers’ capacity, commit rights.
5. **Sensitive to gender**: Advocate gender equality in enrolment and success; guarantees girl-friendly facilities, environment and teaching; respect for other’s rights and dignity.
6. **Involved with communities**: Works to strengthen families; helps stakeholders establish collaborative relationships; works with other.

#### 2.6.1 Child Friendly School Approach:

The rationale of a child friendly school (CFS) model is to move schools and education systems progressively towards quality standards, addressing all elements that influence
the wellbeing and rights of the child as a learner and the main beneficiary of teaching, while improving other school functions in the process.

**Figure No. 2.4: Child Friendly Schools Approach**

![Child Friendly Schools Approach Diagram](image)

(Source: Child Friendly Schools Infrastructure Standards and Guidelines, pp.5)

Few main objectives in child friendly school planning are to Attract students (increase access); Improve attendance rates; Improve retention and completion rates; Improve learning achievement and Provide safe, inclusive, welcoming environments for all children etc.

A structure for learning (school) and its immediate environment (school grounds) must offer basic minimum standards to encourage and facilitate the main objectives of a child-friendly school. These child friendly schools have much in common with any good school; therefore the child-friendly school needs to be conceived as an improvement on the basics of existing good schools (Wright, Mannathoko, & Pasic, 2005). There are three elements in child development that are essential for child-friendly school design i.e. safety, health and nutrition. These three must be adequately addressed if the school is to become an inclusive, holistic learning landscape that provides a safe, enabling learning environment where children can thrive.
2.6.1.1 Classrooms:
Classrooms can vary in size and serve different functions, with children moving from one place to another for different purposes. Instead of being single purpose spaces, they can allow a number of different activities, such as reading, research, group work and art. Direct access to the outdoors from the classroom enables children to make better use of the outdoors as a learning resource, but there should be one or more intermediate spaces (e.g., corridors) that link the outdoors with the indoor learning environment. In this way, there will be a range of learning spaces gradually changing in character and multiple learning opportunities.

In child-friendly schools, mobile furniture replaces benches or desks that may have been bolted to the floor. The designer needs to consider the children’s age group, so chairs and desks fit the students’ sizes comfortably. When seats are movable, children can work alone or in groups. Chairs or stools are easier to move around than benches. Storage facilities in or near the classroom for children’s class projects, artwork, bags and coats are necessary. Students need to have private, lockable storage areas to keep their belongings safe, even if just a tiny space.

Classrooms need blackboards and, in the lowest grades, child height rails for hanging students’ work and posters. The range and expense of these vary widely. It is best to utilize local material and community maintenance. A blackboard and teacher’s desk in front of the classroom encourages a focus on the teacher as the resource for learning. If the teacher can move about, giving assistance to groups or individual students, children will be more actively involved.

Classrooms need good fresh-air circulation to avoid heat and excessive humidity. To ensure adequate daylight, a minimum of 20 per cent of the classroom floor area should be window area. Electricity or another means of power is needed to provide light and to operate equipment. Classrooms must be sufficiently shaded from direct sunlight, glare (direct light) and reflection (indirect light). Schools should not be located close to sources of excessive noise or excessive pollution. When this is not possible, design measures
should be used to minimize the impact of these problems. Materials and finishes should be the light, natural colours of the materials themselves, selected in harmony with warm natural hues as accents (reds, oranges, maroons, ochres and linen/khaki/off whites) dictated by local and cultural preferences. For example, timber may be finished using clear varnish to preserve the natural beauty and warmth of the material or brighter accents can be used for play corners, decks, corridors and furniture. Learning spaces should be light and relaxed in colour, not gloomy, dull or dark (Wright, Mannathoko, & Pasic, 2005).

2.6.1.2 Additional Functional Elements for a Child-Friendly School:
Flexible spaces increase child participation in class and allow teachers to provide a more dynamic environment for learning and teaching. Such spaces provide opportunities for group activities, areas for manual projects and easy access to open spaces. Individual classrooms or other facilities that create outdoor space between structures give students a chance to be in open areas when in transit between classes. Classrooms should be accessible for all children; ramps and wide doorways should be provided for less mobile children. School grounds form an integrated, holistic unity with school buildings and their users, but in conventional school planning they are often neglected. Trees are vital for filtering sun, dust and noise and for beautifying the school. Indigenous trees, shrubs and flowers should be planted in the school compound along with edible plants meant to teach children food production and conservation. Trees also have a softening and calming effect on the learning environment and its users. Landscaping is a good way to involve children in the realization of a child-friendly school (Wright, Mannathoko, & Pasic, 2005) (Wright, Mannathoko, & Pasic, 2005).

2.6.2 IS 8827 -1978 (Reaffirmed 2006):
The Indian Standard Code was adopted by the Indian Standards Institution on 27 February 1978, after the draft finalized by the Functional Requirements in Buildings Sectional Committee had been approved by the Civil Engineering Division Council. Further revision was done in 2006.
As a student moves from nursery to higher levels, the process of teaching changes and teaching pedagogy also need more focus with infrastructure. This demands addition of a number of facilities to the basic class room unit depending upon the level and nature of the school. At present, in the absence of any uniform standards, there is marked variation in the educational facilities between various schools. Again in view of the changes in educational pattern as well as teaching aids adopted, it is necessary to introduce the relevant requirements in a national standard. The standard is, therefore, intended to lay down optimum requirements for school buildings, subject however to local conditions (Chairman).

Point three of IS Code further elaborates that purpose of this standard is not to offer design solutions for an educational facility but to lay down standards for both spatial and environmental needs of the basic class room and allied spaces. IS Code provides information about classroom as follows:--

- The classroom, apart from satisfying the minimum requirements of space, fittings and furniture, shall be designed to meet the adequate functional and environmental requirements. The size of classroom shall depend on the following:--
  a) Anthropometric dimensions of children and their space requirements;
  b) Dimensions, arrangements of furniture and equipment and their incidence;
  c) Number of students to be accommodated;
  d) Types of activities to be carried out; and
  e) Diverse seating arrangements essential for these activities.
- The primary classroom should be designed for 40 student places. Area of classroom with furniture for 40 students should be calculated as 1.11 sq.m per student. Height of the classroom should not be less than 3.00 m measured at any point from the surface of the floor to the lowest point of the ceiling.
- The minimum headroom such as under the bottom of beams, fans and lights shall be 2.6 m measured vertically under such beam, fan or light. The proportion of the breadth (minimum dimension.) to the length (maximum dimension) of the classroom should be not more than 1: 1.5.
With above explanation regarding classrooms; the following figure no. 2.5 shows the sketch of an illustration of a primary classroom (A) and the alternate arrangement of furniture in a primary classroom (B) (Chairman).

**Figure No. 2.5: Illustration of a Primary Classroom**

![Illustration of a Primary Classroom](source: IS 8827 – 1978-Reaffirmed 2006 pp.7, 9)

2.6.3 Spatial Characteristics Observed:
A three dimensional space can offer a unique setting for a child to learn because it can introduce a multiple sensory experience to accompany the textbook or blackboard. Spatial dimensions, textures, shapes, angles, movements and spatial attributes like inside – outside, up – down, can be used to communicate some basic concepts of language, science, mathematics and the environment. These concepts can be applied to existing as well as new, to be built spaces. The structuring of infrastructural facilities is essential for paving the way for creating a learner – friendly and activity - centric context. Setting norms and standards, especially relating to space, building and furniture would help in fostering a discerning sense of quality (Pal).
Though classroom is the main image of school, to complete the frame; there are other supplementary spaces like art room, music room, computer lab etc. Playground, garden, other open spaces are related to physical and mental health of students which is the most important for student’s activities. For this study only classroom, corridor and play area is considered.

Classroom essentials refer to the item which mainly shapes the classroom and IS 8827 (1978): Recommendations for basic requirements of school buildings [CED 12: Functional Requirements in Buildings] are referred for finalization of parameters. The crucial unit of a school is classroom. The classroom, apart from satisfying the minimum requirements of space, fittings and furniture, shall be designed to meet the adequate functional and environmental requirements. Height of the classroom should not be less than 3.00 m measured at any point from the surface of the floor to the lowest point of the ceiling. The minimum headroom such as under the bottom of beams, fans and lights shall be 2.6 m measured vertically under such beam, fan or light (Chairman).

After completion of construction, number of years that the building in use is referred. Age of building is synonyms to old building, renovated building. Age of building in and itself is usually not directly related to student performance in earlier research; but availability of facilities as per current norms, maintenance or retrofitting possibilities play a positive role in student performance. McGuffey and Brown investigated the influence of school building age on student achievement in the fourth, eighth, and eleventh grades in Georgia. They found that the school facility age does affect what students learn, and that this relationship was not related to student’s socio-economic status. In comparing the achievement scores with the age of the building, the statistical analyses indicated that the building age could account for 0.5% to 2.6 % of the variance in the fourth & eighth grade (Earthman & Lemasters, 1996). Chan, 1979 has studied the relationship of school building age and student academic achievement in three types of school buildings using different schools and building populations. In these studies, schools were categorized as old non-modernized school buildings, partially-modernized school buildings, or modern school buildings (Earthman & Lemasters, 1996). These studies were non-experimental.
research which used different statistical analyses to determine whether school building age has a significant impact on student achievement before and after controlling for student socio-economic status (SES).

Classroom fittings refer to the items which are part of classroom interior, used as teaching learning material. Classroom fittings mainly involve items mentioned in IS 8827 (1978): Recommendations for basic requirements of school buildings [CED 12: Functional Requirements in Buildings] (Chairman). Table no. 2.1 shows the fittings that should be provided in each classroom.

**Table No. 2.1: Classroom Fittings**

<table>
<thead>
<tr>
<th>No.</th>
<th>Fittings</th>
<th>No. of Units</th>
<th>Area</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chalk board</td>
<td>1</td>
<td>1200mm x 2400mm</td>
<td>Its base should be 800 mm above the floor / platform level. The location of the chalkboards should be on the walls adjacent to the window wall and placed such that the mid-vertical line of the board lies between one half and two thirds the depth of the room. This is to ensure that the glare due to windows at student’s seat area is minimized.</td>
</tr>
<tr>
<td>2</td>
<td>Cupboard</td>
<td>1</td>
<td>1.5 sq. m.</td>
<td>Its depth should not be less than 450 mm. It would serve as space for storage of maps, display materials, etc.</td>
</tr>
<tr>
<td>3</td>
<td>Pin board</td>
<td>-</td>
<td>-</td>
<td>There should be one or more near the chalkboard area or on the side walls to display maps, charts, students work, etc.</td>
</tr>
<tr>
<td>4</td>
<td>Fans</td>
<td>3</td>
<td>1200 mm diameter</td>
<td>Arrangement of fans and lights in classroom is as per specified layout.</td>
</tr>
<tr>
<td>5</td>
<td>Light Points</td>
<td>4</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Students</td>
<td>--</td>
<td>--</td>
<td>Depends upon the number of seats to be</td>
</tr>
</tbody>
</table>
desk provided and whether the desks are single or double

Desirable fittings:

<table>
<thead>
<tr>
<th></th>
<th>Wooden Figure rail</th>
<th>1</th>
<th>Length = Length of wall</th>
<th>The rail should be provided on the wall opposite to windows or opposite to chalkboard.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Students’ Locker</td>
<td>1 for each class</td>
<td>--</td>
<td>A locker for each student may be provided in case such an arrangement in students’ desks is not possible.</td>
</tr>
</tbody>
</table>

(Source: Classroom Fittings Table No.3, IS 8827-1978 reaffirmed 2006, pp.11)

One wall of classroom normally bears a chalkboard which is a major tool in teaching process. Majority of classroom furniture arrangement is mostly done facing the black board. Minimum clear distance, Base of the chalk board, Chalkboard location and Chalkboard size are the essential requirement for chalkboard / black board placement. Children’s chalk board is self expression of end user. Provision of a chalkboard will initiate students to draw and to increase peer interaction. Children can be encouraged to participate in activities to make the school and classroom attractive for study, work and play. The walls of the primary school classrooms till about 4 feet should be painted black so that they serve as a free slate and drawing board for children.

Pin board i.e. Display area in classroom (provide visual delight to eye as well as very much required to exhibit student’s creative work. This display should contain charts, drawings and maps, student’s group work as it is important components of pedagogy. Drawings, art and craftwork put up on the walls and shelves send out a powerful message to children and their parents that their work is appreciated.

Desirable fittings include wooden figure rails lockers. Much of discussion is happening related to weight of school bag that students carry. Government of Maharashtra is thinking of provision of lockers in school so that burden of carrying heavy schoolbags will be reduced and also help in reducing health issues.
Environmental Condition includes fans, light points, window area, noise, door width, number of doors and colour. Light is one of the most important aspects in classroom design. Classrooms can be brightened up by first ensuring adequate natural light. Quality and type of lighting will either hamper or make the classroom environment lively; contributing to the aesthetic and psychological character of a learning space. It is important to provide adequate light and ventilation as per norms to attain basic requirements.

Rooms shall have, for the admission of light and air, one or more apertures, such as windows and fanlights, opening directly to the external air or into an open verandah. The minimum aggregate areas of such openings excluding doors inclusive of frames shall be not less than 20 percent of the floor area in case such apertures are located in one wall and not less than 15 percent of the floor area in case such apertures are located on both side walls at the same sill level (Chairman). As research suggests that 20% of wall space be allocated to windows located so students can see out from a seated (Tanner, 2009).

Sound is another important aspect as the intensity and frequency affects the user. The external noise has significant influence on the background noise in classrooms, and this becomes the basis for determining the Speech Intelligibility in classrooms. The background noise in the classrooms is influenced by the noise within the school. Location of school, classroom shape; classroom fittings all influence the speech intelligibility in classroom.

Application of suitable colours in places and students interest is important. Students agree that application of light colours in corridors, green spaces makes school exciting (Mokhtari, Amini, & Mottaghi, 2014). It is also believed that carefully planned colour schemes can influence absenteeism, promote positive feelings about the school and, if students like the colours, can also influence muscular tension and motor control (Fisher, Research into Identifying Effective Learning Environments, OECD/PEB, 2005).
2.7 Relationship between Physical Environment (Spatial Characteristics) of school / Classroom Environment and Student Behaviour, Learning:

The focus on better understanding of the association and relation between social, spatial characteristics and student behaviour, learning has emerged out of a concern as to whether pedagogies, curriculum, new teaching aids, different stakeholders and classroom space forms necessary to develop the students i.e. future of India. Urbanization, high land value rates in urban area, Growing technology, inclusion of ICT for better teaching – learning and government of India’s effort for UEE are the points at back of mind for study.

Research on classroom environment included the analysis of relationship between student and teacher behaviour and attitudes, dropout rates, teacher’s satisfaction; majorly student achievement is measured on standardized test scores, with variables like acoustics, colour, light and ventilation, class size, density in class, school size, and open classroom. These variables have been used for causal linkage between classroom or school environment and student achievement.

Concern for the classroom, school building has been limited to enforcement of minimum standards of classroom size, light, ventilation requirements etc. It assumed that if basic requirements are fulfilled, then student’s performance depends on teaching and psychological variables. The association of classroom environment and student behaviour, learning has not been investigated in architectural research literature, especially in Indian context. In order to understand this research, it is necessary to look at school reform movement under SSA, government funding and increased awareness towards schooling.

2.7.1 Reviews pertinent to Relationship:

Following sections reviews the studies in various relevant disciplines indentifying associations /relations between study variables.
Weinstein’s (Weinstein, 1979) research regarding class size and school size has gathered significant evidence for a direct effect on student achievement. The research by Weinstein (1979) and Gump (1987) are comprehensive review on physical setting of school. Contextual variables like socioeconomic variables, operational policies etc. need to be taken into account. Quantitative studies tended to focus on direct links between outcomes and learning spaces, recent qualitative research provides greater understanding as to how this has occurred and why.

Talton and Simpson (1987) comment that ‘The classroom is the basic structural unit of our educational system , the nature of classroom is same throughout except size which may change as per school design and minor changes as per school mission (Lynn & D., 1987). Carol Cash’s study (Cash, 1993) was the first pioneering study that dealt merely with the overall building conditions. Cash examined the relationship between the condition of school facilities and student achievement and behaviour. Her study used the entire population of small, rural high schools in Virginia. More specifically, the sample was 47 schools in 36 school divisions in Virginia, which had a population of fewer than 100 seniors in the 1991-92 school years and was located outside urban areas.

Building condition was determined by the Commonwealth Assessment of Physical Environment (CAPE), which was completed by personnel in the divisions of these 47 schools. Student achievement was determined by the scale scores of the Test of Academic Proficiency (TAP) for grade eleven during the 1991-1992 school years. Student behaviour was determined by the ratio of the number of expulsions, suspensions, and violence/substance abuse incidents to the number of students in each school. All achievement scores were adjusted for socio economic status by using the percentage of students in the free and reduced lunch program. These variables were investigated using analysis of covariance, correlations, and regression analysis.

Cash divided school building conditions into two categories: structural conditions and cosmetic conditions. Structural conditions related to physical features of the school buildings for e.g. presence of windows and lighting; while the cosmetic conditions related
to aesthetic aspects, such as recent painting, presence of graffiti and cleanliness. The findings indicated that students in the buildings with above average structural conditions scored lower than those students in sub-standard school buildings. However, students who attended schools rated as above standard structural building condition scored higher in all sub-tests than students attending schools rated as sub-standard building condition with only one exception, which was Written Expression. Cash found that the student achievement scores were higher in schools with better building conditions. The numbers of student discipline incidents were also higher in schools with better building conditions. Her study mainly relied on overall building conditions assessment and Cash has proposed a model as seen figure below showing the association.

**Figure No. 2.6: Cash’s Model**

![Figure No. 2.6: Cash’s Model](image)

**(Source: Building Condition and Student Achievement and Behaviour (CASH 1993 pp.4)**

Figure no. 2.6 shows the Direct and Indirect Relationship between Building Condition and Student Achievement

Moore, G. and J. Lackney explored the relationship between educational performance and the architectural design of educational facilities. With a brief review of the crisis in school buildings in the United States, an attempt is made to clarify the issues involved in the research literature bearing on the relationship between educational performance and school facilities and to critically review some of that literature. Two physical environmental factors are found that directly impact academic achievement in elementary
schools (school size and classroom size) and another two that impact “non-achievement”
behaviours (location and secluded study spaces). Two of the 27 design patterns
developed in response to these findings have been presented and discussed. In
conclusion, a mediational-interactional model of the relationship between the socio-
physical environment and educational outcomes has been presented (T.Moore &
Lackney, 1993).

Educationist Earthman, G and Linda Lemasters reviewed research on the relationship
between school buildings, student achievement and student behaviour. Student
achievement as measured by some form of standardized or normed test was considered.
Student behaviour includes specific level of student activity or school climate. The
relation of these variables with schools was explored through literature. In the research,
McGuffey’s two conclusions that old and obsolete buildings do have a negative effect
upon the learning process of students whereas safe, modern and controlled environment
facilities enhance the learning process were studied (Earthman & Lemasters, Review of
Research on the Relationship between School Buildings, Student Achievement, and
Student Behavior, 1996).

School building age was significant contributor to student achievement and behaviour in
seven studies reviewed by McGuffey. School building age can also serve as surrogate for
a number of specific variables such as condition of building, thermal control, and proper
lighting, acoustical control, support facilities. Maintenance can keep a building in good
repair. Condition of building and student attitudes and behaviour was reported in the
study where it was observed that students from modernized building had better attitudes
and less disciplinary behaviour.

On the similar lines, other studies were conducted where possible causal links between
school facility condition, building design, pedagogy and student outcome have been
discussed (Lumpkin, 2013). Teachers can change the desk arrangement in classroom as
they need. It can provide private area. Different room arrangements serve different
purposes and it is necessary for classrooms to have some degree of flexibility.
Plenty of storage and lots of display area leads to more time spent by students which is also suggested in the national curriculum framework. Maxwell agrees that display of student work gives feeling of welcoming and increases sense of belongingness. Dudek M. sees it as visual aspect (Dudek M., 2000). There are various ways of student work display which will increase passive exploration of display throughout the school which parents appreciate more than students (Maxwell, 2000).

Sandra Horne Martin studied the design of classroom environments and the impact of these environments on the practice of teachers. Question raised was about how teachers should be trained to perceive the environment as a part of the learning process and not just as furnishing, equipment and walls. Teachers have the ability to affect a wide range of environmental qualities within their classroom such as personalization and ownership and providing places for social interaction. The need was felt for educators to become more aware of the potential and opportunities that the physical setting presents to teachers and students. Data was gathered through teachers and behaviour mapping in classrooms. The data identifies a link between teacher satisfaction with their settings and their feeling of control. Teachers who are aware of their surroundings deliberately use it while teaching. These are the environmentally aware teachers but they are not as common place as ideally it is wished. Auditing the space is a useful exercise for teachers as they realize how much of their rooms are actually flexible. In same vein, Johnson also found that the impact of the school’s physical setting on the teachers affect their desire to continue teaching (Martin, 2002).

Earthman, G. in his research paper titled School Facility Conditions and Student Academic Achievement shows that the condition of school facilities has an important impact on student performance and teacher effectiveness. In particular, research demonstrates that comfortable classroom temperature and noise level are very important to efficient student performance. The age of school buildings is a useful proxy in this regard, since older facilities often have problems with thermal environment and noise level. School building conditions also influence teacher effectiveness. Teachers report
that physical improvements greatly enhance the teaching environment. Finally, school overcrowding also makes it harder for students to learn and this effect is greater for students from families of low socioeconomic status. Analysis show that class size reduction leads to higher student achievement (Earthman G., 2002).

In Heshong’s study, teachers desired more space, a good location and quiet environment, and have lots of storage and water in the classroom (Higgins, 2005). Classroom arrangement is also a basic variable in reference to classroom size. The arrangement of desks or independent desk and chairs has been researched. Within row arrangements as seen in majority of schools, there seem to be differences in student involvement with an action zone increased near teachers desk, reduces till end in T shape.

Zulkiflee Abdul Samad & Sebastian Macmillan (2005) conducted a study to understand valuation of intangibles; following Rouse’s work, a study was undertaken on improving the valuation of intangibles which resulted in a classification of stakeholders and the outcomes they value, and a model which identified six different types of tangible and intangible value delivered by buildings. The pilot study was conducted on a newly build primary school to investigate perceived intangible benefits – which values may be raised by its design quality and to obtain initial feedback on valuation of intangibles. The inquiring process involved interviewing the head teacher, an education officer and the architect of the school. Findings illustrate encouraging signs that key stakeholders of a newly built primary school can identify the intangible benefits that have been provided by the design quality of their new school buildings, and that there is a recognized need for valuation methods that allow these benefits to be defined in some measurable way. The paper concludes by suggesting that improved understanding of the impact of design on outcomes, combined with new valuation methods for capturing intangibles, should raise awareness of appropriate levels of investment needed to achieve design quality and deliver particular outcomes (Samad & Macmillan).

Valkiria Duran Narucki studied the role of condition of school facilities play in educational outcome. A total of 20 items which were conceptually relevant to student’s
perception of their building were selected to create a school building condition index. School report cards that were issued by New York City board of education were considered as database for student performance in study area i.e. New York City schools. Data on building condition and results from English Language Arts (ELA) and Mathematics (Math) standardized tests were analyzed using a sample of 95 elementary schools in New York City. Variables relevant to academic achievement such as ethnicity, socioeconomic status, teacher quality, and school size were used as covariates. Hypothesis testing was done for determining the mediator as suggested by Baron and Kenny. The analysis shows that a preliminary but cannot be overlooked as the environmental aspects that affect academic performance of school children in New York City. Elements of school building in disrepair also cause students to avoid using them. The daily social interaction between all the students of the school was affected by the condition of school building. Children at primary school may be particularly sensitive to their surrounding environment (Narucki, 2008).

C. Kenneth Tanner compared student achievement with three school design classifications: movement and circulation, day lighting, and views. This study is part of the original research efforts at the University of Georgia, USA. Since 1997, the focus of research in the University of Georgia’s School Design and Planning Laboratory (SDPL) has been the measurement of the impact of the school’s physical environment on aspects of affective, behavioural, and cognitive learning. Three school designs, taken with a ten-point Likert scale, were compared to students’ outcomes defined by six parts of the Iowa Test of Basic Skills (ITBS): Reading comprehension, Reading vocabulary, Language arts, Mathematics, Social studies, and Science. Data are tested through reduced regression analysis. This result, in each case, is defined as the effect of the school’s physical environment on students’ outcomes represented by achievement scores on the ITBS. Significant effects were found for Reading vocabulary, Reading comprehension, Language arts, Mathematics, and Science. The study’s findings regarding movement and circulation patterns, natural light, and classrooms with views have implications for designing new schools or modifying existing structures (Tanner C. K., 2009).
Filiz Erbaya & Esra Omeroglu studied the preschool educational environments in Konya-Turkey. Survey research was conducted with revised early childhood environment rating scale. Classroom space and furniture sub-scale was used for government primary schools, autonomous schools and preschools, preschools within private primary school were studied as sample. Statistical analysis shows that number of children in classroom, school type, number of floors and garden influence organization of preschool educational environments (Erbaya & Ömeroglu, 2009).

Tina Haghighat and Azizi Bahauddin (2011) conducted a study to identify the impact of kindergarten on academic achievement in Iran. Kindergartens being a first social place, the children become more active and creative. This influences their behaviour. Chi square test of independence was used to examine the extent to which selected kindergarten environmental facilities influence students’ academic achievement. Multiple intelligence theory dimensions were also studied along with academic achievement. Results show ranks of components where safety was given priority. Teachers were more concerned about the light, class furniture, suitable study material and interior space. A need of collaboration of Teachers, Architects, Child Psychologists and Private sector was felt (Tina & Azizi, 2011).

Selda AL et al investigated the effect of spatial quality of schools in Trabzon/Turkey and their physical conditions on child’s academic achievement. For this study, secondary public schools in Trabzon were selected. Study is not just limited with architectural field and it has an interdisciplinary dimension in the triangle of child, education and education buildings so that child and education psychology fields are joined to study together with architecture. The required information about student’s attendance to school, academic achievement report, school size, trainers and staff numbers were got from the school management and also by using observation technique existing physical condition of school were determined. To determine effect of variables in the study on student’s academic achievement and attendance, survey data were analyzed with Chi-square independency test, cross tables analyzes and comparing of percentile ratios. There is significant relation between classroom physical conditions and student’s science-math
scores but it was seen that there is no significant relation between student’s grade point average, Turkish-social science score and classroom physical conditions. This study also supports earlier research by Heschong Mahone Group report, 2003 regarding operable windows and absenteeism that operable windows and air conditioning have no effect on absenteeism (AL, Odaci, & Sagsöz).

The research conducted by Shuhana Shamsuddin et.al was focused on identifying the relationship between the outdoor physical environment and the students’ social behaviour in the urban and secondary school. Research indentified the most preferred behavioural setting in the outdoor physical environment of the urban secondary schools and how the characters of the external urban schools environment influenced the students’ social behaviour. Peer interaction and acceptance, sense of belonging, sense of privacy and sense of curiosity were considered as a Social behaviour for this research. Though the survey was conducted under controlled conditions, discussion of research illustrates that open spaces are preferred during recess. Students do enjoy doing activities in groups, looking at each other and seating on benches in recess time if any covered area is available. Corridors are also a place of preference. Application of colours and usage of materials is important as students enjoy them (Shamsuddin, Bahauddin, & Aziz, Relationship between the Outdoor Physical Environment and Students’ Social Behaviour in Urban Secondary School, , 2012).

Lorraine e. Maxwell et.al (2012) examined the role of school building quality ,both perceived and objective in development of self efficiency and academic success in young adolescents (range 11-17 years). School quality was assessed by a trained researcher, and academic performance was measured by classroom grades. Study was carried out in five public schools with a sample of 105 individual student interviews. A tour of each school was carried out with school building quality checklist. Regression analysis shows that objective and perceived building quality and self efficiency are significantly related to grade scores. Out of environment attributes noise was marginally related to academic performance. Perceived School building quality was significantly related to absenteeism (Maxwell & Schechtman, 2012).
Nur Hidayahuljamilah Ramli et al. investigated student’s perception about their classroom and preferred classroom environment. This research investigated classroom users perception of their classroom and the improvement as end user. The study was conducted in Malaysian schools with 60 students and 10 teachers as sample. The questionnaire was designed on basis of a visual questionnaire design by Sanoff (1991) considering need of current study. The questionnaire survey form included open-ended and close ended questions using the nominal, Likert scale and writing a list of wish poem. Phase I asked about current layout and Phase II asked about new layout redesigned by researcher. Data analyses done with mean score and open ended questions were analyzed; responses were listed, summarized to 10 things respondents required in new layout. The layout and arrangement are related to the number of students in the classroom. Teachers and students recognized that reducing the number of students in the classroom, change in layout in the classroom in order to improve their performance in teaching and learning process was useful. Both respondents Teacher and student have an opinion about their current classroom environment, users participation in design process which has been highlighted in this study (Ramli, Ahmad, & Masri, 2013).

Arab Naz et al. (2013) studied the relation where school size was very important and basic element in creating atmosphere for desirable outcomes and also for student’s personality development. The analysis and statistical discussion enhanced that physical facilities along with proper size of classroom was very important and the size of school plays a pivotal role in students’ academic performance. This study also recommended that proper seating arrangement is the core of learning recreational and leisure time activities play a pivotal role in the adjustments and presence of comfortable environment bring positive changes in personality and academic development (Naz et al., 2013).

Educationist Dr. Snehlata Verma, Harpreet Kaur (2014) conducted a study of infrastructure facilities, teacher’s quality and student’s academic achievement of government primary schools of Punjab. Descriptive survey method was used for study covering 30 schools and 100 teachers and a questionnaire for teacher’s quality and
checklist for infrastructure quality were used for data collection. From analysis it was concluded that lower academic achievement can be related to poor infrastructural facilities (Snehlata & Kaur, 2014).

2.7.2 Awareness in India:
National Consultation Workshop on Whole School Development Planning was organized by the Department of School Education and Literacy, Ministry of Human Resource Development, Govt. of India and Educational Consultants India Limited (EdCIL) Technical Support Group for SSA at New Delhi during August 2010. In this workshop had many brain storming discussion as interdisciplinary experts participated. Following details gives a brief overview of this workshop:--

- The questions raised by experts are as school built environment just about a permutation and combination of rooms or is it (or it should be) an experience- a child friendly learning experience?
- A classroom is usually thought of as just four walls and a roof with doors and windows and perhaps a chalkboard – this space not be linked to the very activity – teaching-learning and its need for sitting arrangements, storage, display, communication, etc? The space should encompass larger goals of access, retention as well as minor details in very simple way.

The National Curriculum Framework 2005 developed by NCERT gives clear view point about education and corresponding teaching learning material needs and infrastructure requirements. Teacher and school management may not be trained to develop physical manifestations of educational values and ideas, and as a result, fail to connect with it. We have to create an interface and a common language between both ends of the spectrums i.e. school architects, builders and educationist; so that what a child gets to experience in a school is holistic in nature. In absence of a common language, many terms and concepts are left to the interpretation and misinterpretation of the school architects for e.g. ‘a child friendly classroom’ may be interpreted in several ways, like permanently painted walls with geographic information, animals, disney world on walls or furniture, play
instruments which a child may find very uncomfortable to use every day. So despite of huge investment the child friendly concept is not implemented.

In early nineties, a major initiative to achieve universal primary education came in the form of District Primary Education Programme (DPEP) which has now emerged as a major vehicle for bringing about a qualitative change in primary education through SSA. Quality cannot improve by itself. It requires multi-pronged and strategic reforms in teacher training; improvements in the facilities and infrastructure in schools; teachers’ motivation and a change in the style of teaching to make it attractive to the students. (Aggarwal, 2001).

2.7.3 Reviews related to Data Collection:
Mohamed Yusoff Abbas et.al conducted a study in preschool classroom environment and five types of play behaviour in Malaysia. Data collection involved teacher’s questionnaire and un-obstructive observations with video recording. The research design for this study followed Descombe’s (2001) suggestion, whereby any research should be strategized with one out of the five options – survey, case studies, experiments, action research and ethnography, while the methodologies for data collection should incorporate at least three methods for triangulation out of the four options – questionnaires, interviews, observations and documents (Mohamed Yusoff Abbas et.al pp.50). The study was based on previous studied by Moore (1994, 2008) and Zimmons (1997). Specially Children’s Physical Environment Rating Scale (CPERS) was used for survey. The study was carried out in two phases. Preliminary study was conducted for familiarization of researcher to setting for conducting survey and observations. It helped to indentify ignored elements that could impact the survey and also a pretest for questionnaire. The second stage was study of classroom settings and Un-obstructive Non participant observation was adopted for study to reduce impact on the collected data, as subjects were preschool children. After 10 minutes of observation, field notes were taken and used for mapping student’s location in classroom. Study findings show that children’s behaviours are influenced by physical environment (Abbas, Othman, & Rahman, 2012).
Mutlaq M. Al-Enezi studied the relationship between school building conditions and academic achievement of twelfth-grade students in Kuwaiti public high schools. The population of the study was 56 high schools (28 boys' schools and 28 girls' schools) that offered a Sciences and Arts majors. The major research questions in this study were based on Carol Cash’s study. The high school principals were given the revised Commonwealth Assessment of Physical Environment (CAPE) to assess building conditions. Student achievement was measured by final examination scores collected from the Information Center at the Ministry of Education. Pearson r, was used to determine if there is a relationship between building conditions and student achievement. This analysis revealed that a positive significant relationship exists between student achievement scores and building conditions in the boys' schools.

The results of two-way ANOVA and the t-test, used sequentially to compare academic achievement in the top and bottom quartiles, found that building conditions affect significantly the achievement of students in the Sciences major. The t-test highlighted significant differences in subjects in the Sciences major among only the boys' schools. Multiple regression, used to explain the variance in student achievement, indicated that building conditions explain at least 77% of the variance of Sciences majors' achievement, but did not account for any Arts majors' achievement. Because the SES index was neither available nor introduced into a formula, this resulted in a heavier weighting given to the remaining variables. The building conditions of the girls' schools did not explain student achievement in either the Sciences or the Arts majors. Step-wise multiple regressions, used to determine which physical aspects of a building's condition best predict student achievement, indicated that graffiti and roof leaks are the main predictors of achievement. This study then underscores the need for the Kuwaiti Ministry of Education to establish policy supporting a program of improved facilities for all new schools (Al-Enezi, A Study of The Relationship between School Building Conditions and Academic Achievement of Twelfth Grade Students in Kuwaiti Public High Schools, 2002).

Robert Scott McGowen explored the possible relationship between school facility conditions and school outcomes such as student academic achievement, attendance,
discipline, completion rate and teacher turnover rate. School facility condition for the participating schools was determined by the Total Learning Environment Assessment (TLEA) as completed by the principal or principal’s designee on high school campuses in Texas with enrollments between 1,000 and 2000 and economically disadvantaged enrollments less than 40%. Each school in the study population was organized by grades nine through twelve. Data for achievement, attendance, discipline, completion rate and teacher turnover rate were collected through the Public Education Information Management System (PEIMS) managed by the Texas Education Agency. Student achievement, attendance, discipline, completion rate and teacher turnover rate and their relation to school facilities were investigated using multiple regression models to compare sections and subsections of the TLEA with each of the five dependent variables. Major research findings of this study was that student achievement, attendance and completion rate measures were not found to be statistically significant in relation to school facility conditions as measured by the TLEA at the 0.05 level; second, discipline, or behaviour, was found to be significantly related to the TLEA. This indicates that the subsections of the TLEA could be used to predict discipline factors for schools in the study population (McGowen, 2007).

2.8 Research Gap:
The changing surrounding due to globalization has an effect on lifestyle, healthcare, and on education also. Primary education constitutes a large part of education sector in India. Primary schooling in India is changing due to the awareness created regarding primary education, increased parent’s involvement and increased school going population. No. of primary schools are increasing with newer technology input but concern still remain as; do the schools clearly express to the children that their presence is enthusiastically desired and they are welcome with their friends and parents.

The market driven forces in recent times has changed the face of school. With glass facades, polished marble corridors and rich, colourful and interiors. Considerable time that student and teacher spent in classrooms and on playground have also changed. The changing surrounding due to globalization has an effect on lifestyle, healthcare, and on
education also. Primary education constitutes a large part of education sector in India. Primary schooling in India is changing due to the awareness created regarding primary education, increased parent’s involvement and increased school going population. No. of primary schools are increasing with newer technology input but concern still remain as; do the schools clearly express to the children that their presence is enthusiastically desired and they are welcome with their friends and parents.

The market driven forces in recent times has changed the face of school. With glass facades, polished marble corridors and rich, colourful and interiors a model of which is presented in figure no. 2.7 which shows the advertisement pamphlet of school. Considerable time that a student and a teacher spend in classrooms and on playground has changed.

**Figure No. 2.7: School in advertisement**

![Image](source: Compiled by author)
The researcher had read through the literature and reviewed important concepts namely learning environment, social, spatial characteristics of school building and student behaviour, student’s academic performance. Educational, psychological research focuses on school culture, school climate, teaching pedagogy and student achievement, behaviour issues. Majority previous research findings have considered school building condition as the main variable.

Though findings indicate the positive relation between school building condition and student achievement, or studies related to other independent variable like outdoor spaces, light, age of building do have a proven relationship. There is less evidence about architectural research concerning classroom characteristics and student behaviour, learning especially in India. This signifies the need of identify the association between social, spatial characteristics between student behaviour, learning. Figure no. 2.7 shows a glimpse of the advertisement style of the schools.

2.9 Summary:
Review of literature assists in understanding the evidence related to relationship between social, spatial characteristics to learning. Studies done by educationist, sociologist facilitates understanding of inter disciplinary perspective. The literature review also revealed the theoretical and analytical aspects needed for study.

Review facilitated in following:--

- To indentify the need of study, as well the variables for study.
- Identification of social, spatial characteristics of school especially classroom in detail.
- A conceptual framework for questionnaire and field study.
- A conceptual framework for statistical analysis.

The next chapter i.e. research methodology elaborates various tools and techniques used for the study. The chapter provides information regarding pilot survey, sampling, research area and methods of analysis in detail.