Interpreting Spaces for Advanced Learning Environment by Interaction with the Natural Environment in Primary Schools

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ABSTRACT

The rate of urbanization is accelerating in an unprecedented way in all countries, which leads to the difficulty of people reaching the natural environment. As a result of urbanization, the individual spends most of time inside the buildings. The individual in childhood needs to be more closely related to nature than adults. Natural is a basic requirement for humans because it is part of its formula. The problem with this study is that most of the research focuses on connecting students to the natural environment by playing in the open air, while there is little research on the possibility of connecting students in primary schools with the natural environment while they are inside the building. The aim of this study is to offer proposals and solutions in the ways of having a natural environment in the primary school, and to identify places with large gatherings in the school to know how the natural environment is distributed inside or outside the school building; also the existence of solutions for the presence of natural environment spaces in primary schools regardless school size.

The limitation of the study can be defined with five primary schools in the United States. The schools were chosen every five years starting from 1995 to 2020. These schools are distinguished by their contemporary and innovative design and the existing natural environmental spaces, and the different school spaces, all of which were designed and built by a group of Architects and interior designers. The methodology of this study is qualitative, as a group of books, articles, and magazines have been analyzed and recapitulated. Results of this study show possibilities of having a natural environment under any natural conditions and whatever the size of the primary school.

The school's indoor spaces can be linked with the natural environment by focusing on the areas where students gathered in large numbers.

Keywords: education building, primary school, learning environment, natural environment, design.

ÖZ

Kentleşme hızı tüm ülkelerde görülmemiş bir şekilde artıyor ve bu da insanların doğal ortama ulaşmasının zorlaşmasına neden olmaktadır. Kentleşmenin bir sonucu olarak birey, zamanının çoğunu yapıların içinde geçirmektedir. Çocukluktaki bireyin, yetişkinlere göre doğayla daha yakından ilişkili olması gerekmektedir. Doğal, formülünün bir parçası olduğu için insanlar için temel bir gerekliliktir. Araştırmaların çoğunun öğrencileri açık havada oynayarak doğal çevreye bağlamaya odaklanması, ilkokuldaki öğrencileri okul içindeyken doğal çevre ile ilişkilendirme olasılığı üzerine çok az araştırma olması, bu araştırmada problem olarak nitelendirilmektedir. Bu çalışmanın amacı, ilkokulda doğal bir çevreye sahip olma yollarında öneriler ve çözümler ortaya koymak ve doğal çevrenin okul içinde veya dışında nasıl dağıldığını bilmek için okulda büyük toplantıların olduğu yerleri belirlemek; ayrıca okul büyüklüğü ne olursa olsun ilkokullarda doğal çevre mekanlarının varlığına yönelik çözümlerin varlığını işaret etmektir.

Çalışmanın sınırlaması, Amerika Birleşik Devletleri'ndeki beş ilkokul ile belirlenmiştir. Okullar, 1995'ten 2020'ye kadar her beş yılda bir seçildi. Bu okullar, çağdaş ve yenilikçi tasarımları, mevcut doğal çevre alanları ve her biri bir grup Mimar ve iç mekan tasarımcısı tarafından tasarlanan ve inşa edilen farklı okul alanları ile ayırt edilmektedir. Bu çalışmanın metodolojisi niteldir, çünkü bir grup kitap, makale ve dergi analiz edilip özetlenmiştir. Bu çalışmanın sonuçları, ilkokulun büyüklüğü ne olursa olsun, her türlü doğa koşulunda doğal bir ortama sahip olma olasılıklarıdır. Okulun kapalı alanları doğal çevre ile ilişkilendirilebilir. Öğrencilerin çok sayıda toplandığı alanlara odaklanmaktadır.

Anahtar Kelimeler: eğitim binası, ilkokul, öğrenme ortamı, doğal çevre, tasarım.

DEDICATION

To my mother and father, your constant support for me in all the circumstances that I have been through and during my long absence from you, I love you so much.

To my father, you are my inspiration and my hero in this world. You are the first person who encouraged me to study masters and always give me advice that gives me motivation to move forward, I love you.

TO my brothers Hamza and Mahmoud, thank you for your help and patience with me, and for sharing all my happy and sad days, you are not only my brothers, you are my close friends, and my beautiful sisters Dalia, Esraa, Sally, Aseel.

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Chapter 1

INTRODUCTION

Today the world is moving towards urbanization, which gives people the opportunity less to engage them with the natural environment and interact with it. Which necessitated finding an appropriate solution to this change due to the importance of the natural environment in our lives. And here came the necessity of the attention of the people who design the spaces in which individuals live, like the architects, interior architects and landscape architects. There are studies that confirm the need for children of a young age to relate to the natural environment more than adults. Here it is necessary to look at the way students communicate with nature because it considers the natural environment to be present in the region where students live because it is inherent in the human composition (Moghaddami, 2019). The places and spaces where students spend a long time because they are the future generation, their physical and emotional health within the built spaces is the responsibility of the designers, it is the duty to find ways to strengthen the relationship between nature and the spaces students use to keep them close to the natural environment (Woodward & Zari, 2018).

When the students finish kindergarten, they start with the primary schools. At primary schools, students begin to obtain more information in-depth and also develop knowledge and thinking of them, and their presence becomes more inside the school building. Since the interior and exterior spaces of the educational buildings are one of the key factors that affect students during their presence within the building spaces,

and the learning in primary schools takes a tangible form or in other words, the school site can support learning processes effectively or motivate, so it is necessary the primary schools have well-designed and organized interior spaces (Gislason, 2007).

So here comes the importance of a natural environment outside and inside the educational building spaces. This study turns to provide information about the educational building and primary schools, and information on the impact of the natural environment on the educational building. And the analysis of the natural environment in the selected primary schools, which have design and different sizes.

1.1 Problem Statement & Sub-Questions

Education is a fundamental right of all human beings. Nevertheless, it was seldom discussed and evaluated the areas of buildings in which the education process, its quality and as well as the learning environment. Many people believe that the quality of education is more important than the quality of the spaces in which education is made. It would be bad to deny the importance of spaces because of their important contribution to educational progress, user focus and results (Shamsabadi, 2016).

The problem that is ignored is insufficient attention to the importance of the natural environment inside or outside educational buildings, because of the urbanization speed of countries. People prefer to keep pace with development, so they are completely away from nature. Research has shown that isolation from the natural environment has a negative impact on human well-being and cognitive performance, which confirms that nature is an important part of human life and the appreciation and development of ties with nature (Woodward & Zari, 2018). The architects use industrial materials and contemporary styles in building educational buildings more than focused on the natural

environment surrounding them, this leads to reducing of the natural bonds that a person needs. (Salingaros & Masden, 2008).

The questions here are, does the outdoor natural environment in schools influence student performance? Can be related to the contemporary design with the natural environment? Is it possible to find a natural environment in the primary school whatever the size?

1.2 Aim of the Research

This study aims to begin to close the gap between the natural environment and architecture in primary school by studying the positive effects in the learning environment and establishing design environments suitable for student development. The objective of this research is:

- The presence of natural environment for all primary schools of all sizes and number of facilities with a natural environment in them, whatever the circumstances.
- Focusing on educational facilities in primary schools where students gather in a large number, and I learned how it can be linked with the natural environment.
- Enhance the natural environment in the educational environments of primary school students to increase their sense of belonging to the place and the stronger attachment to the natural environment that has endless benefits to their well-being.
- Thinking about what should be and what could be in the area of education and taking ideas and what can be done in different types of areas educational buildings.

- Determine the direction of the views and the sites of the natural environment.

1.3 Limitation of the Research

Data on primary schools were collected and counted as five case studies. The analysis will be carried out according to research in magazines, books and previous articles, and an analytical schedule will be developed for each school separately. The primary schools are randomly chosen in the USA, among projects with architectural design excellence, five primary schools were selected. Designed by companies with a team of designers and architects. Selected schools choose one school every five years, from 1995 to 2020. The USA is interested in building education and encouraging the development of school buildings to improve the level of education.

Schools with the innovative and special design were chosen, they were chosen within a different set of design curricula, and the projects are diverse in their civilizational environment. These primary schools are designed according to a set of design styles contemporary school environment. Five schools were chosen to give an adequate concept about the different design methodology.

1.4 Methodology of the Research

This study is started by having more knowledge about the school buildings and then primary schools. Followed by the significance and effect of the natural environment on interior spaces, its importance for the educational performance of students, its positive influence on humans and How to increase awareness of the design of a natural environment in primary schools.

By studying articles, theses and books about the importance of the natural environment and improving the internal environment, the importance of the presence of natural

environment spaces in the interior of the primary schools is clarified, which help architects and designers when build or design the school . In the thesis, an analytical schedule was prepared for each primary school and the ways for a natural environment in them, whether inside or outside the primary school spaces. The methods chosen to evaluate the data include qualitative methods, the available data are presented and studied, and the results of the analysis will appear in the final chapter.

1.5 Scope of the Research

In the first chapter, a definition of the natural environment, its importance, problems arising, and questions about the thesis and objectives, as well as limits and methodology are defined; and the way to analyze and study the selected primary schools. The second chapter, a study of some general information about the educational building in general, and also primary schools in particular, and also definition and information about the educational environment, the thermal environment, and the physical environment in primary schools. The third chapter is studying and making a schedule for primary school plans, and studying the details of the plan for schools in terms of spatial organization of the interior spaces and their connection to the natural environment. Chapter four, the results that were drawn from the study or obtained.

In this thesis, primary schools with outstanding architecture design and interior design, studying and analyzing primary schools ’interest in designing a natural environment, whether internal or external natural environment.

Chapter 2

BUILDING FOR EDUCATION

2.1 Definition of School Building

As described by Hertzberger (2008) stated, the school as a small-city and this means that the school has wide scope. The process of designing schools especially in urban place, focuses on architectural issues instead of focusing on designing a project that has the ability to keep pace with changes and developments in educational fields, the school improve students in terms of education, mental, body, social and knowledge.

Rehab Adel Gabal and Abdallah Abd El-Halim Mohamed, (2016), identified that the school is a junior social and educational institution within the broader community, where it educates child people, preparing and integrating them into society. Besides, it's an institution that allocated to education, and which has a pedagogical role that is no less important than its educational purpose.

Space can, therefore, be characterized as an essential communication tool so that the individual can discern the environment and forms behaviour. Accordingly, it gives chances for social and critical events in society and human relations such as gatherings, working, socializing and learning. At the same time, the school buildings are also the first places to encounter various classes and social backgrounds for primary school children. The physical environment affects perception and actions process directly or

indirectly. In this regard, the child must feel secure, enjoy the world in which he or she lives and develops, express itself and meet socially and culturally his or her needs.

According to Ahmet Türel and Elmira Ayşe Gür (2019), the physical atmosphere of the school affects the child's visual awareness and actions. Such elements, such as primary school facilities, incentives for physical education, mobility, housing, architectural structures, room length, fabrics, light and texture, influence space awareness and actions of the child, in addition to the accomplishment of the child.

Therefore, education can take place in various spaces, like home, museum, natural parks, etc. But the only space that is designed exclusively to respond to children's needs to invest in studying and planning is school (Moghaddami, 2019).

2.2 Types of School Building

During the recent history of design, multiple schools concerned in design attempt to form a field in many ways. Most of these ways were experimental while the other where grounded and had an efficient focus.

However, when we talk about the school design, the school construction should assist the school in its function whether the school is new and being constructed or it is an old school that is being redesigned, also the teachers and the architects held the responsibility to make this happen.

Consequently, according to a report of the National Education Association of United States (2019), the architects must focus on having tangible characters that help the educational applications and organizational point of views in educational structures and buildings that assist.

Besides that, they stated there are different kinds of educational buildings that can be divided into four categories:

1. Designs of the 1940s -- Centralized areas for cafeteria, gym, and auditorium; long, straight corridors with rooms sprouting from each side.
2. Designs of the 1950s -- the same as that of the 1940s, but a little more modern, with updated materials and colours.
3. Designs of the 1980s and 1990s -- Pods, larger rooms with movable walls, and planning areas for teams of teachers.
4. Designs of the Future.

Moreover, as regards the type of design, no single model can be recommended. However, the school building can be of several layouts:

1. The I Type – Consisting of a row of classrooms.
2. The L Type – L type with an extension on one side.
3. The T Type – T type with an extension on one side both ways.
4. The U Type – Two 'I' type joined on one side (Figure 1).
5. The E Type (Figure 1).
6. The H Type (Figure 2).

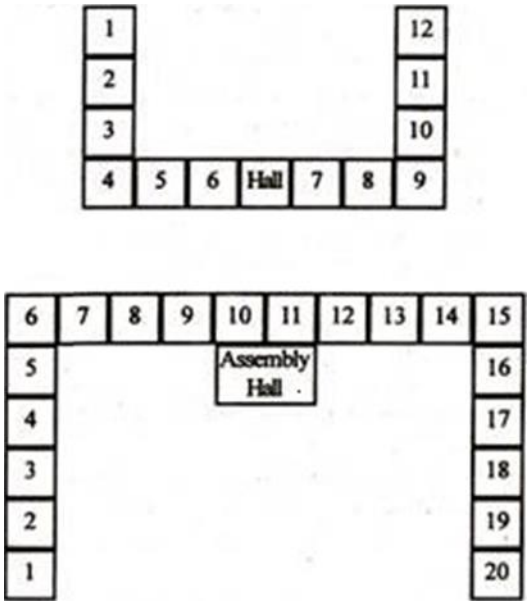


Figure 1: The types E and U of the school building layouts

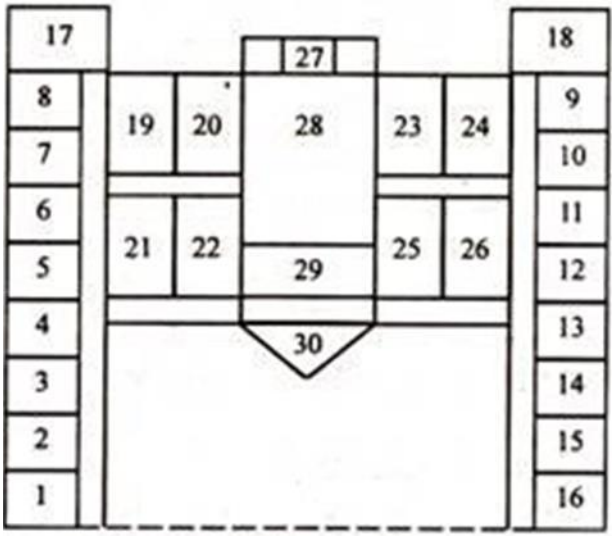


Figure 2: The type H of the school building layouts

Usually, T.E.L.H and U types of buildings are preferred as they are convenient and beautiful to look at. There should be windows on opposite sides of the room opening to the outside and giving cross ventilation. So, ventilation, light and heating should be in accordance with the student's needs. The building should be daily cleaned and annually washed and other repairs should be timely attended to.

2.3 The Significance of Space Quality in Education Building

The education building layout is not only the context of "appropriate" schooling function. The classroom or the school itself would be something more than just a repository of learning and instruction, as if absent to the physical or structural world (Burke & Grosvenor, 2008).

The architecture of schools, which contain many parts starting at classes and school structures and until it reaches to outdoor play sector and all in between, was central to the development of education and was an essential factor in the transmission of ideas regarding educational goals and aspirations. In this way, school design and the arrangement of the schoolroom mediate student perceptions and ambitions. Consequently, they form and enable – also in the relatively unstructured space of school buildings – pedagogies and classroom-dynamics as well as experiences and learning (McLeod, Goad, Willis & Darian-Smith, 2016, p. 15).

Furthermore, understanding the importance of space needs more than exposure to the educational effectiveness of learning environments (Leander, Phillips & Taylor, 2010). This as well as includes the types of student individuality and requirements which the field of education attracts and enables (Burke & Grosvenor 2008; Gutman & Coninck-Smith, 2008).

Therefore, the right design and function of schools contribute to the cultural and reputational importance that they have in and outside their culture. The emphasis on school experiences underlines the significance of the conceptual and representational aspects of schools for staff, students and communities, in public and neighbourhood contexts, coupled with the living reality of being in schools – designed, natural, indoor

and outdoor. As Christmann (2008) notes, buildings are distinguished by structural, architectural and in all situations visually.

2.4 Schools in the Community

Jana Kalin & Barbara Šteh in (2016), explained the partnership between the school and the wider community of schools is one of the most critical activities for the educational building. Public schools are seen as metaphors for group sovereignty, civic resilience, engagement with the environment, personal power, personal and community heritage, and personal and community identification. Schools are, thus, spaces for activities, performance space, music and other civic events (Waters, 2005).

It is also necessary to consider that schools are part of the local and wider social systems. Therefore, it is essential to deal together actively, to create confidence and to foster a culture of communication, through a range of collaborative events, both in schools and throughout the community. It, therefore, creates space for each other to learn and teach both children and adults, and strengthens the social and cultural capacity of the family, enhancing the sense of identity and harmony, facilitating the growth of the person and the society (Bečaj, 2009; Deutsch & Kolar, 2009).

Jana Kalin & Barbara Šteh (2016) highlight that, through successful collaborations or supportive interactions, citizens develop a sense of solidarity, a constructive social environment and a reform ethic within a clear cooperation plan.

2.5 Requirements of School Design

Chiesa and Grosso (2017) stated that public buildings have a profoundly symbolic function because they reinforce the position of spaces open to people. This is particularly important in schools at academic institutions reflecting not just a place of

learning for young people, but also a place of learning where knowledge of citizenship was created. Currently, a modern, rigorous aspect is being applied to this concept: the need for environmental protection to be accomplished by the criteria of the almost zero-energy building defined for modern public buildings by the 2018 European Directive EPBD 2010/31 / EU.

Consequently, to accomplish this goal, school buildings must be built concerning sustainable architecture planning, to measure educational performance and sustainability to a level far higher than the present one.

However, there are many problems in achieving this goal including, for example, an urgent requirement to modernise the established school buildings, provide they in different purposes and rehabilitate them from their present degradation in the functional and structural aspects.

The above method must, therefore, be applied from the earliest design stages and particularly the architectural planning process. Architectural planning is the conceptual design process concerned with the preparation and review of the knowledge required for the logical and consistent creation of subsequent design phases.

Conventional architectural planning deals with general knowledge and conformity with requirements. It is usually built on a morphologically prescriptive framework (for example, the quantitative spatial principles – total size, height, windows region to be followed). The following design phases (layout, volume and material configurations) was done in compliance with standard specifications. The environmental-

technological programming, on the other hand, requires general knowledge, the study of activities, needs, and requirements (ANR) according to the performance-oriented method to constructing the buildings for the needs of users without being restricted to any particular shape or dimension. When this strategy is using an introductory level, a space unit model and technical approaches (virtual configuration) were applied before the schematic building plan (pre-design), to test efficiency vs specifications (conformance review).

Therefore, Khan, Z. (2014), gives some of the major facts considered for planning a good school plant, besides, to guidelines for planning and designing a school building as follows:

1. Selection of the Site
2. Sanitation
3. Beautification of the School Campus
4. Maintenance of the School Campus
5. Construction of a School Building.

While the guidelines for planning and designing a school according to Khan, Z. (2014) guidelines, the building, have to be as follows:

1. A master plan should be drawn up for the site as a whole. For this purpose, services of a good architect should always be taken for the planning of the building. However, teachers and head of the institution should also try to equip themselves for giving suggestions to the architect or planner in order to make the school plant more useful and serviceable.
2. The level of the school should be high so that water-logging does not take place in the wintertime season. There should be a proper drainage system.

3. Always it is advisable to have the buildings of one storey. The second storey can be constructed in future when future expansion is needed. So, any type or design must, therefore, take note of this possibility of future expansion. So, it is desirable that the school plant should be planned.
4. The building should be south-facing, so that sunlight can enter into the room in the winter and cannot enter directly in the summer. Provision should be made for the free circulation of air, proper light and a minimum area to accommodate a certain number of school children. The building must be planned with hygienic laws.
5. The school building must provide for certain amenities for the students' such common room, sanitary conveniences, provision for mid-day meals, refreshments and in case of girl students retiring rooms with necessary facilities, accommodation for teachers with a common room available for them where they can meet one another, a reading room and a library; a visitors' room, a room for the headmaster, an office room and a well-planned and equipped science laboratory to stimulate greater interest in science. But planning and designing should be a scientific and modem. The construction of all types of rooms in the building must be determined not by fancy but by the utility.
6. Adequate space must be provided with classrooms, special rooms, school halls, staff room, office room, pupils' common room, library and reading room in every secondary school. The classroom should have 56 Sq. Ft floor area (30′ x 20′). The height of each room must be more than 15 feet.
7. Efforts should be made to have school buildings with a graceful look. The surroundings of the school building should be attractive and must provide a

stimulating environment for children to study and conduct co-curricular activities more effectively.

2.6 The Influence of School Buildings on Education

Research of academic achievement and functional learning environments demonstrate that spatial conditions affect the success of students. The study indicates that the spaces and situations in which students invest a significant deal of time studying influence how much they perform (Earthman, 2004). The physical characteristics of learning spaces will activate feelings, build comfort and encourage learners for learning. Study (2015) by Mohsen Ghasemi Ariani and Fatemeh Mirdad reveals that interior architecture and the inner structure of learning environments may help students concentrate their research attention or discourage them from giving maximum attention to studying (Yeung, Craven & Kaur, 2014).

Popular designs include unrivalled entrance points, very private and public spaces that enhance a sense of shared solidarity and cohesion with a specific focus on a variety of colours (McGregor, 2004). Yeoman (2012) reveals that architecture properties such as bad acoustics, insufficient airflow, ineffective illumination and excessive noise sensitivity hinder education. School designers today will provide learning opportunities that inspire students and encourage learning and teaching. In reality, they can not only be usable in physical settings but have soothing spaces like sound architecture and creative design. While school design and physical learning are significant, education spaces design and planning are contentious issues.

At the other side, there is a range of schools and facilities based on international standards. In fact, these school designs may affect the success and encouragement of

students. Education requires a particular environment and planners will take charge of the education room to encourage schooling and to identify a sound architecture. Creating ideal learning and teaching areas is also an art that increases the success and inspiration of students. Excellent educational facilities allow students to collaborate and develop their cognitive functioning. This is often the consequence of cooperation between school planners and officials at colleges. New schools and facilities will incorporate emerging technology that connects the learning cycle with the outside world. This ensures that students will know that their environment, curriculum and preparation methods are specifically interconnected. If public environments fulfil environmental and instructional standards, students and teachers are motivated to enhance their results. Typically speaking, significant strides will be made to facilitate student thinking, foster professional development and provide incentives for growth.

The specific facets of interior physical environments and atmospheres such as room preparation, furniture collection, illumination, materials and finalities will be addressed in order to construct and accomplish a better design for the educational building. In contrast, two of the interiors – physical and environmental – provide a significant effect on the majority of the practical, spatial, cognitive, symbolic and social impacts. Increasing these factors actively and implicitly impacts the student's reaction by influencing certain factors, therefore, the physical environment is one of the most influential and all-embracing forces. Although many factors include physical environments, including the environment and the inner elements, that interact and influence each other in various ways. Ultimately, the focus will be on users' preferences, wishes, requirements and understanding (Lababneh, Omer, Ibrahim, Alqamaz & Awawdeh, T, 2019).

2.7 Characteristics of School Buildings

The Education Business Journal (2020) study states that the function of school buildings, new or partially restored. They have popular features of school architecture, classroom rooms, future features and vast fields. However, not all measurements match. The school building needs to function to avoid obstacles such as small rooms, shortage of natural light.

Furthermore, space and natural light in a school building will be total; this will improve the school structure and advancement, offering students and staff a feeling of empowerment and pride. Over the years, work was performed on the effects of well-designed buildings, and it was hard to quantify the impact on educational performance, low truancy among students, Improved morale of staff and successful environments, It is common sense; The world in which you find yourself has a tremendous impact on your emotions (Education Business Journal, 2020).

In particular, it is difficult for each local authorities to predict demand if they have to plan five years ahead, and any construction process takes the same amount of time to expand. The challenge here is to provide a long-term, sustainable school estate. Short-term solutions where fast decisions compromise quality create future problems (Education Business Journal, 2020).

Over the years, the property of the school would be more stable and viable, with decreased costs of service. It was very clear in the way builders discussed of how a school ought to operate and the services they provided. The schools shouldn't have outstanding services that are available for a limited period (Education Business Journal, 2020).

Furthermore, the most critical element of school design – and that needs to be the first goal – is to build the concept of education, whether it be for a massive new school or a specific improvement of an established school. It is vital to understand how the school works, how many students it has and how they come. Inquiries at the beginning whether the design looks at a small element or the entire classroom and whether a more comprehensive professional layout is in place. This concept will then be converted into space through the design brief and used as working paper throughout the planning, construction and while the building is utilized (Education Business Journal, 2020).

2.8 Designing Educational Facilities

An increasing number of studies have shown that schools have a significant effect both on the performance of teachers and pupils. So far as teachers are concerned, school services influence the recruiting, training, dedication and initiative of teachers. School facilities impact safety, attitude, engagement, success and progress of achievement as far as students are concerned. Experts, therefore, believe that it is exceedingly impossible to support a vast number of children with special needs without sufficient services and funding (Penn-state Centre for Evaluation and Education Policy Analysis, 2017).

Among general repair and building concerns, several studies find that schools neglect utilities, classrooms and educational facilities in the 21st century. More than half may not have sufficiently accessible classroom room to have successful instruction.

Hence, the consistency of the facilities is a significant indicator of engagement of teachers and learning for students. In contrast, students and teachers' physical and

mental safety relies on the nature of their physical position, which renders clean and secure buildings necessary.

Consequently, the current campus for primary, secondary and senior high school children also has a range of services built to satisfy their unique specifications as seen below (Penn-state Centre for Evaluation and Education Policy Analysis, 2017):

2.8.1 The School Library

The extensive school library has to include magazines, newspapers and a comprehensive title index that encompasses history as well as literature. Those were selected for the insightful and instructional nature that is ideal for all ages. Children are urged to utilize these services in full to facilitate a safe reading and please their imaginative minds. The library has to operate by extremely trained library employees. However, the library also has to provide a complimentary digital audio-visual system with an Internet connection.

2.8.2 Science Labs

In line with Senior Middle, Primary and High School graduates, state-of-the-art labs (General Science, Math, Physics, Chemistry and Biology) has to provide an excellent set of facilities and equipment to ensure secure, spacious and distinct learning environment in keeping with The Central Board of Secondary Education norms (CBSE).

2.8.3 Computer labs

Technology is used for practical and enjoyable teaching and learning. ICT is fully established in all sectors. Across both schools and meeting centres, and it is considered one of the spaces that are preferred to have high flexibility.

2.8.4 Multi-purpose Hall

The school has a multifunctional space, which is used for all primary school purposes. The multi-purpose hall presents an excellent location for school sessions, plays, projects, miniature sports and inter-school programs.

2.8.5 Sports Facilities

A variety of athletic facilities will be given to promote the student participation in programs in physical education including indoor football, badminton and volleyball, cricket matches, tennis courts and traditional soccer.

2.8.6 Art Room

The school should provide a professional innovative Art Room with internet connectivity that allows students to develop their artistic skills and to show the creative expressions.

2.8.7 Music Room

The fully fitted music room provides students attracted to music with a range of instruments including guitars, pianos and drums.

2.8.8 Cafeteria

The school cafeteria needs to sell a range of nutritious foods and beverages consumed all day long.

2.8.9 Books and Uniforms Store

The school requires a store that sells recommended textbooks, journals, documents and a selection of items at a limited price for the advantage of students. The Uniform Shop supply issued school uniform and is required to use this service to ensure uniformity.

2.8.10 Medicare

The school should have a wellness service composed of at least two full-time physicians and four trained nurses. Students receive routine wellness tests, and a

growing pupil has a health record. When the unit administers first aid procedures, the nearest facility is directed to every emergency (Penn-state Centre for Evaluation and Education Policy Analysis, 2017).

2.9 Primary Schools

2.9.1 Definition of Primary School

Öymen Gür and Zorlu (2002), defines the construction of schools is the conceptual design that better represents the ideals and opinions of the community and their schooling. A primary school building in town will only function as a classroom, where only children are taught, but it is a sign for the city. Primary school is considered half of the basic educational structure, it differs from kindergarten and secondary schools in the age group of students it serves, which often ranges from 5 or 6 to 11 years old. It is usually preferred for primary schools to be located in the communities near the residential areas that serve. For addition, school experiences should be more interlinked with the community to encourage students to be happier and more responsible (Dudek, 2007).

Furthermore, educational build appreciably impact on students' learning abilities, desires and inspiration according to (Cole, 2011; Fisher & Dovey, 2016). It encourages the children to establish specific relationships throughout order to recognize their selves and to provide an emotional, social atmosphere (Levin, 1980; Rubin, 1998; Gur, 2014). The child's spatial awareness is considered to be necessary, provided that educational buildings are the first sites to improve this method. Dudek (2000) suggests that the design of schools will increasingly adapt to social changes at stages. Nonetheless, constructing a school building for the use of different user classes can be

a problem (Penoyre, Penoyre & Prasad. 2007). Yet it gives a reciprocal gain in terms of exchanging resources in the urban child triangle.

2.9.2 Characteristics of Building Primary Schools

In several areas of student study, interior architectural layout plays a significant part. Through the student's selection, the chair to the wall colours, architecture options are worthy in promoting a productive learning environment. Such architecture features implicitly reinforce the dedication of a school to student achievement.

Hence, schools are always complicated systems for architects to build. They will have several classroom spaces and often take sport and leisure events into account. However, the biggest challenge outside its scale or surface is to design an area which promotes a positive pedagogical atmosphere for children. In contrast, to build a pleasant atmosphere for engagement, there are several ways you should attach personal touches to the school as McWilliam explained in (2007), for example:

- Soft furniture, such as a couch or large armchair
- Nontoxic plants
- Natural or soft lighting, through the use of window or lamps
- Throw pillows, cushions
- Other decorative touches, such as area rugs or repurposed furniture
- Family photos from the children and staff
- Inexpensive frames to hang children’s artwork on the walls
- Neutral paint colours.

According to Emelina Minero (2018), in her study, she presented essential five universal design principles of the school buildings as explained below:

2.9.2.1 Technology Integration

Until the beginning of the modern era, technological adoption in the majority of schools culminated in computing labs, different rooms lined with cumbersome tables for usage by pupils. The infrastructure in schools today reflects a technological leap forward — it is omnipresent, transparent, intimate and social all at once.

The entire school has to be wired, and outside, engineers accept that projectors, computers and sound systems move from classes to corridors, dining spaces, cafes and even stairwells. Learners will use the network anywhere on campus, displaying and exchanging research in the building on multimedia screens. The findings may be revolutionary, the reliance of learners' mostly on instructor and encouraging peer-to-peer cooperation and expanding the scope of learning in the school.

2.9.2.2 Safety and Security

The horrific events in Columbine, Colorado and, inter alia, Parkland, Florida have highlighted security and safety measures in school design. Yet while the defence of incidents of school violence is of paramount significance to the schools, pupil bullying is a more pervasive and a frequent issue and presents its own architectural threat. Not unexpectedly, bullies are looking for places far away from parental influence. In a newly released survey by the National Centre for Education Statistics, students aged 12 to 18 recorded about twice as many bullying cases in hallways and stairwells where they spend a majority of their time than they did in other school areas such as cafes or playgrounds. More flexible, reflective architecture that underlines openings and direct sightlines even across floors eliminates intimidation incentives and enhances the learning atmosphere, architects add, for disadvantaged students.

2.9.2.3 Transparency

The concept of optical interconnection, spatial clarity, is an evolving norm in new school design. Internal spaces such as corridors, classes and cafés, usually divided from each other by opaque constructs such as walls and doorways, have given way to transparent architectures that encourage the usage of glass partitions and clear visual lines from modern working environments such as Google's and Apple's campuses.

2.9.2.4 The Assembly Spaces

The school is considered one of the places where there are many student gatherings and there is little possibility of students wanting to be in private spaces. The assembly spaces are one of the spaces that give students an atmosphere of ownership of the environment in which they study, and it is one of the places that must be fulfilled inside and outside the school in several places in which students can meet together as a group, and studies indicating the importance of appropriately designing assembly spaces in the school so that students can converge and gather without disturbance elsewhere. The places that can students gather, such as: cafeteria, stands, lobbies, corridors, playgrounds, and classes (Tanner, 2008).

The speed of social and technical transition is disorientating, and current learning experiences are changing. According to the architects, part of having educational spaces effective requires long-term sustainability such that infrastructure, curricula and pedagogies may evolve across the course of 50 years of a building and do not impede such adjustments. Education building designers do the scanned for the school in every inch for their potential to aid in learning.

2.9.2.5 Outdoor Learning

Gerald A. Lieberman and Linda L. Hoody (1998) suggested that many benefits of outdoor education, including better creativity and reduced stress, are gained while

Gerald concluded that, when it is practicable and relevant to the environment for students, they are more involved in curricula and better performance in academic testing.

According to leading educational architects, specific outdoor learning environments are simply places that allow a community of benches, an amphitheatre or a partly exposed workplace to become acquainted. Besides classes, these outdoor spaces were reserved for education, meetings or solo and community study, that provide a different outlook for students who spend the most time spending indoor learning.

2.10 Summary of Chapter

The school building is a place for students to improve academically and improve physical and to improve their relationship with the surrounding community. The school environment is distinguished in a way that they can meet student's needs, affects their visual awareness, their actions and their achievement. The necessity of having the ability in the school building to implement its educational function and organizing the structure in a way that helps facilitate the educational process. And design it such that it provides their needs in a way that is suitable with the natural environment. Each part of the school structure outside or inside has an important factor in achieving the school's goals and the appropriate design has a role in improving school architecture. The appropriate coordination between facilities in educational buildings has a great role in affecting the mental and physical integrity, progress and stimulation for students. So should take into account the number of students and the nature of the school’s work, and looking into professional designs. Primary school is half of the basic educational structure and differs from the other school stages. The importance of designing learning spaces and the basic characteristics of designing school spaces are

technology integration, safety and security, transparency, assembly spaces, and Outdoor learning.

Chapter 3

NATURAL ENVIRONMENT IN THE PRIMARY SCHOOLS

Throughout the growth of the individual's physical and cognitive growth, childhood is a critical time, and this phase relies upon many specific genetic and environmental influences. The pupil communicates with his material world and utilizes his physical environment as a place to think, to explore, to imagine and to feel.

This complex behaviour and the child's guidance also helps to create infant growth (Türel & Gür, 2019). To understand the child's development, it should be taken as a whole. The physiological improvements influencing the child's behaviour must be known directly and indirectly (Yavuzer, 2000). The child's social-emotional growth concerning its brain development has to do with factors, such as self-confidence, stability and comfort, external experience and gender interpretation (Gur, 2014).

3.1 Natural Environment

The interpretation of the world is achieved with the help of environmental stimulation. Although spaces that include variation may be more recognised, common areas are challenging to identify. As the building structure cannot be created by spontaneous design, order and organisation are developed. This is described as form-ground connections, accomplishment, progression, resemblance and proximity by the basis of Gestalt, which consider one of the analyses of perceptual psychology (Rock & Palmer, 1990).

3.1.1 The Effects of Natural Environment in Primary School

Landscapes are an ecosystem supported by the physical system which has good effect on the children. The role that children play and the acquisition of information as a group of possibilities (Gibson, 1986; Heft, 1999; Kytta, 2003; Wohlwill & Heft, 1987), which is the main purpose of its content and its components for the sake of children to realize its advantage (Heft, 1999). Natural play area are a place for children to realize the potentials, and it is considered a place for exploration and satisfaction (Kellert, 2002), because of the children's freedom to move in them (Kytta, 2004).

Moreover, both Nicola Kemp and Alan Pagden (2018) believe that the natural environment has an important role, especially in the learning that children acquire, but their belief were bounded. The purpose of the external natural environment located within the school planning is always in dispute. There are some people who see the natural environment as a way to achieve certain goals, while others see it as an alternative to education. A change occurs far from traditional education instead of being a part of what is usually found in schools (Rea & Waite, 2009).

According to the theory of the suitability of the person and the environment, the human behaviour, encourage to achieve goals, and individual health can be effected according to the build quality, and the relevance with the natural environments and the characteristics of these environments. Children's motivation and satisfaction may be affected in a bad way if the natural environments do not match their psychological needs. According to the theory, motivation, behaviour, and performance of students may decrease during their transition to the environments that is psychologically disagree with the students (Ozdemir & Yilmaz, 2008).

3.2 Merging the Building with the Natural Environment

Architecture's interest in user comfort, local climate, and environment effects is slowly increased over time on a large scale since the seventies. From what emerged the so-called bioclimatic architecture, meaning that the structure is accountable for supporting the human being, and finding the connection between the local climate with looking for the best circumstances for the internal environment to achieve user fulfilment in its many aspects, including visual, acoustic, thermal, cultural and emotional (Saraiva, 2018).

Educational facilities are considered as one of the most significant observances in the community, since that students consume approximately quarter of their period inside the building spaces. Also, the school building is one of the buildings in which the occupancy rate is much higher than any other building (Saraiva, 2018). Therefore, schools should enjoy a high level of internal comfort in order not to affect the intellectual performance and health of students. A drop in students 'grades can happen due to an increase in their complaints regarding the quality of the indoor and outdoor environment like sound, visual, air quality and thermal comfort (Lee, 2012).

The non-disclosure of the location, materials, manufacturing methods, and energy use, and the results of the individual or sustainable work of the building users. This may indicate in an undirect way that designers and architects are not interested in these necessary things (Orr, 1999).

Orr (1999) argues that this approach makes the disconnect between use and building normally. Primary schools have aims to have longevity (sustainability) within the

community they work for, which may cause the inclusion of sustainable architecture a potentially cost-effective option, thus reducing such disconnects.

However, many Primary School buildings are commanding and operated by non-pundit such as, head-teacher, governors, caretaker, and other personnel who will change. There is, therefore, the potential for the main aim of the design and its important characteristics to be lost in multiple hand-overs, contributing to the gap between the predicted and recorded performance and separate between building and user (Speedie& Mulville, 2017).

Currently, there appears to be little guidance available to educational institutions, from government bodies or others, concerning building-focused environmental education. Such education could be used to increase the realization that the built environment is an important part of the environment in which the individual lives. Therefore, a critical factor in sustainability (Speedie& Mulville, 2017).

3.3 Learning Environment

3.3.1 Definition of Learning Environment

Traditional education spaces are consist of classrooms and lectures, which link them to specific administrative, educational and learning methods, which form combined a specific approach to learning and teaching. And the most proof of this talk is the essence that is found in the educational environment. The learning space is not only an example of certain learning methods and certain meanings of learning. The education space is a concept that goes beyond the theories of education and descriptions for the space which consist of physical and face to face education. It also can have a role in the "inertia" (Weller, 2007) that has a relationship to the direct

receiving of information face to face by limiting the type of education in which they are able to give with the resources that distinguish them.

At the same time, recent studies have proven that learning spaces have become an important subject of study in modern research, due to the increased interest in them academically and institutionally for the ability of the physical space to influence the education of students and method of teaching as a staff. And one of the most prominent organizations that dealt with this topic due to its importance is Educause, an organization concerned with promoting technological development in higher education. It has devoted a large number of its publications, most of which are a most known to this topic.

Moreover, a group of advocates for designing and redesigning spaces that is suitable for learning argued that the importance of practicing learning, teaching and their results outweighs the costs by developing constructivism forms for active learning, also, encouraging new educational methods, worked to improve the applicability of education, Theory and conceptual forms of learning, and raising the high level of students' overall participation. Despite the theoretical and practical importance of this matter, there is little research to judge these allegations (Brooks, 2011).

3.3.2 Components of Effective Learning Environment

The learning and teaching curricula at the present time emphasize the importance of the role of student participation in a way that participation is connected functionally and significantly to the education process (Graetz, 2006). For this reason, physical environments become known as "containers" and are the context for group interaction (Milne, 2007). This makes designing physical learning spaces and learning environments an operation that should be intervened with participation directly in the

design-learning professions. Conventional classes and lectures do not give purpose that motivate active learning. This is not intended to signify that interactive learning in these places is out of the question, but rather that interactive learning is a feature that appeared during the learning spaces and the designed environment that provides reasons to encourage the activity of such participation.

Therefore, the design of traditional educational spaces emerged from the premise that education is to a large extent limited to these formal spaces. And many people's opinions regarding learning emphasized that learning does not happen in known informal learning spaces, but can take place in informal places that were not signed as learning spaces (Cross, 2007). Realizing this make learning free from the forms of physical imprisonment. Also, Practitioners and planners of higher education realize that the school campus is a space for learning and that learning space has a great influence on the design of all campus areas and mainly on unofficial spaces (Calhoun, 2006; JISC, 2006).

The JISC (2006) has visualized aspects of campus space design that have a direct influence to the type of education we want in the current century according to a paper which is named “Designing Spaces for Effective Learning”. And this begins in type of learning that relies on flexible, adaptable and creative minds, and it means evaluating designs of learning spaces and the extent to which innovative ways of thinking are promoted. In addition to that the learning space promotes the development of skills, it must be applied physically to the vision of the institution and the learning strategy. Here are some attributes of a building design that a physical representation should show:

- Flexibility: that is the ability to keep pace with current and future teaching methods.
- Future-proofed: It means the possibility of reshaping an area and reallocating it.
- Bold: looking beyond well-known and tested teaching methods.
- Creative: to stimulate thinking and inspiration for students and teachers.
- Supportive: to increase the potential of all students in the school.
- Enterprising: Intended to make spaces able to serve different needs (JISC, 2006, p. 3).

The JISC (2006) report suggested that upon getting into a school structure there should be a certain feeling of enthusiasm about learning accompanying, the only suggestion that was made by Long and Ehrmann (2005) include that the gift of instructing is known to be an important role in planning and using space, replacing traditional classroom and lecture hall with others have high empowerment and flexibility, with was called by Oblinger the organization of 'built pedagogy' (Calhoun, 2006). Built pedagogy is not based on identical principles as embodiment, which are linked to the design of traditional educational spaces but based on principles with higher potentials.

3.3.3 Designing Spaces for 'Learnings'

If the learning spaces and environments properties develops the "learning", then the situation of the space plan becomes an unpleasant learning, so planning should be done on the basis of the possibility of different types of learning appearing once students interact with these spaces. Learning spaces are initially designed with the understanding that the range of types of learning is unable to predict. This is indeed the situation, even so in previous time the planners liked to planning old traditional

learning spaces rather than thinking about imperatives for ecological planning complex adaptive learning (Thomas, 2009).

A requirement for designing a complex learning space is to first re-engineer the design process. And consideration of the traditional 2008 design methods in the higher education institution. First of all, important content should be covered throughout the semester. To achieve this, one must develop teaching and educating plans, an evaluation strategy, and other resources. Within the course plans and achieving the course outcomes is the important goal of the course and designing the evaluation strategy, resource use, and teaching and learning strategy to complete the required results. Coverage of content becomes secondary (Thomas, 2009).

The first requirement of the basics of the learning space is not the starting point in the planning procedure. Complex learning ecology cannot be planned by designers. Only in the event that the learning space becomes not a priority during the planning of the institution's structure and learning environments. It is essential that the basics of the learning space be a part of a complex adaptive system in which it serve (Thomas, 2009).

The second requirement is that the learning space should be adaptive and flexible if the learning environment looked like a complicated flexible system. JISC (2006) report contain some suggestions concerning about the learning spaces have the ability to provide possibilities to start with this planning, provided that the capabilities distinguish the virtual and physical learning spaces.

Third requirement is the types of abilities can be contained for the manpower that will come in coming times. Critical thinking abilities in complicated environments are important abilities for future comprehension to the workers (Calhoun, 2006). The workers will live in environments where many facts are something normal or common, and uniform facts are strange, and this poses great challenges for the designers who learn learning space or environmental. Also, "learning environmental" will be trained to workers who have the knowledge and the ability to work in multidisciplinary teams through the Internet (Long & Ehrmann, 2005). Within this there is an important challenge for learning environmental designers and planners.

When you read these requirements, they seem daunting, but there are ways to adapt planning methods and also to meet challenges in new ways. In 2006, The Graetz identified four environmental preferences:

- Cohesion, or the facility that enables it to organize spaces in a way can that be perceived.
- Complexity, or the ability to feel an individual's interest and stimulate activity in the place.
- Clarity, or ease in planned use.
- Ambiguity, or imagining entering a place that results in improve interaction, learning, or increased interest (Graetz, 2006).

3.4 Summary of Chapter

Students during their growth stage must be watched the periods of their development or growth and way of reaction with the physical world and the environment. The world is interpreted with the help of the surrounding natural environment. And the elements of the natural environment help children to perceive. The outer areas are considered

spaces that give students the possibility to explore the natural environment surrounding them. According to the theories of suitability for the person and the environment, students can be affected by the surrounding natural environment, its characteristics, and the quality of the building. And if the natural environment is not compatible with the needs of the student, it may negatively affect for students. The components of an effective learning environment have an active role in the education process and achieving the purpose of the school design process. Interactive learning appears in educational spaces and designed environments. Among the important characteristics in the design of educational buildings is flexibility, Future-proofed, Bold, Creative, Supportive, Enterprising. Learning spaces are usually designed on the basis that the scope of learning is unimaginable and that the structuring of learning spaces serves a complex adaptive system. And the skills to deal with and coexist with different and complex future circumstances.

Chapter 4

CASE STUDY

After collecting information about the school building and designing educational facilities in the second chapter, and explaining the importance of the natural environment in the school building in the third chapter. This study is based on a qualitative methodology, as this analysis was carried out by scanning articles, literature, books, scientific journals and reliable web resources.

Primary schools are randomly chosen in the USA, among projects with architectural design excellence, five primary schools were selected. Designed by companies with a team of designers and architects. Selected schools choose one school every five years, from 1995 to 2020. The USA is interested in building education and encouraging the development of school buildings to improve the level of education.

Schools with the innovative and special design were chosen, chosen within a different set of design curricula, and the projects are diverse in their civilizational environment. These primary schools are designed according to a set of design styles contemporary school environment. Five schools were chosen to give an adequate concept about the different design methodology, and the way to integrate them with the natural environment and to avoid duplication of information previously mentioned. The table of selected primary schools are as below:

Table 1: Selected primary schools

Name Of The Primary Schools	Year Of Establish Ment	Construction Area	Architectural Firm
Cragmont elementary school	1999	~4180 m²	ELS Architects
Burr Street Elementary School	2004	~ 6503 m²	SOM
Gloria Marshall Elementary School	2010	~ 9791 m²	SHW Group
Fayetteville Montessori Elementary School	2012	~ 737 m²	Marlon Blackwell Architects
Lisle Elementary School	2019	~ 9290 m²	Perkins and Will

4.1 Data Collection and Data Analysis Methods

The case study of this thesis will be analyzed thoroughly. First, general information has been written about the school location and the design company that built each school with some pictures about the school, from their own website for schools and ArchDaily website. Second, this case study is looking at the important educational facilities in primary schools and shading, some of them were mentioned in section 2.8.1, knowing that all the selected schools consist of first floor and second floor.

Then draw dotted circles in the school plan on the areas where students are gathered in large numbers and place it in the assembly areas section. After that, the natural areas in the schools and their environs are identified or shaded, and the potential direction for the views in the internal spaces of primary schools for the natural environment.

Some important criteria will be discussed in every primary school building, above each picture in the table. In the end, give comments for each school.

4.2 Analysis of the Case Studies

Before starting the primary school analysis process, the criteria that have been adopted for the analysis of the selected schools will be mentioned. First, the criteria for an outdoor area: the existing nature, the presence of trees, the location of the school, the school environment, the relationship with the natural environment, dealing with different environmental conditions and design in a contemporary and innovative way. The criteria for building plans in floors (1) and (2): the number of floors 2, the size of the classrooms, spacious and convenient location and distinctive view and a different function protected by the school building such as: • classrooms • cafeteria • multi-purpose rooms • lobby • library. The criteria for grouping spaces: for the common space, the size of the spaces and suitable for a large number of students. The criteria for the direction of views and the sites of the natural environment: direction of views (looking through the windows or walls transparent), a natural environment and access to the external natural environment from all directions.

4.2.1 Analysis Table of Case Studies

The analytical schedule includes five main aspects, which will be relied upon in the study of the primary schools. Begin to comment on the outside area of the project, with a special illustration for the project and image of the place through Google Map. Followed by the scheme of the project for the first floor and the second floor with an analysis of the existing standards and educational facilities that were previously identified and shaded in the plan. Then the assembly area should be analyzed whether it is a good area to contain a large amount of student numbers, and draw a circle on it. Towards the views and the sites of the natural environment found in the interior, and outer spaces by the school plan and put some pictures to illustrate these spaces. Writing comment for each school.

Table 2: Analysis table

Outdoor area	
Layout the building in the floor (1) & (2)	
Assembly spaces:	
The direction of the views and the sites of the natural environment:	
Comment	

4.3 Case Studies

4.3.1 Cragmont Elementary School

In the Berkeley, California. The Cragmont elementary school (Figure 4.1) (Figure 4.2), was built in an earthquake-eligible area, so the area is not suitable for building a school. However, the strong desire of locals to build a primary school in the area made designers and architects find solutions to all the conditions expected to happen. The design of this school is distinguished by the fact that the method of designing this school was also under the supervision of parents, local neighbors, school administration and teachers. As a result, the school was designed to serve as a community center, a neighborhood gathering place, and an emergency relief shelter.

The ELS Architects work for semi-centennial, they work has improved the understanding of urban life while being aware of the environment. It employs a group of architects and designers. Their designs with thoughtful attractiveness translate emotion, excitement, vision and connection to places that engage people and nurture society.

The designers and architects have also emphasized the importance of the natural environment in education, by paying attention to the landscapes in the school's outer space that include farms, native plants and the public park. In this school, windows and balconies are designed to connect them with the surrounding community. And, also designed interior spaces to achieve maximum flexibility.

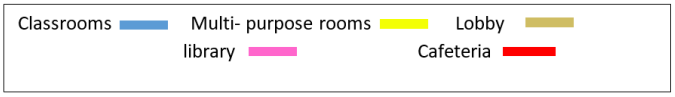
Figure 3: The outside view of the Cragmont elementary school

Figure 4: The outside view of the Cragmont elementary school

Table 3: Cragmont elementary school

Outdoor area **Ref. for photos:** http://www.arch.mcgill.ca/prof/mellin/arch671/winter2004/student/Gudzio/assign3links/Cragmont.html & www.google.earth.com	• The exterior of the school is designed in a graduated and sharp shape, it can be seen from the outside of the school building. It was designed in a contemporary and innovative way. • It is located in a residential area, where there are buildings opposite the school entrance and on the left and right side. • The back of the school has a wide natural area, and around the buildings there are few landscapes. 

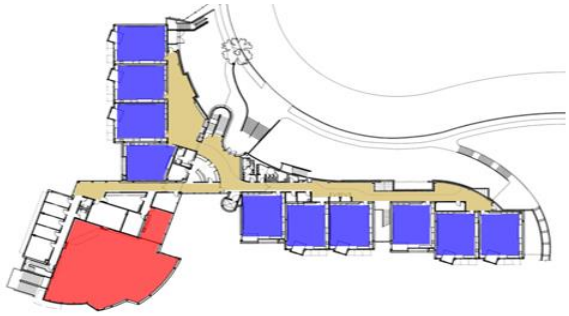
- The school building consists of two floors.
- The area of a multi- purpose room is spacious and has a convenient location and a distinctive view in it.
- Class rooms are large in size, depending on the planned building of the school.
- The library is of adequate size.
- The Lobbies are connected in all rooms, and the rooms can be easily inferred, but the Lobbies are small in width.



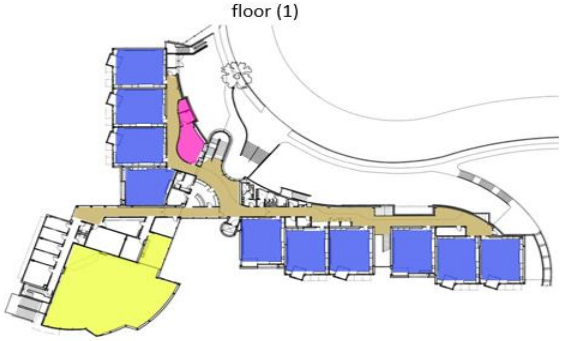
Layout the building in the floor (1) & (2)

Ref. for photos:

http://www.arch.mcgill.ca/prof/mellin/arch671/winter2004/student/Gudzio/assign3links/Cragmont.html



floor (1)



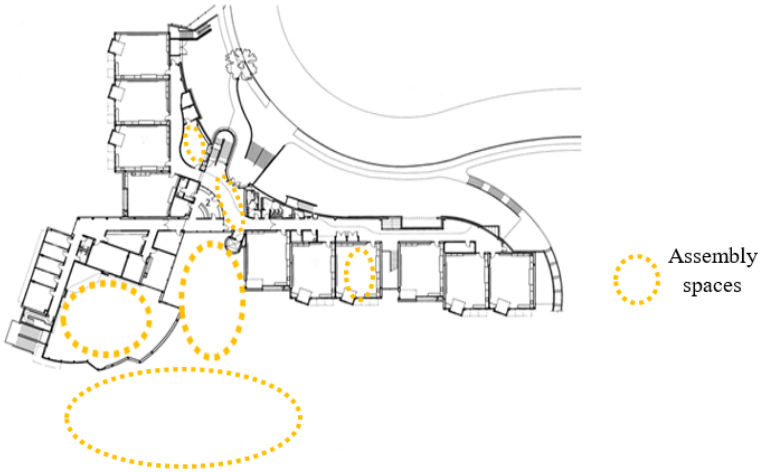
floor (2)

Assembly spaces

Ref. for photos:

http://www.arch.mcgill.ca/prof/mellin/arch671/winter2004/student/Gudzio/assign3links/Cragmont.html

- Classrooms are suitable for a large number of students.
- A multi-function room as a place where a large number of students gather is an appropriate place.
- The library is suitable, but not for a large number of student gatherings.
- There are ample outdoor play and seating areas where students can gather comfortably and without disturbance.
- The Lobbies are not suitable for student gatherings, there will be difficulty in movement in the event of student gatherings.



	• The outside landscape can be seen but on the entrance side it is difficult to see it, only on the back side of the school. Therefore, it is difficult to reach the external natural environment from all directions of the school. • Most of classrooms have a view of the environment, the outside nature, and the classrooms on the first floor have spaces that allow students to go directly to the building of the external school. So there is a strong correlation between students and the external natural environment in this school. • The outer courtyard is large, so students can take a lesson in it.
The direction of the views and the sites of the natural environment: **Ref. for photos:** http://www.arch.mcgill.ca/prof/mellin/arch671/winter2004/student/Gudzio/assign3links/Cragmont.html	
Comment	• This primary school is a place for the future-proofed, a supportive design. • This school can adapt to different conditions.

4.3.2 Burr Street Elementary School

Fairfield, Connecticut .The structure of the Burr Street Elementary School (Figure4.3) (Figure4.4), was designed on two floors and the spaces were designed in an unorganized manner and partitions, then the designers and architects designed the facade of local stone and natural resources. Also, designers and architects integrate sustainability methods.

SOM group have role in building buildings of the most technologically and environmentally advanced in the world. A group of designers, architects and planners in the company. You can apply international expertise at the local level, they believe that design not only meets human needs but also fulfils their aspirations. They focus

on environmental and social challenges and find engineering solutions for them. Apply innovation and emerging technologies when designing buildings to a new party for living and education. They are distinguished by their sustainable design, and they have a long history of innovative designs in architecture and sustainable designs. Communication, connection and harmony with the natural environment.

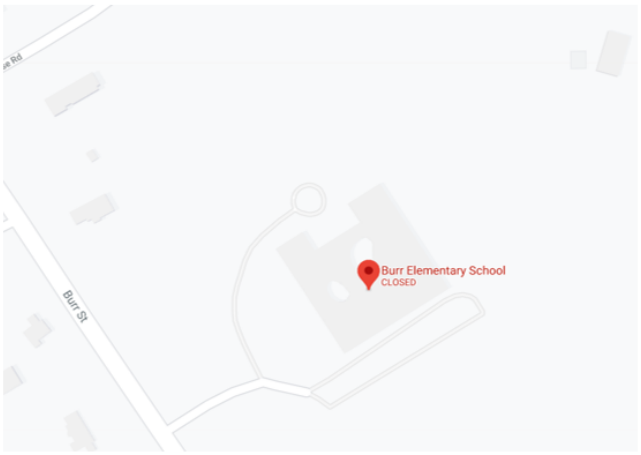
They designed the building, highlighting the outdoor landscape and interior of the school. The school highlights the importance of the surrounding and interactive areas at the educational level. It was designed in such a way that the school building is environmentally responsible in all expected conditions.

They designed them exactly like the designers and planners, and they also focused on light and space. The goal of the architectural design company is to provide a lot of elementary school, but in an environment in which it becomes a connection between the growth of students and their natural surroundings.

Figure 5: The outside view of Burr Street elementary school

Figure 6: External entrance of Burr Street elementary school

Table 4: Burr Street elementary school

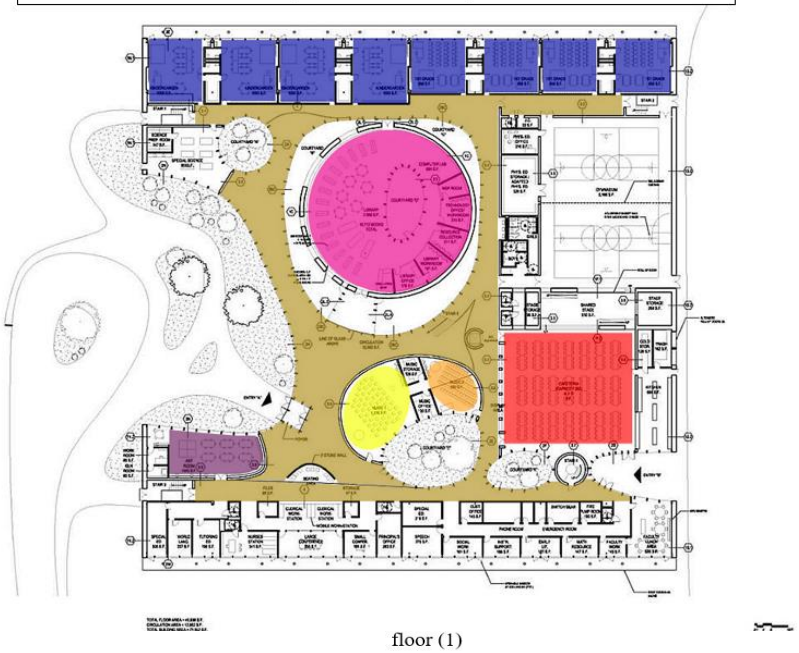
Outdoor area Ref. for photos: https://www.som.com/projects/burr_street_elementary_school & www.google.earth.com	• The school was designed within the nature of the presence of trees in the space and created through, which has become a courtyard or outside spaces within the school spaces. • The primary school is located in a natural area, surrounded by some apartment buildings. • There is a visual link with nature from all directions the interior spaces of the school. • A strong opportunity for students to learn through the school building and strengthen their relationship with the natural environment. • The school can cope with all the different environmental conditions.  

Layout the building in the floor (1) & (2)

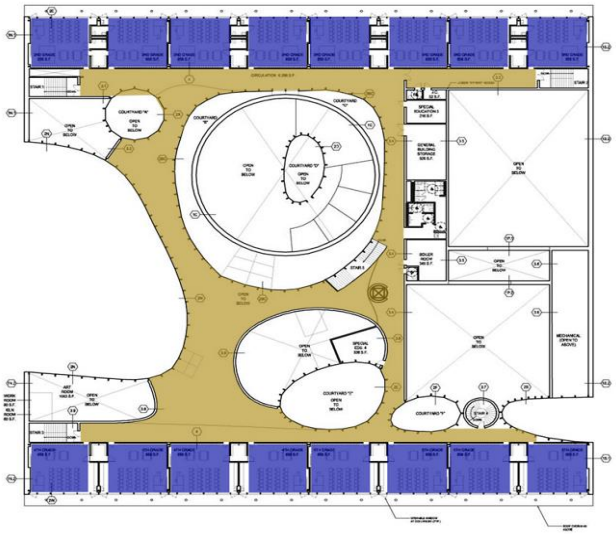
Ref. for photos:

https://www.som.com/projects/burr_street_elementary_school

- The building has two floors.
- Size of the Classrooms are appropriate.
- It accommodates a large number of students
- Lobbies have big space as well as cafeteria, Multi- purpose, Art room rooms and library.



floor (1)



floor (2)

Assembly spaces

Ref. for photos:

https://www.som.com/projects/burr_street_elementary_school

- The most places where students meet inside the school.
- As a size is suitable for large numbers of students.

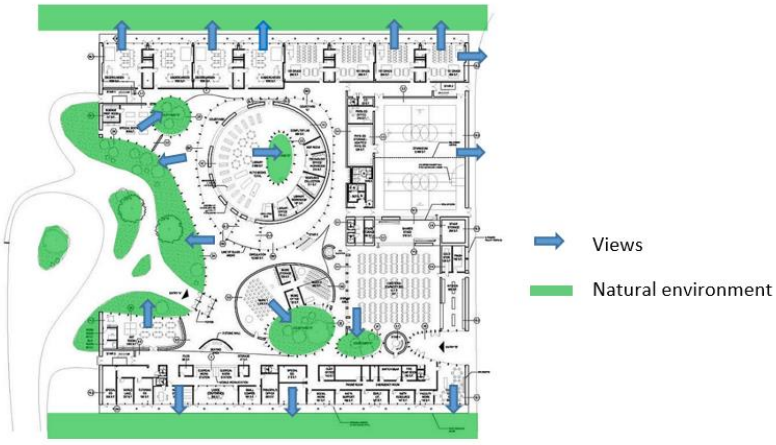
The direction of the views and the sites of the natural environment

Ref. for photos:

https://www.som.com/projects/burr_street_elementary_school

http://www.diblasi-engrs.com/projects/schools/burr.html

- Natural spaces can be seen outside the school boundaries.
- Understand the design environment for students and encourage them to education, their growth in a place with a natural.
- Natural Environment surrounding them in all areas of the school's internal spaces.
- Strengthening the student's relationship with the natural environment inside the spaces by the windows transparent long.



	
Comment	• Adaptive for the future. • Flexibility, ease of movement of students inside the school spaces. • Creativity, The design of this school helps students increase their inspiration and thinking, and the way the school structure is linked to the existing natural environment. • Enterprising, the school space is able to support various purposes.

4.3.3 Gloria Marshall Elementary School

In Texas, US Gloria Marshall Elementary School (Figure4.5) (Figure4.6), was designed for the purpose of designing a school to make an example for other schools, the outcome of using this design in the school make it one of primary schools in Texas and without an additional cost to the state for the design process.

SHW Group which designed this school, provides a range of architectural, engineering and planning services in the United States. Founded in 1945, the number of employees in two cases is more than 15,000 employees working in more than 250 locations in the USA. This group combines creativity and innovation in their projects. And their projects have a profound impact on education and society as a whole. Improve the quality of life in societies and believe that education role a major role in the social and economic progress of society.

When the architects and the Spring Independent School District discussed the aims of the school, such as the provision of daylight, energy efficiency, and material

preservation. Which led to the design of a high-performance school, a sustainable school, and education for generations of students to conserve the resource.

The school holds a LEED Gold certificate, and has met the green building program standards, students can interact with building systems and their area.

Figure 7: External entrance of Gloria Marshall elementary school

Figure 8: Interior space of Gloria Marshall elementary school

Table 5: Gloria Marshall elementary school

	• The school is close to residential areas, but the external of school space is suitable. • The school building is a rectangular form, with long sides facing north and south.

Outdoor area

Ref. for photos:

https://www.archdaily.com/119924/gloria-marshall-elementary-school-shw-group

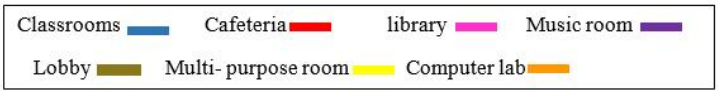
https://www.ayalavargas.com/gmes & www.google.earth.com

Layout the building in the floor (1) & (2)

Ref. for photos:

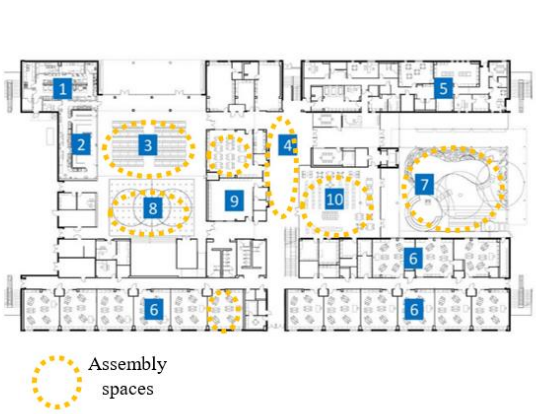
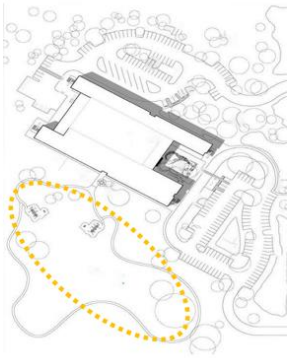
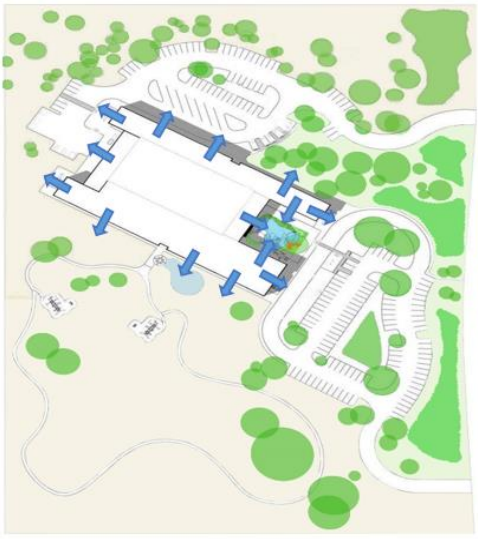
https://www.archdaily.com/119924/gloria-marshall-elementary-school-shw-group

- There are a number of classrooms.
- The cafeteria and library have a spacious space, by comparison with the number of classes.
- The building has consisted of two floors.
- It accommodates a large number of students.
- The space of the musical room and the computer lab is small.
- Students can infer the places through the lobby easily and it is wide.



First Level Plan

Second Level Plan

Assembly spaces Ref. for photos: https://www.archdaily.com/119924/gloria-marshall-elementary-school-shw-group	• The classrooms spaces are small. • The outdoor play area is spacious. • The lobby space at the entrance to the school is spacious and suitable for a large number of students, but the space outside the classroom is small. • The courtyard space at the entrance has a large size. • The cafeteria and library are suitable for large numbers of students, unlike the music room and the computer lab.   Assembly spaces
The direction of the views and the sites of the natural environment Ref. for photos: https://www.archdaily.com/119924/gloria-marshall-elementary-school-shw-group	• Natural spaces can be seen outside the school boundaries. • Views of all classrooms are towards to the external natural environment. • The outdoor patio provides space for students to play and interact with the external natural environment. • The school is located in a natural area and a central courtyard in which there are various forms of the natural environment. • There are no views in the lobby spaces toward the external natural environment. • Windows have various shapes that are put in all façades of the school, and this gives spaces the mutual connection between the external and internal nature.  

	 
Comment	• Future-proofed, in design this school was looking to the future and also serving future requirements. • Structural support design as this school has solidity in its construction. • Adapt with different circumstances. • The school space is able to support various purposes.

4.3.4 Fayetteville Montessori Elementary School

In Fayetteville, Arkansas. The Fayetteville Montessori Elementary School (Figure4.7) (Figure4.8), is in a triangle-shaped place and the place where the school is exposed to floods, which decreased the area where you can build to a tiny triangle. Besides the physics of building the school, designers have been trying to design a strict environment and meet urgent needs.

Marlon Blackwell Architects, Their projects promote the public good, especially in education, health care, and entertainment. And their projects are award winning and have an environmental response. What distinguishes this company is that architecture can take place anywhere and in the scope of the presence of architecture in places that are difficult to imagine its existence or do not expect it to happen.

For school space, on the lower floor there is a rounded garden and a green roof above a portion of the roof of the building along the western edge. A balance between the educational program and the environmental requirements leading to a high

performance at the school, and exploring the bond that connect the built environment and the natural world. This design can be a source of inspiration for future designs.

Figure 9: The outside view of Fayetteville Montessori elementary school

Figure 10: The outside view of Fayetteville Montessori elementary school

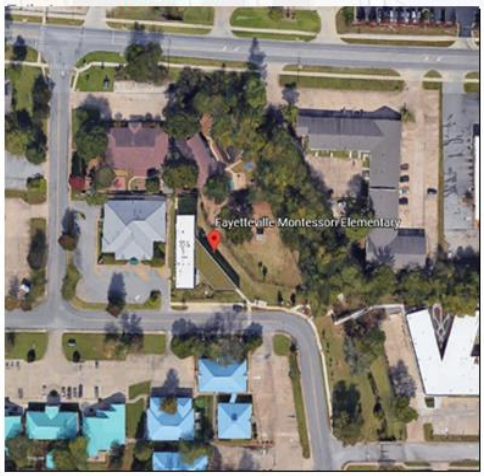
Table 6: Fayetteville Montessori elementary school

	• The school is located next to residential buildings and educational buildings. • The area on which the school was built is in the form of a small triangle. • The building is clad with box metal rib panels, and cypress wood which provides a warm and attractive touch to the south porch and entrance porch. • The glass windows from the south and west sides have a vertical shape to give an aesthetic view from the outside and the inside.

Outdoor area

Ref. for photos:

https://www.archdaily.com/776191/fayetteville-montessori-elementary-school-marlon-blackwell-architect?ad_source=search&ad_medium=search_result_projects & www.google.earth.com



- The building has consisted of two floors.
- There are four classrooms.
- Corridor spaces are suitable.
- There is no library, cafeteria, or multi-functional rooms, because of the small space available.

Layout the building in the floor (1) & (2)

Ref. for photos:

https://www.archdaily.com/776191/fayetteville-montessori-elementary-school-marlon-blackwell-architect?ad_source=search&ad_medium=search_result_projects & www.google.earth.com

floor (1)

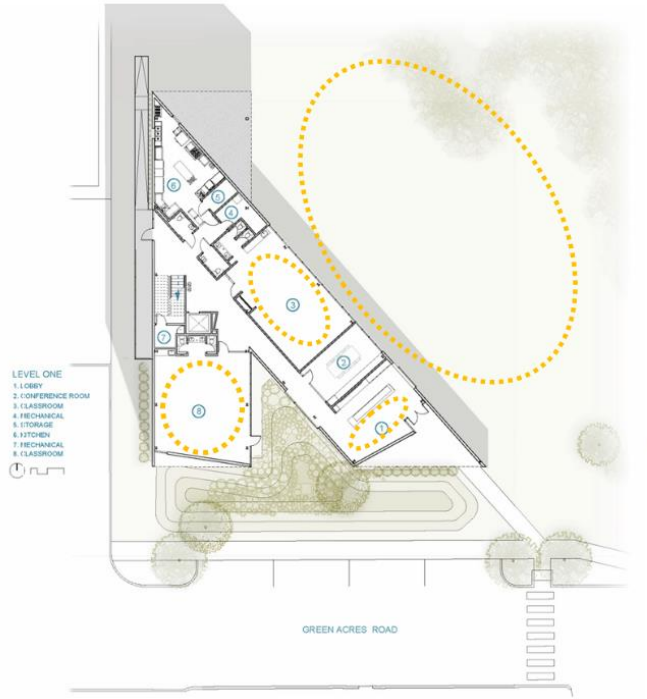
floor (2)

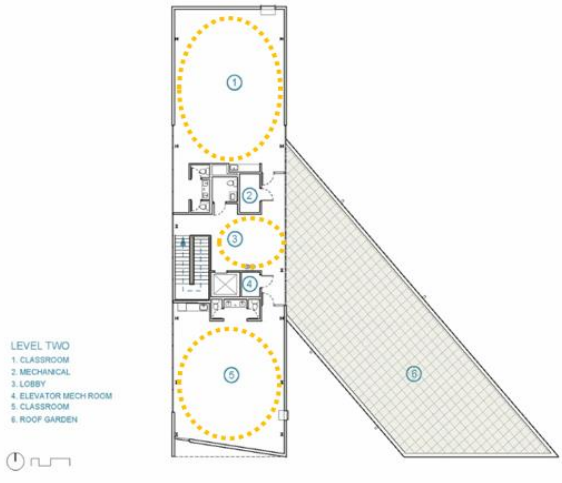
Assembly spaces

Ref. for photos:

https://www.archdaily.com/776191/fayetteville-montessori-elementary-school-marlon-blackwell-architect?ad_source=search&ad_medium=search_result_projects

- The spaces of the classrooms are wide, it can accommodate large number of students.
- The corridor space is suitable for large groups of students.
- The external spaces is suitable for the total area.
- Classrooms space can be used for more than one activity.





The direction of the views and the sites of the natural environment Ref. for photos: https://www.archdaily.com/776191/fayetteville-montessori-elementary-school-marlon-blackwell-architect?ad_source=search&ad_medium=search_result_projects	• The architects and designers made the limited space available have for the student and relate with the natural environment, when they are inside the school space, because they believe that the element of the external natural environment is important during the student's growth period. So they combined the classrooms and lobbies with the outdoor natural environment. • As is evident, how students in the school are interested in the outdoor landscape. • Architects and designers made a green roof, to strengthen the relationship between the student and nature as much as possible and they succeeded. 
Comment	• The design of the school is bold, although the area that was built on is small in size, but engineers and designers have been able to build a school. • Creative in the way they design. • Enterprising, although not all the necessary spaces are provided for students such as a library and cafeteria, but large classrooms and unique views are designed to provide the required needs in one space. • Link the school structure to the natural environment, despite the small spaces. • And also adapted to different climatic conditions.

4.3.5 Lisle Elementary School

In suburban Lisle, Illinois, known as “Arboretum Village”. The Lisle Elementary School (Figure 4.9) (Figure 4.10) is located in an area with green areas, trees, land and nurseries, the design goal is to produce a dynamic environment in the background of the landscape and the nearby area. The school has areas of unique scale for the building with different teaching methods.

Perkins and Will firm it employs a group of architects and interior designers. The second largest architectural design company in the world. Sustainability is their design

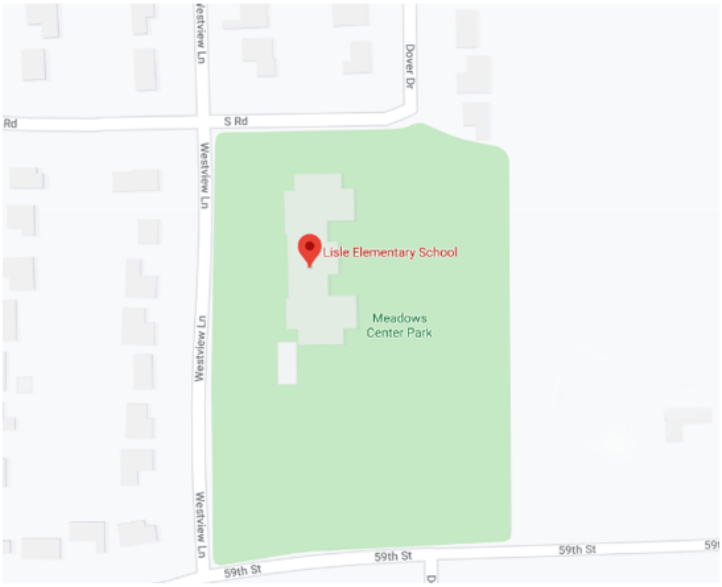
priority, because the most effective designs or projects are those that work in par with the natural environment (projects that are linked and one structure with the natural environment) projects must be closely linked with the natural environment, from protecting human health and Maintaining Earth's environmental systems. This company is distinguished by setting new standards on contemporary issues and distinguished by its innovative design. The company's goal is to improve the human experience with the built environment. They always seek knowledge and determination with risk, investigation, discovery and asking questions, what if? What then? That makes their design clearer and smarter takes precedence over everything or is expected to happen through questions.

What distinguishes this school is the presence of a library in the heart of the school that connects to the classes, paths and stairs. There is a diversity of learning spaces, a diverse line of vision and the student has the independence to need to grow. There are interior windows in the school building anywhere in the building. The presence of a stroke at the top to confirm the relationship the school achieves between students and the natural environment.

Figure 11: The outside view of Lisle elementary school

Figure 12: The outside view of Lisle elementary school

Table 7: Lisle elementary school

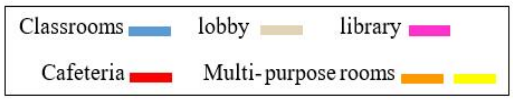
Outdoor area Ref. for photos: https://www.archdaily.com/933383/lisle-elementary-school-perkins-and-will?ad_source=search&ad_medium=search_result_projects & www.google.earth.com	• The school is located close to the residential buildings, but the school is surrounded by a natural environment from all directions and its different types, and how to add a balcony garden in the school. • The exterior atmosphere of the building demonstrates the primary school's interest in connecting learning and the surrounding landscape together. • The size of the school from the outside is proportional to the external natural space. • The school space is large and designed in an innovative and contemporary way. • The balcony is a unique addition to the building, helping to break the massive building block, and a visual addition for students with nature. 

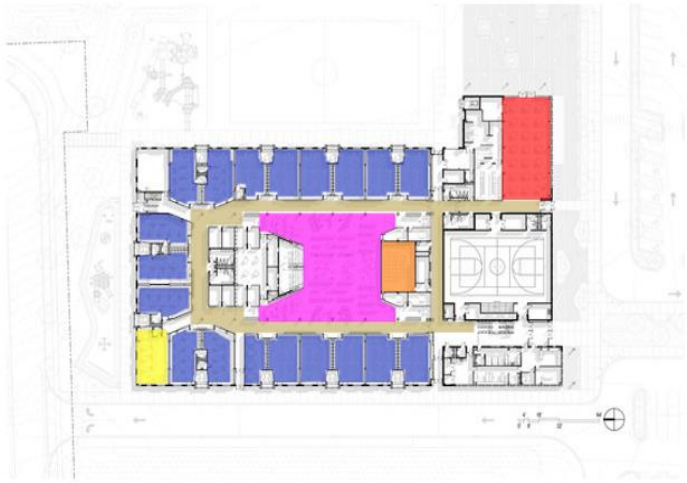
- There are a large number of classes of large sizes, suitable for large numbers of students.
- The design of this school is characterized by the presence of the library in the middle of the internal building spaces, which makes the office space a large area and connected to the classrooms and internal corridors.
- The second floor of the building is open on the first floor, and these are unique features of the school design.
- The area of the cafeteria is large, and its location in the planned is appropriate.
- The lobbies are long and easy to infer rooms through, and also wide.
- The multi-purpose rooms have small size.

Layout the building in the floor (1) & (2)

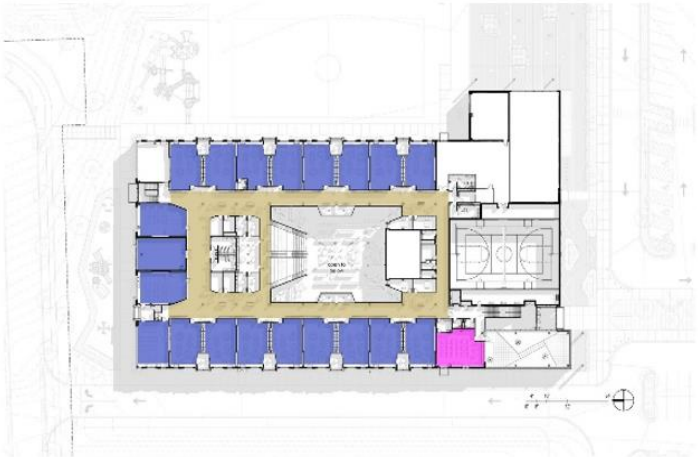
Ref. for photos:

https://www.archdaily.com/933383/lisle-elementary-school-perkins-and-will?ad_source=search&ad_medium=search_result_projects





floor (1)



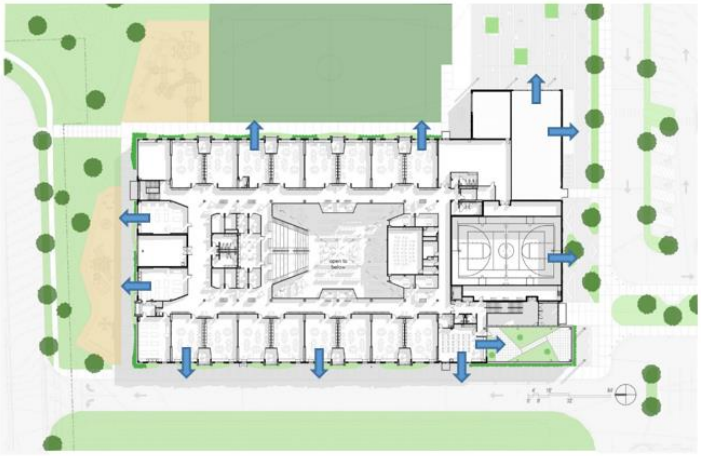
floor (2)

Assembly spaces

Ref. for photos:

https://www.archdaily.com/933383/lisle-elementary-school-perkins-and-will?ad_source=search&ad_medium=search_result_projects

- Classroom space is suitable as a gathering place for a number of students.
- The outdoor play area is spacious and suitable for a group of students.
- The cafeteria is a place for groups of students, but not for large numbers of gatherings.
- Multi - purpose rooms are not suitable as a space for student gatherings.
- The library as a suitable size for many gathering a large number of students, but reduces the ability to focus, because the library is open from all directions even from the second floor

The direction of the views and the sites of the natural environment Ref. for photos: https://www.archdaily.com/933383/lisle-elementary-school-perkins-and-will?ad_source=search&ad_medium=search_result_projects	• The ability to communicate and view the students with the external spaces from inside the school building easily due to the presence of natural environments spaces in all directions of the school. • The second floor there is a balcony that has types of crops, and this helps visual continuity of students to the natural spaces. • There are natural environments outside the school in many different types. • His goal in designing this school was to create an educational building with a dynamic environment and surrounding landscape    
Comment	• The strong association of the school design with the natural environment. • There is high flexibility in the design of this school. • Future-proofed where spaces can be reconfigured and allocated. • Creativity in its design method, which helps increase student interest. • But not all of the school's interior spaces are associated with the natural environment like the library.

4.4 Research Results

All case studies have their own distinct approach to the way they design the natural environment. And all of them had a primary goal of connecting the elementary school building with the natural environment. Cragmont elementary school, this school is close to the buildings surrounding it, and Integrate part of the classroom with the natural environment outside. The spaces of the facilities are wide but the internal lobbies are narrow. Design the school in a contemporary way. Gloria Marshall Elementary School, the natural environment in all the surroundings of the school and there are various natural environment elements, the spaces of the facilities are large and the area of the natural environment is appropriate. Fayetteville Montessori Elementary School, design in a contemporary and innovative way, very close to the buildings surrounding it. While the school was built in a small area, but there is a natural environment from all directions, and also the design of a green roof in the school building. Lisle Elementary School, it has a natural environment from all directions and also design balcony that contains elements of the natural environment. The facilities' spaces are suitable for large numbers except for the space of the multi-purpose room. Designed in a contemporary and innovative way. And one of the most distinctive projects linked to the natural environment, The school Burr Street Elementary School has connection with the natural environment was very creative, so that the architects and designers of this school were able to make the natural environment and the school building as one body that does not separate.

Chapter 5

CONCLUSION

The considerable interest of the civilization progress that led to the trend of people towards preferring to keep abreast of developments, which led to avoiding interaction or visual contact with the natural environment, especially as it has become an interest in designing educational buildings is the pursuit of innovation Contemporary. This study is based on placing the importance of the natural environment in primary schools that have a major role in improving the educational environment for students, meeting their needs, improving their environment, physical health, intellectual development and focus.

In the second chapter, the school building was defined and its impact on education, and that schools should support the educational process. And I mentioned the importance of quality space in school buildings, where he stressed that the school is not just a space for information acquisition, but it has a significant impact on the spatial and physical environment of the school. Students in primary schools begin to receive a lot of information and spend more time inside the school building. In the third chapter, written the importance of the natural environment in the school building. The natural environment affects students and ability to improve their potential.

The learning environment is not just learning spaces, it is very important in the education process, and strengthening the structural and innovative forms of schools

and have an important role in increasing the level of student performance as well. The components of an effective educational environment are that the design of school buildings be flexible, and that they are able to reallocate space and make the space capable of supporting various functions.

This study proved the outdoor natural environment can affect student performance. And After the analysis of the case studies, determining the location of a natural environment and identifying the facilities for the schools, assembly spaces and views, it is possible to found a natural environment even if the buildings close to the school area and possibilities of linking the contemporary design process in primary schools with the natural environment so that it doesn't diminish it or affect the design or project. Whatever differences in primary school sizes can be related to the natural environment.

5.1 Recommendation

These studies may have an important role in the development of design methods for future primary schools in our countries. And there are studies that follow the improvement of the built environment by highlighting specific design patterns for children with special needs and that for their special circumstances such as students with autism or ADKD or Down syndrome, because their needs are different from students who do not have these conditions. The work of this study may take a step towards recommending a suitable strategy for them by providing a natural environment in their schools with its great support in the welfare of them.

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