

Exploring Design Strategies of Modern School Buildings in Cyprus (1945-1974)

Sevil Aydınlık

Submitted to the
Institute of Graduate Studies and Research
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy
in
Architecture

Eastern Mediterranean University
January 2020
Gazimağusa, North Cyprus

Approval of the Institute of Graduate Studies and Research

Prof. Dr. Ali Hakan Ulusoy
Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Doctor of Philosophy in Architecture.

Prof. Dr. Resmiye Alpar Atun
Chair, Department of Architecture

We certify that we have read this thesis and that in our opinion it is fully adequate in scope and quality as a thesis for the degree of Doctor of Philosophy in Architecture.

Prof. Dr. Hıfsiye Pulhan
Supervisor

Examining Committee

1. Prof. Dr. Asu Beşgen
2. Prof. Dr. Esin Boyacıođlu
3. Prof. Dr. Uđur Ulaş Dađlı
4. Prof. Dr. Hıfsiye Pulhan
5. Asst. Prof. Dr. Nazife Özay

ABSTRACT

The education system played an important role socially and school buildings played an important role visually first in the dissemination of nationalism when the ethno-nationalist movements within the Turkish and Greek-Cypriot communities increased dramatically under British colonial rule (1878-1960), and later in the dissemination of internationalism in the mid-20th century. Despite the increased conflict and nationalism, which was reflected by Neo-Greek architectural elements, the striking impact of the International Style turned school buildings into representations of the communities' attitudes towards modernism.

After Second World War, the Style embodied by many school buildings conveyed science-based modern thought; modernization attempts for political, economic and social reforms; and the strong commitment of the first modernist Cypriot architects to the spirit of the time and the philosophy of the modern.

In this study, the main aim is to understand how post-war school buildings in Cyprus are identified as unique artefacts transformed from an 'ethnicity-based' image into an 'environment-based' form that is more associated with the modernization, decolonization and nation-building processes from which local nuances of mainstream modernism emerged. Besides the effects of socio-political environment, and implementation of International Style principles in Modern Cyprus school buildings, especially climate-sensitive design strategies of the post-war architectural culture is examined as an important value that determines a new aesthetic understanding.

Accordingly, this study explored post-war school buildings to illustrate their transformation from a monumental, resplendent and nationalist image to a rational, international Mediterranean Modern image under the influence of diverse political regimes, with both images implicitly conveying a socio-political fusion in the architecture of Cyprus.

Keywords: school buildings, nationalism, modernism, design with climate, Cyprus

ÖZ

Eđitim sistemi sosyal olarak ve okul binaları ise görsel olarak; İngiliz sömürge yönetimi (1878-1960) altındaki Kıbrıslı Türk ve Kıbrıslı Rum toplumları içinde, önce etno-milliyetçi hareketlerin önemli ölçüde artarak milliyetçiliđin yayılmasında, daha sonra da yirminci yüzyılın ortalarında enternasyonalizmin yayılmasında, oldukça önemli bir rol oynamışlardır. Neo-Yunan mimari unsurları ile yansıtılmış bu artmakta olan çatışma ve milliyetçiliđe rağmen, Uluslararası Stil'in çarpıcı etkisi okul binalarını toplumların modernizme karşı olan tutumlarının birer temsilcisine dönüştürmüştü.

Özellikle, II. Dünya Savaşı'ndan sonra bu Stil'in vücut bulduđu birçok okul binası; bilime dayalı modern düşüneyi; politik, ekonomik ve sosyal reformlar için modernizasyon girişimlerini; ve ilk modernist Kıbrıslı mimarların o zamanın ruhuna ve modernin felsefesine olan güçlü bađlılıđını temsil ediyorlardı.

Bu çalışmadaki asıl amaç, Kıbrıs'taki II. Dünya Savaşı sonrası okul binalarının 'etnik-temelli' bir görüntüden 'çevre-temelli' bir biçime, benzersiz eserler olarak nasıl dönüştürüldüğünü anlamaktır, ki bu daha çok ana akım modernizmin yerel nüanslarının ortaya çıktığı modernleşme, dekolonizasyon ve ulus oluşturma süreçleriyle ilişkilidir. Bu bağlamda Modern Kıbrıs okul binaları, sosyo-politik ortamın etkileri ve Uluslararası Stil ilkelerinin uygulanmasının yanısıra, özellikle II. Dünya Savaşı sonrası mimari kültürün iklime duyarlı tasarım stratejileri ile yeni bir estetik anlayışın belirlendiđi önemli deđerler olarak incelenmiştir.

Buna göre, bu çalışmada II. Dünya Savaşı sonrası Kıbrıs okul binalarının anıtsal ve milliyetçi bir imajdan; rasyonel ve uluslararası bir Akdeniz Moderni imajına

dönüşümlerini göstermek için incelenmiştir. Sonuç olarak, her iki imaj çeşitli siyasi rejimlerin etkisi altındaki Kıbrıs mimarisinde, sosyo-politik bir füzyonu dolaylı olarak aktarmaktadır.

Anahtar Kelimeler: okul binaları, modernizm, iklim ile tasarım, milliyetçilik, Kıbrıs

DEDICATION

To My Family

ACKNOWLEDGMENT

First and foremost, I would like to thank very much my supervisor, Prof. Dr. Hıfsiye Pulhan for her constant and illuminating encouragement, critical inspiring feedback, guidance, support, and excellence supervision all through my research. Her ideas, experiences, and passions have truly inspired and enriched my growth as a student. I owe many thanks to my thesis monitoring members, Prof. Dr. Uğur Ulaş Dağlı and Assist. Prof. Dr. Nazife Özay, for their constant support, positive and constructive feedback, and sharing their extensive knowledge with me. I am grateful in every possible way to them. Also, special thanks go to Assoc. Prof. Dr. Türkan Ulusu Uraz for her advice, encouragement, and support during my research. In addition, my thanks go to my friends who helped and supported me on different stages of the study.

Last, but not least, I always owe a debt of gratitude to my family. Thank you for believing me, being so supportive and understanding in my stressful times. I am truly grateful to my parents Hatice and Aydın Aydınlık, my husband Nadiri Başar, my brothers Umut and İsmail Aydınlık, and my beloved grandmother Havvalı And, who have been with me throughout every step of the way with their unconditional love, patience, and support.

TABLE OF CONTENTS

ABSTRACT	iii
ÖZ	v
DEDICATION	vii
ACKNOWLEDGMENT	viii
LIST OF TABLES	xii
LIST OF FIGURES	xiii
1 INTRODUCTION	1
1.1 Backgrounds of the Study	2
1.2 Literature Review	7
1.3 Research Aims and Objectives.....	13
1.4 Research Methodology.....	15
1.5 Limitations	18
1.6 Structure of the Study.....	22
2 THEORETICAL FRAMEWORK OF MODERN SCHOOL ARCHITECTURE .	26
2.1 Spirit of the Time, International Style and the Design of School Buildings.....	27
2.1.1 Early Modern Era School Architecture (1840-1918)	39
2.1.2 Inter-war Period School Architecture (1918-1939).....	45
2.1.3 Post-war Period School Architecture (1945-1965)	48
2.2 Decline of International Style and Rise of Climatic Issues in the Design of School Buildings	54
2.2.1 Design with Climate	57
2.2.2 Orientation and Layout of Building Mass	64
2.2.3 Shades and Shadows of Building Surfaces.....	75

3 HISTORICAL EVOLUTION OF EDUCATION SYSTEM AND MODERN SCHOOL ARCHITECTURE IN CYPRUS	82
3.1 Modern Reforms and Education in the Ottoman Period (1571-1878)	82
3.1.1 Religion-Based Outlook in Late-Ottoman School Architecture.....	87
3.2 Rise of Nationalism and Education during the Inter-War Period (1918-1945)	89
3.2.1 Ethnicity - Based Image of Inter-war School Architecture	91
3.3 Independent State and Education towards Post-Colonial Period (1945-1974).	95
3.3.1 Environment-Based Forms of Post-war School Architecture	100
4 DISSEMINATION OF INTERNATIONAL STYLE THROUGH POST-WAR CYPRUS SCHOOL BUILDINGS.....	108
4.1 Architectonic Quality with the Interplay of Volumes in School Buildings	109
4.2 Battle of Regularity and Articulation against Axial Symmetry in School Buildings	119
4.3 Avoidance of Applied Decoration as Aestheticized Climate Control Elements in School Buildings	126
4.4 Design with Climate in the Context of Local, Regional and Global Thinking	136
5 MEDITERRANEANIZATION OF INTERNATIONAL STYLE IN POST-WAR CYPRUS SCHOOL BUILDINGS.....	140
5.1 Orientation and Layout of School Building Masses	141
5.2 Shades and Shadows of School Building Masses	165
5.3 Design and Use of Brise-soleil in the School Building Surfaces.....	173
6 CONCLUSION AND DISCUSSION.....	183
REFERENCES.....	190
APPENDICES	207
Appendix A: Shades and Shadows of School Building Masses	208

Appendix B: Inventory Study of School Buildings 228

LIST OF TABLES

Table 1: Timeline of Cyprus and World	6
Table 2: Research Design of the Thesis	18
Table 3: Post-War School Buildings in Cyprus (1945-1974)	20
Table 4: Limitations and Scope of the Study	22
Table 5: Structure of the Thesis	25
Table 6: Architectonic Quality with the Interplay of Volumes in School Buildings	118
Table 7: Battle of Regularity and Articulation against Axial Symmetry in School Buildings	126
Table 8: Avoidance of Applied Decoration as Aestheticized Climate Control Elements in School Buildings	135
Table 9: Design with Climate in the Context of Local, Regional and Global Thinking	139
Table 10: Orientation and Layout of School Building Masses	164
Table 11: Orientation of Modern Cyprus School Layouts towards North.....	166
Table 12: Vertical, Horizontal and Egg-crate Types of Brise-soleil in Modern Cyprus School Buildings	182

LIST OF FIGURES

Figure 1: One Room School House Plan, 1938, Photo Credits: Weisser, A., (2006)	40
Figure 2: A Typical Arrangement of the Classroom Prior to the Turn of the 20 th Century, Photo Credits: Dudek, M., (2000)	40
Figure 3: Bridgeport High School, Connecticut, 1879, Photo Credits: Baker, L., (2012)	41
Figure 4: DeWitt Clinton High School, New York City, 1906, Photo Credits: Weisser, A., (2006)	41
Figure 5: Fabritius School by W. M. Dudok, Netherlands, 1926-28, Photo Credits: Hille, T. (2012)	44
Figure 6: Kingswood Girls' School by Eliel Saarinen, Michigan, 1929, Photo Credits: Hille, T. (2012)	44
Figure 7: Hessian Hill School, New York, USA, 1931–32	47
Figure 8: Ring Plan School, Los Angeles, USA, 1926–60	47
Figure 9: Friedrich Ebert School, Frankfurt, Germany, 1928–30	48
Figure 10: Bauhaus, Dessau, Germany, 1919–25	48
Figure 11: Finger Type Layout and Mass in Crow Island School by Perkins & Will Architects, Photo Credits: Tanner and Lackney (2005) and Neil Gislason (2011)	52
Figure 12: Interactive Classrooms Arrangements in Crow Island School, Photo Credits: Hedrich-Blessing	52
Figure 13: Huston School by Caudill Rowlett Scott, Oklahoma, 1948, Photo Credits: Julius Shulman	54
Figure 14: San Jacinto Elementary School Liberty by Caudill Rowlett Scott, Texas, 1956, Photo Credits: Ulric Meisel	54

Figure 15: Christ Church Cathedral School, Godwin and Hopwood, Lagos, 1956...	60
Figure 16: Polana High School, João José Tinoco and José Forjaz, 1969–1973, Mozambique, Photo Credits: Ana Tostões.....	61
Figure 17: Nampula Technical School, Fernando Mesquita, 1953–1973, Mozambique, Photo Credits: Ana Tostões.....	61
Figure 18: F. Comandante Valodia Secondary School, Castro Rodrigues, Lobito, Angola, 1966–1967, Photo Credits: Ana Tostões.....	62
Figure 19: ICRA (former Pio XII Institute), Vasco Vieira da Costa, Luanda, 1968, Photo Credits: João Vieira Caldas	62
Figure 20: The Phillis Wheatley Elementary School, Charles R. Colbert, New Orleans, 1955, Photo Credits: Frank Lotz Miller	63
Figure 21: Thomy Lafon Elementary School, Curtis and Davis Architects, New Orleans, 1954, Photo Credits: Frank Lotz Miller.....	63
Figure 22: School Building Layout Types by Rigolon (2010)	71
Figure 23: Palace of Assembly, Le Corbusier, India, 1964, Source: https://www.archdaily.com/155922/ad-classics-ad-classics-palace-of-the-assembly-le-corbusier	78
Figure 24: Vertical, Horizontal and Egg-crate Types of Shading Devices, Respectively Olgyay, A., & Olgyay, V. (1957).....	81
Figure 25: Küçük Medrese and Fountain in the Front Gate, Photo Credits: Özgüven B. (2004).....	88
Figure 26: Pancyprian Gymnasium, Nicosia, 1923, Photo Credits: Sevil Aydınlık ..	93
Figure 27: Famagusta Boys' Elementary School, Famagusta, 1926, Photo Credits: Sevil Aydınlık	93
Figure 28: English School, Nicosia, 1939, Photo Credits: Costas Georghiou.....	94

Figure 29: Lefkosa Turkish Lycee, 1962-63, Photo Credits: Kyrenia National Archive	105
Figure 30: Pallouriotissa Female Gymnasium, 1962, Photo Credits: Demetris Thymopoulos Archive, in Georghiou (2018).....	106
Figure 31: Image of Grille Effect by Using Concrete Skeleton Frame in Cyprus School Buildings	110
Figure 32: Cantilevered System in Lefke Technical School.....	111
Figure 33: Vertical Shading Devices in Kykkos High School.....	112
Figure 34: Weightless Effect Created by Lifting Up the Volume from the Ground	113
Figure 35: Elevated Volume as if Floating in the Air, Famagusta Boarding Nursery	113
Figure 36: Northern Surface of Lefkosa Turkish Lycee	114
Figure 37: Single-pitch Roof in Lefkosa Technical School.....	115
Figure 38: Angular Arrangement of the Windows According to the Sun Direction	116
Figure 39: Perforated Concrete Panels like Honeycomb Grillwork, Brise-Soleil in Vertical Circulations	120
Figure 40: Vertically Arranged Brise-Soleil from Main Entrance View in Lykavitos Elementary School	122
Figure 41: Egg-Crate Shading System.....	122
Figure 42: Cylindrical Volume in Lefke Technical School.....	123
Figure 43: Emphasis of Horizontality in Cyprus School Buildings.....	124
Figure 44: Horizontal Strip or Ribbon Windows in Schools	125
Figure 45: Folded Plate Roof in Lefkosa Turkish Boarding School for Girls.....	127
Figure 46: Parabolic Forms in Terra Santa Schools.....	128
Figure 47: Decorative and Functional Openings on the Elevations.....	129

Figure 48: Perforated Honeycomb Grillwork, Brise -Soleil in Transitional Spaces	130
Figure 49: Yellow Sandstone and River Cobbles as Local Cladding Materials on the Surfaces	131
Figure 50: Sculptural Symbolic Figures in Limassol Terra Santa School	132
Figure 51: Semi-open Transitional Spaces and Connection with Nature	133
Figure 52: Functional and Aesthetic Details on the Mass and Surfaces	137
Figure 53: Orientation and Layout of Building Mass	138
Figure 54: Lefkosa Turkish Boarding School for Girls, Drawn by Sevil Aydinlik.	143
Figure 55: Pallouriotissa Female Gymnasium, Drawn by Sevil Aydinlik.....	145
Figure 56: Kykkos High School, Drawn by Sevil Aydinlik	146
Figure 57: Lefkosa Turkish Lycee, Drawn by Sevil Aydinlik.....	148
Figure 58: Lefke Technical School, Drawn by Sevil Aydinlik.....	149
Figure 59: Limassol Technical School, Drawn by Sevil Aydinlik	151
Figure 60: Lefkosa Technical School, Drawn by Sevil Aydinlik	153
Figure 61: Famagusta Terra Santa School, Drawn by Sevil Aydinlik.....	154
Figure 62: Limassol Terra Santa School, Drawn by Sevil Aydinlik	156
Figure 63: Lefkosa Atatürk Elementary School and Limassol First Elementary School, Drawn by Sevil Aydinlik	158
Figure 64: Lykavitos Elementary School, Drawn by Sevil Aydinlik	159
Figure 65: Koskluciftlik Elementary School, Drawn by Sevil Aydinlik	161
Figure 66: Famagusta Nursery School, Drawn by Sevil Aydinlik.....	162
Figure 67: Vertical Shading Devices in East Elevation of Lefkosa Boarding School for Girls, Drawn by Sevil Aydinlik	176
Figure 68: Horizontal Shading Devices in South-East Elevation of Lefke Technical School, Drawn by Sevil Aydinlik	179

Figure 69: Egg-Crate Shading Devices in South Elevation of Pallouriotissa Female
Gymnasium, Drawn by Sevil Aydınlık..... 181

Chapter 1

INTRODUCTION

‘The philosophy of the schoolroom in one generation will be the philosophy of government in the next’

Abraham Lincoln (Boyle and Burns, 2011, p.17)

School buildings have a reasonably valuable place in all societies, both socio-cultural and urban aspects, with their educational type and architecture. In Cyprus, which was under the influence of various socio-political periods, it is important to investigate and evaluate the design strategies and documentation of post-war school buildings with unique examples as a Modern architectural heritage. In this context, the main architectural trends and approaches of the period and environment based design strategies developed after the Second World War, are the important issues that form the background of the subject. In order to fully understand the issue, while examining the importance of Modern Cyprus school buildings compared to the rest of the world, it is also noteworthy that they were designed in a significant transition period in terms of the socio-political history of the island. School buildings played an important role in the spread of Modern Architecture and thus the International Style movement, which is clearly seen to be effective in the design of these buildings. Referring to post-war school architecture, it is observed that they were also designed in sympathy with climate and at the same time lead to developing a new aesthetic understanding. In this study, besides the effects of socio-political environment, and implementation of International Style principles in Modern Cyprus school buildings, especially climate-

sensitive design strategies of the post-war architectural culture is examined as an important value that determines a new aesthetic understanding.

1.1 Backgrounds of the Study

The Modern Movement had dramatically influenced the whole world, from the First World War to the early 1970s, both in the field of architecture and art. After the Industrial Revolution, a turning point was experienced especially in the architecture sector and accordingly new construction methods were developed rapidly by using the advantages of new technological advancements and materials such as concrete, glass and steel were started to be used. One of the most important aims of the architects and designers who followed the Modern Movement was to leave behind the monumental, resplendent and decorative image of the past, and instead to create scientific, functional and rational solutions in buildings (Mallgrave, 2009; Curtis, 2013). In addition, Modern Architecture was not only limited to creating a new architectural style with new materials but also there were socio-political reasons behind it. In particular, to get rid of the destructive effects of the world wars and to forget the past, to switch to the modern lifestyle, to move towards a fast and economic production and, above all, with the influence of socialism, to create a 'classless' architecture for everyone, were some of the leading ideals and philosophies of the era. Architecturally, many styles and trends emerged in different countries during this period, which mostly ending with -ism such as Futurism, Constructivism, Expressionism, Brutalism, to name a few. However, among all, the main style that left its mark on the mid-century world architecture and in fact connected all -isms to a common purpose was the 'International Style' (Tietz *et al.*, 1999). The Style was first born in Europe in the 1920s by famous modernist architects such as Walter Gropius, Mies van der Rohe, and Le Corbusier. Then, in 1932, one of the most important Modern Architecture exhibitions in American

history took place at the Museum of Modern Art (MOMA) in New York City, which the term 'International Style' was first officially announced to the public by Philip Johnson and Henry-Russell Hitchcock. Aside from presenting the work of renowned modernist architects to American society, it was consciously tried to define the Style and the ideology of the movement. Parallel to the exhibition, Johnson and Hitchcock published a book called 'The International Style: Architecture Since 1922' and described three important principles defining this new architectural style as 'architecture as volume, concerning regularity and the avoidance of applied decoration' (Hitchcock & Johnson, 1995; Tournikiotis, 2001). In the exhibition, which also featured school buildings, Johnson made a remarkable claim that:

“The international style in architecture is specially adapted to school buildings, because functional planning, the fundamental principle of the new architecture, is exactly what schools need to develop in sympathy with modern trends in scientific education” (MOMA, 1932).

After the Second World War, with the new spirit and enthusiasm of the modernist architects, the International Style began to spread rapidly across the continents. However, its unprotected bare glass surfaces were not suitable for all climates and cultures and therefore it began to take its place in architecture, not as a 'style', but as an 'approach'. The Style has begun to move away from its everywhere-applicable, classless and identity-less appearance which underlying in its philosophy; and it was reinterpreted and transformed according to its location and climate. In this context, a regionalized version of the Style has emerged which blended with the local context and climate during the post-war time (Khan, 1998). Thus, the 'Tropicalization' of the Style was observed in Latin America and India, while 'Mediterraneanization' of the Style occurred in the countries of the Mediterranean region (Bozdoğan & Akcan, 2012). Le Corbusier was the pioneering architect that in the effectively helped the

dissemination of International Style in the Mediterranean zone. He specialized in creating light, space, and shadow in many of his works, and particularly developed design strategies that are compatible with the climate (Goldfinger, 1993). The most important invention of him was 'brise-soleil' (sun-breaker), which was both functional and aesthetical elements in Modern Architecture (Sobin, 1994). Besides the use of brise-soleil, some other characteristics such as flowing semi-open transitional areas, verandas, balconies, pilotis, play of light and shadow on the surfaces and masses, integration between man-made and natural environment, orientation of the building towards the sun, and so on, which are the significant environmental design strategies at the essence and origin of Mediterranean region, continued to be effective in Modern Architecture as well. These were not only the features that reflected the social life of the Mediterranean people who love to spend their time in shady outdoors but were also the most important passive design strategies in such a hot climate. For this reason, providing comfortable shaded areas and control of sunlight in spaces was one of the most meaningful and crucial design approaches in terms of climatic and socio-cultural aspects of modern Mediterranean architecture. The result was the reinterpretation and reshaping of the International Style according to the region, which once again demonstrated that design could not be created without considering climate and context (Lejeune & Sabatino, 2010). The International Style, which influenced many countries from Morocco to Israel throughout the Mediterranean, was undoubtedly reached on the island of Cyprus as well.

Dissemination of the International Style since the 1930s made a great impact worldwide after Second World War , and it was rapidly 'regionalized' all over the world. Undoubtedly, the role of school buildings as vessels for disseminating the

International Style during that period was great as is the role of school buildings of the post-war era (1945-1960) in fostering understanding in ongoing educational debates and the unique circumstances of that time. The creation and emergence of new capital cities characterized by modern idioms, which became symbols of their nations, appeared either in the establishment of new republics or in decolonization processes of different countries during the post-war era. Respectively, modernization processes around the world have led to the ‘gradual globalization’ of various versions of the International Style (Khan, 1998).

Like many of its modern architectural ancestors in the Mediterranean, Cyprus embodied the Mediterranean Modern which juxtaposed vernacular dialogues and contested identities. In that sense, Cyprus school buildings designed in the spirit of the post-war period broadly fulfilled the requirements of the modern education system and represented the post-war experimentations of the first modernist Cypriot architects around the 1950s and 1960s. Their buildings were functional and human-scale structures that humanized and deinstitutionalized the learning environment by using mainly exposed concrete and local materials. Attention to environmental factors played a substantial role in forming a local version of modernism in general, and post-war school buildings in particular. However, beyond being formal or stylistic expressions, post-war school buildings were symbols as well as tools of the modernization process in which Turkish and Greek-Cypriot communities’ cultural rivalry took place. Until that time school buildings with Neo-Greek, Georgian or English-Gothic architectural styles had followed a traditional, historic pattern in the name of nationalism. Yet these buildings were more monumental than designed

specifically for education, and it was difficult to accommodate modern educational needs in these outmoded designs.

Regarding to scope of the study; it starts with a brief introduction to the ‘Early Colonial Period’ (1878-1925), which coincided with the ‘Interwar Era’ (1918-1939), to establish how nationalism and national identity developed in Cyprus. The main focus of this study, however, was on school buildings designed in the spirit of the ‘Post-war Era’, which occurred internationally from 1945 to 1960. The ‘Post-war Era’ in Cyprus, however, included two consecutive time periods: the ‘Late Colonial Period’ (1925-1960), which shows the process of colonization and modernization on the island, and the ‘Post-Colonial Independence Period’ (1960-1974), which reveals the process of de-colonization, independence, and division of the island (Table 1). School buildings of the two consecutive periods were mostly constructed in the 1950s and 1960s according to principles of post-war architecture. They are, therefore, called ‘Post-war School Buildings of Cyprus’ and illustrate the local version of mainstream modernism in this study (Aydınlık & Pulhan, 2019).

Table 1: Timeline of Cyprus and World

Cyprus:	1571 – 1878	1878 – 1925	1925 – 1960	1960 – 1974
World:	1840 – 1918	1918 – 1939	1945 – 1965	
	Ottoman Period	Early Modern Period	Interwar Period	Postwar Period
		Early Colonial Period	Late Colonial Period	Post Colonial Period

1.2 Literature Review

In this thesis, the post-war Cyprus school buildings were investigated based on specific architectural styles of the period and determined how they took on unique characteristics according to the climatic design strategies of the Mediterranean architecture. For an original contribution to the knowledge about the school buildings in Cyprus, it is necessary to know what has been done in this field of study up to present. In order to evaluate the contributions of others, to identify trends in this subject and to define areas of theoretical and empirical weakness, a literature survey has been done. For this purpose, firstly, comprehensive studies on modern school buildings, which have been made in general and published as books, then articles on specific local cases have been examined. In the light of the findings, it is understood that there is a gap of knowledge about how the International Modern, allegedly adapted to the school buildings, influenced the Modern Cyprus school architecture and what type of environmental control methods applied considering the Mediterranean climate.

In general, studies are based on survey and documentation of modern school buildings throughout the world particularly by DOCOMOMO International (International Committee for Documentation and Conservation of Buildings, Sites and Neighbourhoods of the Modern Movement'. Also, limited studies have been done related to conservation issues of post-war school buildings; modern educational reformations and school architecture; and some few studies about the environmental aspects of the mid-century educational buildings. In the case of Cyprus, studies about the modern era educational buildings were mostly based on Ottoman and British colonial periods, highlighting the Ottoman, Colonial, and Greek revival architectural

styles; and addressing cultural heritage and conservation issues; evaluating schools more on socio-political base.

Regarding books on modern educational buildings from around the world; an 'in-depth design study' which focused on modern schools' themes, characteristics, the basic aspects of learning and architectural expressions, investigated in the book of Hille (2012), entitled as 'Modern Schools: A Century of Design for Education'. In the 'School', Burke and Grosvenor (2008) demonstrated the evolution of school architecture and education, while examining these institutional buildings in terms of both the physical and cultural dimensions on a global scale. Studies by Tanner and Lackney (2005) as 'Educational Facilities Planning: Leadership, architecture, and management', focused on design principles and planning processes of educational facilities, considering both environmental and political aspects. In the book 'Architecture of Schools: The New Learning Environments', Dudek (2000) presented a comprehensive design guide to school architecture by giving examples from around the world which discussed the physical and psychological dimensions of learning spaces with the changing educational system over time. Gelfand and Freed (2010) research as 'Sustainable School Architecture: Design for Elementary and Secondary School', illustrated how to create healthy learning spaces, preserve the existing ones, respond to sustainability issues and environmental awareness in the planning and design of the schools which have an important place in the societies. In addition, the overlapping ties between post-war educators and school architects in England while underlying that there was a 'hidden internationalism', explored in Burke's (2015) study as 'Hidden Internationalisms: Tradition and Modernism in Post-war Primary School Design 1948-1972'. It is emphasized the years following the Second World

War that architects and educators play a major role in the ‘renewal’ of the school building by the government.

Regarding articles about modern school buildings based on the design with climate: Ferreira’s (2013) research as ‘Local and Global Modern Thinking. Designing with Climate in Mozambique: School Buildings Production’, addressed ‘designing with climate’ issues over the school buildings in Mozambique, constructed between 1955 and 1975, covering the year of ‘independence for the former Portuguese colonies’. Furthermore, research of Caldas (2011) as ‘Design with Climate in Africa. The World of Galleries, Brise-Soleil and Beta Windows’, explored how the Modern Movement spread after the Second World War in cities with tropical climates such as Angola and Mozambique. Particularly in the context of sustainability, climatic design strategies such as solar and wind control were examined through modern school buildings. Moreover, Uduku’s (2006) study as ‘Modernist architecture and ‘the tropical’ in West Africa: The tropical architecture movement in West Africa, 1948-1970’, based on evolution and development of the modern tropical architecture from the mid-1940s to 1970. The study consisted of public buildings including the schools in which the architecture of that period is not only discussed in terms of aesthetically and functionally, but also socio-political and economic dimensions. In Baker’s (2012) study as ‘A History of School Design and Its Indoor Environmental Standards, 1900 to Today’, explored the evolution of school buildings from the past century to the present in order to show different architectural trends during the time. Therefore, how schools are affected by the socio-political environment and with the use of developing new technologies are discussed in the study. In particular, it emphasized the importance of natural lighting, heating, cooling, ventilation, and acoustics to create

more liveable and healthy learning spaces. In terms of Modern school buildings of Greece, Ferro (2004) based his study on modernist architect Karantinòs entitled 'Karantinòs Greek Rationalist', which his school buildings consisted of flexible and functional design solutions and also having climate-sensitive strategies. The ideal learning environment in school buildings of California, built between 1935 and 1965, are examined by Goad (2017) in 'The classroom is another place? Ernest j. Kump's 'ideal' learning Environments for Californian schools, 1935–1965', which emphasized the importance of environmental factors such as light, air, temperature, and ventilation.

Considering the general post-war mid-century school researches in various aspects; Stock's (2008) study as 'Threatened: Mid-Century Modern Public School, Regional Modernism: the New Orleans', investigated the mid-century school buildings in New Orleans, emphasizing the importance of this modern heritage, and why they should be preserved as representative of regional modernism. In 'Educating DeKalb: Midcentury Elementary Schools in DeKalb County', Rhea (2013) investigated the mid-century elementary schools between the years 1950 and 1960 in DeKalb, U.S.A. It was emphasized on the case studies that 'International style was universally employed in an effort to promote an image of modernity and efficiency' and it was argued that primary schools in the mid-century era were often an integral part of the residential zones and were designed with the same ideals. In 'Mid-Century Modern Schools in Manhattan', Mollon (2013) carried out 'a comprehensive survey to document and analyze' the post-war period public school buildings in New York, considering the conservation issues. According to Nallo's (2013) study as 'Die Schule als offenes Haus: school building and leisure in Switzerland in the 1950s and 1960s', school buildings were a reflection of a community. Examining the Swiss school buildings in

the 1960s, the study shows 'how social and economic changes and the reform of teaching methods' affected the architecture of schools. Furthermore, Alegre and Heitor (2013) conducted a study titled as 'The Evolution of Secondary School Building Construction in Portugal in the 20th century: from Traditional to Industrial', to understand 'how the principles of New Architecture were assimilated in the school building design' during the 1930s, and so that an answer could be given to 'educational and economic demands.' Moreover, Ogata (2008) explored in 'Building for Learning in Post-war American Elementary Schools' that 'how the modern American elementary school, as a cultural and architectural form, emerged from a complex interaction of technical concerns and educational theory' at the same time 'the larger historical forces of post-war expansion and Cold War anxiety'. In the thesis study of 'the educational buildings in Ankara in the early Republication Period', Alpagut (2005) argued that Ankara school buildings during the early Republican period, 'symbolize the most important successes in the history of the Republic', but they are 'neglected in an unexplainable manner' now. In Gamarra (2018) study as 'Building Citizens for Tomorrow: Post-war School Design in Ontario', described the effective role of educators and even politicians in the design of school buildings apart from architects after the Second World War in Canada. In addition, Rigolon's (2010) research as 'European Design Types for 21st Century Schools: An Overview', based on a general overview of school buildings in terms of different level of education and types, spatial layout and morphology while considering the 'specific didactic and social needs' in European countries.

Regarding studies on educational buildings of Cyprus; Siandou (2018) addressed Modern Cyprus school buildings 'as a tool for promoting peace' in terms of cultural

heritage. In this study named as 'Heritage values as a tool for promoting peace: the case of the modern architectural heritage in Cyprus', value-based approaches show 'opportunities for tackling the challenges of contested heritage' and accordingly suggested that it should be 'mobilizing heritage towards peace and reconciliation in conflict-affected contexts'. In 'Education under the shadow of politics: school buildings in Cyprus during the British colonial period', Bilsel and Dinçyürek (2017), examined how the 'Turkish Cypriot educational institutions' were affected by the political environment under the British Colonial administration, between the years 1878 and 1960, while highlighting the power of authority. In addition, the study of Yıldız (2015) as 'Charity undertakings for the formation of educational and cultural institutions in Ottoman Cyprus', focused on a 'historical account of the Islamic educational and cultural institutions' which most of these were 'schools and libraries', and 'all established as charity foundations' during the Ottoman period of Cyprus. Moreover, in the books of Georghiou (2013; 2018) as 'British Colonial Architecture in Cyprus: The Architecture of the British Colonial Administration', educational buildings also took place with brief summaries among the other public and residential projects which constructed by the colonial government from 1878 to 1960. Furthermore, Özgüven (2004) investigated the 'architectural characteristics of the schools in Nicosia' which were constructed from the late Ottoman period to the British colonial period in Cyprus, in the study of 'From the Ottoman Province to the Colony: Late Ottoman Educational Buildings in Nicosia'. Accordingly, it showed a 'gradual change' in the architecture of schools affected by the different styles and education systems of two different states. Similarly, in 'Star of the Parthenon, Cypriot mélange: Education and Representation in Colonial Cyprus', Given (1997) examined school buildings of Cyprus under the British Colonial administration covering the years of

1878 and 1960. In particular, the study focused on Hellenic and British colonial school buildings which were shown as ‘representations of nationalist and imperialist ideologies’, while demonstrating the connection between ‘architecture, education, and political ideology’.

As it is obviously seen, in general studies on Modern school buildings are mostly based on survey and documentation of modern school buildings throughout the world, evolution of education and school architecture, design principles and planning processes of school buildings, and conservation issues of post-war school buildings. In particular, studies on Cyprus school buildings are mostly based on Historic documentation of schools during Ottoman and British colonial periods, and socio-political bases of school buildings. Hence, in the light of the findings, there is a gap of knowledge about the post-war school buildings in Cyprus which is allegedly adapted with the Mediterranean Modern.

1.3 Research Aims and Objectives

The education system played an important role socially and school buildings played an important role visually first in the dissemination of nationalism when the ethno-nationalist movements within the Turkish and Greek-Cypriot communities increased dramatically under British colonial rule (1878-1960), and later in the dissemination of internationalism in the mid-20th century. Despite the increased conflict and nationalism, which was reflected by Neo-Greek architectural elements, the striking impact of the International Style turned school buildings into representations of the communities’ attitudes towards modernism. By the mid-1940s these attitudes towards modernism also served as a latent way for communities’ identity struggles and for the sovereignty of each community to exist. After Second World War, the Style embodied

by many school buildings conveyed science-based modern thought; modernization attempts for political, economic and social reforms; and the strong commitment of the first modernist Cypriot architects to the spirit of the time and the philosophy of the modern. This study explores post-war school buildings and their roles in the mid-20th century, which was complicated by identity struggles, communal integrity and equality fights, ethnic violence, conflicts and war in Cyprus.

At that time, the main factors determining the school architecture built by the state in Cyprus came to the fore both in socio-political and physical-environmental terms. Among these factors, which consist entirely of two different disciplines, the main focus of this study is limited to physical and environmental factors. Recently, there has been an increasing interest in the field of environmentally friendly architecture from the last decade, mainly caused by global warming issues in the world. Accordingly, within the scope of Modern Architecture, this study was conducted to understand and learn how climate-sensitive approaches affected and shape the built environment and accordingly how these environment-based design strategies are used in such a complex structures as schools, highlighting the sun factor in Cyprus.

The main aim of this research is to figure out;

- how post-war school buildings in Cyprus are identified as unique artefacts transformed from an ‘ethnicity-based’ image into an ‘environment-based’ form.

Accordingly, this research study questioned and examined post-war school buildings to illustrate their transformation from a monumental, resplendent and nationalist image to a rational, international Mediterranean Modern image.

The primary objectives of the research are;

- to interpret the International Style principles which are blended with regional (Mediterranean) and local (Cyprus) sensitivities in post-war school buildings of Cyprus;
- to understand design strategies of Mediterranean modernism which was the result of dynamic interaction between Modern and Climate with the appreciation of aesthetic principles in Cyprus;
- to examine the sun control which was an important value to determine a new conception of space, function, aesthetics, and design in the Modern Mediterranean architecture in Cyprus.

1.4 Research Methodology

This study is based on a documentary research approach with the analytical method. The research design of the thesis consisted of six stages which explained in detail below; followed by literature review, data collection from primary and secondary sources, field study, identification by inventory study, analysing, evaluation and discussion, respectively (Table 2).

First of all, literature review were done to draw the theoretical framework of the study. Thus, starting from around the world covering Cyprus; relevant reads of the books, publications, and other studies were done including the main topics of Modern Movement architecture, International Style, post-war period architecture, regional modernism, Mediterranean modernism, environmental modernism, design with climate, interwar and post-war school architecture, and so forth. In addition, the archives of the New York Museum of Modern Art (MOMA) were scanned online to reach the original documents which took place in the press. In this context, the New

York Times newspaper's clippings related to the International Style Exhibition were found, including criticisms of its impact on educational buildings.

Secondly; data collection were carried out for understanding the historical evolution of the school buildings in Cyprus. Therefore, the list of post-war schools of the Republic of Cyprus was obtained from the Ministry of Education and Culture. Accordingly, an archive scan was performed to collect data from primary sources. In order to access original documents from first-hand; State Archives of Cyprus, Kyrenia National Archives, Press and Information Office (PIO), Ministry of Education and Culture and municipalities, are visited to find out and collect the official public records, drawings, sketches, photographs, yearbooks and letters of the selected Cyprus school buildings. In addition, the school yearbooks and albums of that period were reached by looking at the history of the schools on their official websites and archives. Furthermore, additional data were collected from the major books, articles and architectural magazines as a secondary source that examined the work of the Cyprus modern school buildings. Moreover, interviews were done with some school principals and graduates about the history of the school while existing school archives were searched. As eyewitness evidence, interviews were arranged to get additional information about the education system and architecture of the period with the well-known people who worked actively during the Republic of Cyprus. For example; with Hakkı Atun, as an architect and planner, and with Emir Ali Başar, as a teacher and inspector during the Republic of Cyprus.

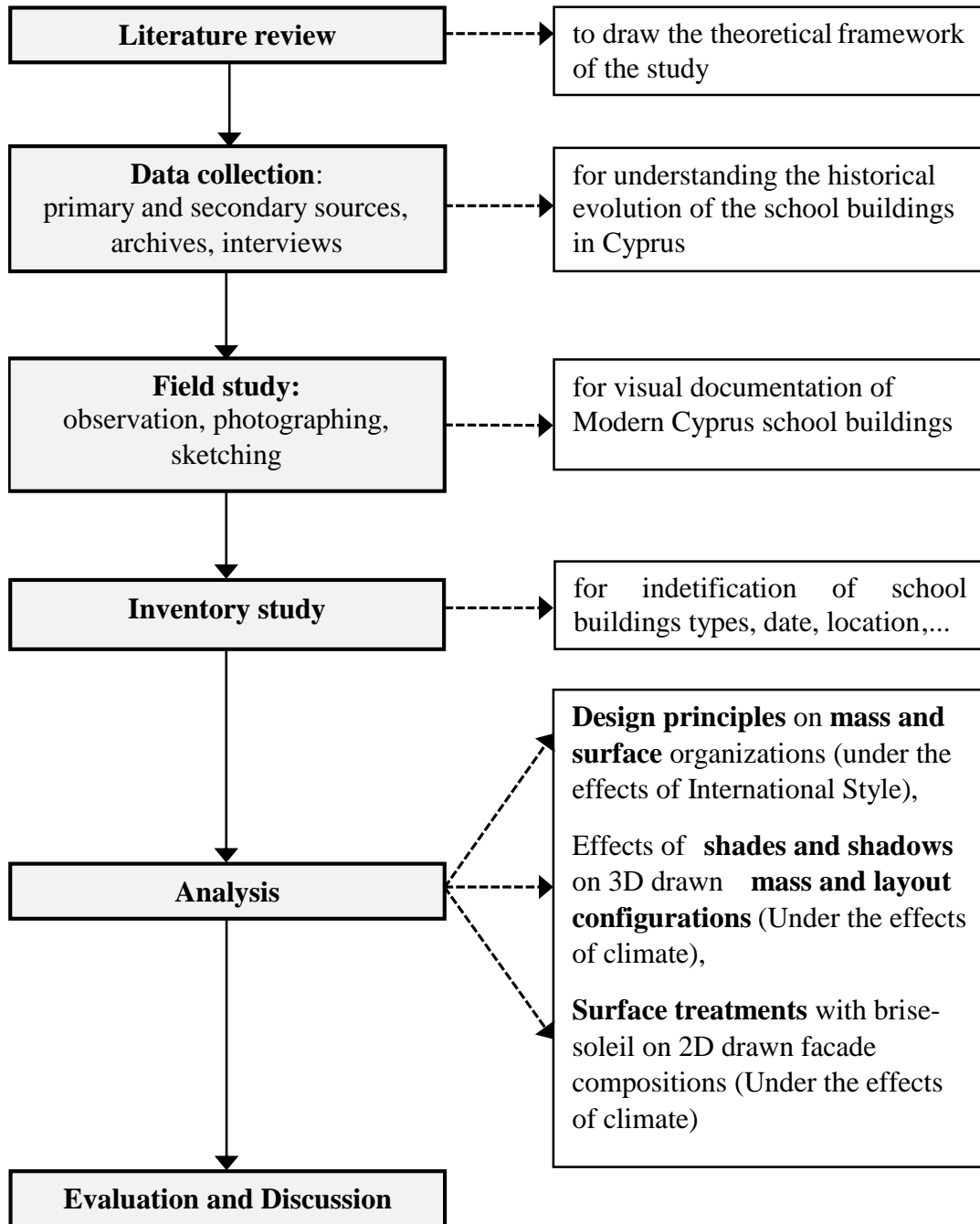
Thirdly, in order to carry out an on-site field study of the schools, permission letters were obtained from the Ministry of National Education covering each level of education as primary, technical, secondary schools respectively, due to security

reasons. Afterwards, a field study was held for visual documentation of Modern school buildings with observation, photographing, sketching, and recording the real situation on site.

Furthermore, an inventory study was conducted for the identification of each school buildings. Therefore, in light of the data obtained from the primary and secondary sources, oral history, and field studies; the list of modern school buildings were clarified including names of the schools known at that time, date of construction, architect/s or architectural companies, type, location, local and regional maps of the schools, and so on (see Appendix B).

According to findings and in line with all the data and studies obtained, the analysis part of the study were generated, consisted of three parts. First, under the effects of International style, design principles were interpreted on mass and surface organizations of the post-war school Cyprus school buildings. Next, under the effects of Mediterranean climate, shades and shadows impacts were illustrated on 3D drawn mass and layout configurations of the schools. Afterwards, under the effects of climate, surface treatments with *brise-soleil* were examined on 2D drawn facade compositions of the schools. Finally, evaluation and discussion part were made according to all studies and findings.

Table 2: Research Design of the Thesis



1.5 Limitations

The preliminary start of this study targeted the investigation of Modern era school architecture in Cyprus, and to find out how they were affected and localized by the Modern architectural styles and trends that have become widespread all over the world. After the general readings, it was reached the theory that the most dominant style at

the beginning of the 20th century, the International Style, was well represented and adapted to the school architecture. However, after Second World War, it is seen that the Style was quickly regionalized, considering the rising concerns about climate. In this context, the study focused on post-war Cyprus school buildings to understand design strategies of Mediterranean modernism which was the result of dynamic interaction between Modern and climate with the appreciation of aesthetic principles.

Considering the characteristics of the post-war period, a number of Modern public school buildings in Cyprus are selected which are the best examples reflecting the International Style. On the way to the independence and de-colonization process after Second World War, various school types were built to serve different needs and levels of education in Cyprus. They are the school buildings including elementary, secondary, technical and religious (Table 3). It should be noted that during the period of 1945-1974, there was an ongoing colonial architecture and school buildings designed according to the traditional styles, which continued in parallel with the Modern Architecture in Cyprus. However, the Cyprus school buildings chosen for this study include the schools, reflecting the international post-war architectural identity as well as having an important place in the modern history of Cyprus, recorded in official documents. In this context, the list of schools selected for this study is published and took place in ‘100 most important buildings, sites and neighbourhoods’ of DOCOMOMO Cyprus; and in the catalogue of ‘Learning from the Heritage of Modern’ prepared in cooperation with the Union of Cypriot architects. In particular, some of the selected Cyprus school buildings were not only generic modern buildings of the period but also significant award-winning architecture. For example, ‘Lefkosa Boarding School for Girls’ was featured in the international German architectural

magazine ‘Baumeister’ in 1964, while ‘Kykkos High School’ was featured in the Greek architecture magazine ‘Architektoniki’ in 1966.

Table 3: Post-War School Buildings in Cyprus (1945-1974)

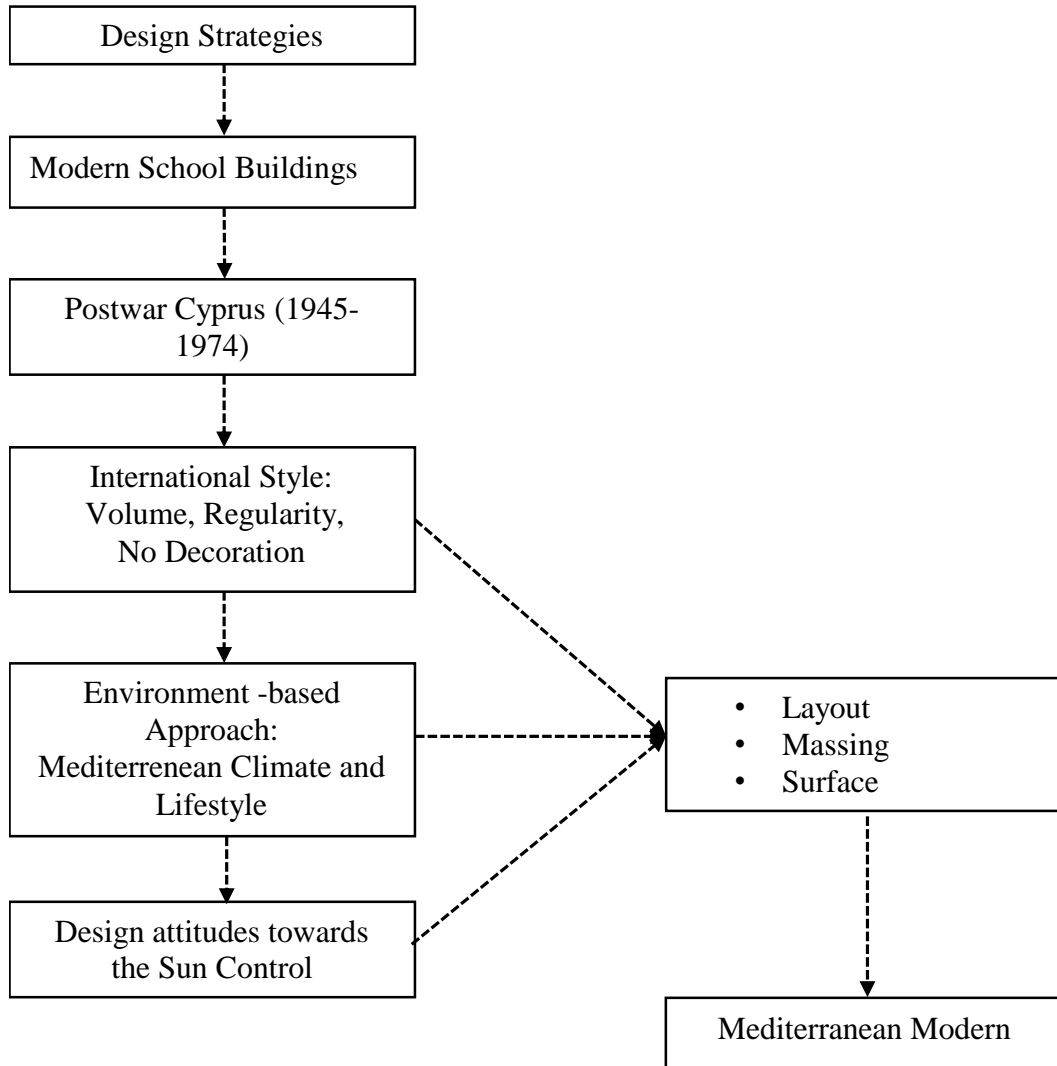
Category	Name	Date	Location	Architect/Designer
Elementary schools	Koskluciftlik Elementary School	1955	Nicosia	Ahmet V. Behaeddin
	First Elementary School	1954-55	Limassol	Rousou&Pericleous
	Lefkosa Ataturk Elementary School	1955-57	Nicosia	Rousou&Pericleous
	Lykavitos Elementary School	1957	Nicosia	Dimitris Thymopoulos
Nursery school	Famagusta Nursery School	~1955	Famagusta	unknown
Technical schools	Lefke Technical School	1955	Lefke	Orman and Partners
	Limassol Technical School	1955	Limassol	Orman and Partners
	Lefkosa Technical School	1955	Nicosia	Tripe and Wakeham Partnership
Secondary Schools	Lefkosa Turkish Lycee	1960	Nicosia	Alister MacDonald
	Lefkosa Turkish Boarding School for Girls	1960	Nicosia	Ahmet V. Behaeddin
	Kykkos High School	1960	Nicosia	Iakovos and Andreas Philippou
	Pallouriotissa Female Gymnasium	1957- 62	Nicosia	Demetris Thymopoulos
Religious Schools	Famagusta Terra Santa School	1959–60	Famagusta	Stavros Economou
	Limassol Terra Santa School	1960–65	Limassol	Stavros Economou

In terms of place, schools were chosen in the main cities of Cyprus where new neighbourhoods and zones developed under the impacts of modern urbanization

attempts such as Nicosia, Famagusta, Limassol, and Lefke. In order to determine a clear date range covering the mid-century period, it is limited to the ‘years of War’ known as the turning point in the ‘World’ and ‘Cyprus’ as, 1945 (the end of the Second World War) and 1974 (the political and geographical separation of the Turkish and Greek communities in the island).

Theoretically, study focused on design strategies by referring to International Style Principles and concerns on Mediterranean climate and lifestyle. Accordingly, design attitudes towards the sun control have been investigated on the layout, massing and surfaces of the post-war school buildings in Cyprus, which was the result of Mediterranean Modern (Table 4). As a matter of fact, this regionalized Style had its most glorious time especially after the Second World War, from around the mid-50s to mid-60s, and then began to disappear in the early 70s, leaving its place to other styles such as postmodernism.

Table 4: Limitations and Scope of the Study



1.6 Structure of the Study

This research is divided into six main chapters (Table 5). Chapter 1 is the ‘Introduction’ part of the thesis, covering the topics of background information, literature review, aims and objectives, methodology and limitations.

Chapter 2 is consisted of ‘Theoretical Background of the Modern School Architecture’, beginning from early modernism to interwar period and then the period after the Second World War, while discussing the importance and role of schools worldwide. It is particularly emphasized that International style had a great impact on

the school architecture, not only with its architectural principles but also its philosophy. However, school buildings designed during mid-century period, categorized within the post-war architectural culture which was critical towards 'International style', ultimately trying to express the building's interaction with the local context and climate. Accordingly, the regionalized Style has shown itself that were rooted in climate in post-war time, which this part were examined under the heading of 'Decline of International Style and Rise of Climatic Issues in the Design of School Buildings'. Particularly, considering the sun factor with the orientation of building mass and also the use of *brise-soleil* on surfaces.

Chapter 3 shows the 'Historical Evolution of Education System and Modern School Architecture in Cyprus'. Accordingly, concise Modern history of Cyprus is divided into three significant periods as Ottoman, British Colonial, and Republic of Cyprus period. Here, it is aimed to understand; how nationalism dramatically increased in between two Cypriot communities during these periods, how education system of colonial government left an overwhelming impact on these societies, and consequently how school architecture was formed in this environment,. So they are identified under the headings of 'Religion-Based Outlook in Late-Ottoman', 'Ethnicity - Based Image of Inter-war', and 'Environment-Based Forms of Post-war' School Architecture.

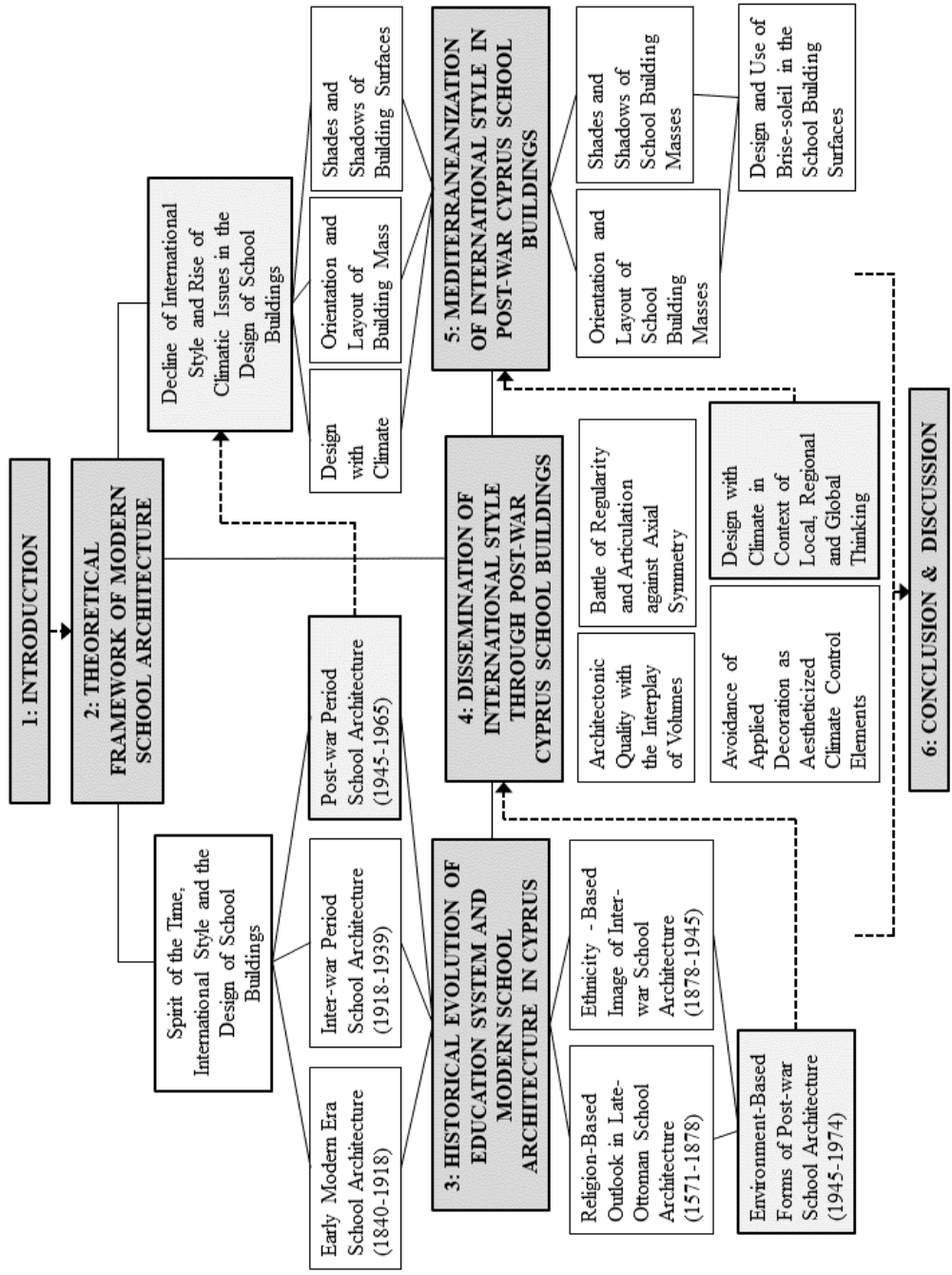
It is highly important to understand how universal principles of International Style were localized and created its own unique architectural characteristics, especially by responding to the environmental conditions of Cyprus as a Mediterranean island. In light of this in Chapter 4, traces of three distinguishing principles of the Style are examined and the design of post-war school buildings of Cyprus interpreted. After the examination, it is revealed as a fourth principle that, adaptation to climate was one of

the most influential design approach considering the modern Cyprus school architecture.

In this context, when environmental design and modern architecture fused in the post-war period, in Chapter 5 school buildings were examined in respect to the Mediterranean climate and, accordingly, the most influential design factor: the sun! Therefore, post-war Cyprus school buildings and their masses and surfaces were analysed relative to the sun.

And lastly, in Chapter 6 is the Conclusion and Discussion part of the thesis, which are the outcome of all findings through these analytical analysis.

Table 5: Structure of the Thesis



Chapter 2

THEORETICAL FRAMEWORK OF MODERN SCHOOL ARCHITECTURE

This chapter consisted of theoretical background of the school architecture, beginning from early modernism involving the period after the Second World War, while discussing the importance and role of schools in the societies. During this time, it was illustrated how these educational institutions were evolved by the changing educational philosophy, architectural trends and movements, and so on. It is particularly emphasized that International style had a great impact on the school architecture, not only with its architectural principles but also its philosophy during the interwar period. However, school buildings designed and constructed at the end of the 1950s and early 1960s, categorized within the post-war architectural culture which was critical towards 'International style', ultimately trying to express the building's interaction with the local context and climate. In this chapter, it is aimed to understand the processes of dynamic interaction between modern and climate, resulting in the appropriation and confirmation of aesthetics and design strategies.

2.1 Spirit of the Time, International Style and the Design of School Buildings

The Industrial Revolution is defined as a radical change in many areas with the development of technology, industrial production, and transportation facilities. The Industrial Revolution has led to significant changes and the emergence of new approaches in many areas such as technology, production, culture, economy, the social structure of society, art and architecture, to name a few (Benevolo, 1971). The socio-economic developments that took place in the period following the Industrial Revolution deeply affected the field of architectural production and led to the emergence of new types of structures on the one hand and a new understanding of space and form on the other. In the 19th century, the use of new construction materials and construction methods in the production of buildings and the competition among the countries in the field of technology led to the introduction of a new type of structure called ‘fair structures’ into the agenda of the architectural world. For example, the Crystal Palace was opened in London in 1851 as a first world fair to represent England. With this structure, the thick walls between the interior and the exterior disappear and thus the interior is freed from all kinds of weight which were a pioneer of a new understanding of space (Mallgrave, 2009; Cunningham, 1998). This was followed by the 5th world exhibition in Paris in 1889, and the Eiffel Tower, as a symbol of the city. Consequently, these structures showed how technology directed the architectural form at that time. The conception of new construction brought to the agenda by these buildings in Europe also manifested itself in America in later years. Together with the Chicago School, multi-story structures are constructed using new materials such as steel, reinforced concrete and glass (Sennott, 2004). Thus, new materials and construction methods are fully used in the field of architecture; these innovations have

created the environment for the emergence of many new approaches in the 20th century architecture, which are based on the developing industry, new materials, and construction methods.

The search for a technology-based form that emerged during this period was also a forerunner of some new trends in the fields of art and architecture. The ‘Art and Crafts’ and ‘Art Nouveau’ approaches that emerged in the second half of the century led to the emergence and development of an attitude aimed at purifying art and architecture from classical styles. Both of these two approaches, as Giedion (1982) stated, are called ‘an interesting intermezzo between the nineteenth and the twentieth centuries’. In particular, Art Nouveau was unable to keep up with technological developments during the period of the Industrial Revolution, causing the buildings produced with eclectic and revivalist approaches to be replaced by structures that were inspired by the simple and natural forms. In the 20th century, this development in the field of architecture had been removed from the dominance of historical forms, adopted new construction materials and techniques, and opened the doors of a new understanding of Modern Architecture. In fact, this attitude has become one of the most important principles of Modern Architecture in later years.

The contemporary and simple architectural understanding that emerged at the end of the 19th century started to develop and spread rapidly in architecture and plastic arts by the 20th century. In architecture, Adolf Loos, Tony Garnier, and Auguste Perret develop the simplification approach in Art Nouveau, laying the foundations of early modernism, which at certain points overlap with Art Nouveau, and at certain points, it is completely separated from it (Banham, 2002). For instance, Peter Behrens' AEG Factory; Steiner House, built by Adolf Loos in 1910; and Fagus Factory, designed by

Walter Gropius and Adolf Meyer, were some of the buildings that reflected the architectural approach of this period. In particular, Adolf Loos rejected the symbolic value of the structure by saying that ‘ornament is a crime’ and stated that it is necessary to make the structure economically with minimum cost and that the economic structure also appeals to the society (Colquhoun, 2002).

It was inevitable that the socio-economic developments that emerged with the Industrial Revolution would affect the artistic environment of the period as well as architecture and lead to important changes in this field. In the 20th century, while simplicity in design and clean lines on the facade gained importance in architecture, a simple and abstract approach began to be effective in the art of painting, which was closely related to architecture (Conrads, 1991). Hence, many -isms emerged that influenced both of these fields, such as Cubism, Futurism, Constructivism, Expressionism, Neo-Plasticism (also known as De Stijl), and so on. Consequently, these developments, which prepared Modern Architecture, continued to increase their effects during the period (Jackson, 2008).

At the beginning of the 20th century, the Modern Movement, which was organized in Werkbund and later in the Bauhaus, began to influence the practice of architecture with its manifestos, products, and declarations. According to Gropius, one of the founders of ‘Bauhaus’, which was founded in Germany in 1919 and aimed to integrate design with the possibilities brought by industrialization; plastic arts, and industrial actions were like two opposing poles. The concept of ‘basic design’ was born from the production of artists, architects, and craftsmen in Bauhaus. The modern man of the age requires a modern building environment and so works were being carried out for the creation of contemporary living and working spaces and buildings in the Bauhaus

suitable for the modern era. In particular, Gropius determined the attitude that would prevail in architectural production throughout the century by emphasizing that standardization and rationalization in construction would provide a great economy and would bring a high standard of living. Bauhaus, which aimed to be a 'design method', became a 'style' that affected the first half of the 20th century despite Gropius' saying that 'we do not want to create a style' (Gropius & Shand, 1998). Accordingly, the use of simple geometric forms, the desire to dominate nature with strip windows, the goal of establishing a visual connection between internal and external spaces with large glazing surfaces, functional space layout, non-prominent construction system, and white exterior facades, were some of the distinctive features of this style. In this way, Bauhaus influenced not only Germany but also the whole of Europe in the field of design and prepared a suitable environment for the birth of the 'International Style' (Curtis, 2013).

The ideals of Modern Architecture, which was aimed to be achieved since the Industrial Revolution, were dominated the idea of architecture with the International Style. The dominance of technology, often emphasized in architecture, absolute abstraction through simple geometries, the pursuit of simplicity and functionality in space, enabling the establishment of a rational and purist understanding of architecture in this period. The aim was to establish an understanding of architecture that is permanent and contains universal aesthetic values (Frampton, 2011). The main characteristics of the International Style can be summarized as; keeping rationality in the forefront of design, creating the structure according to the rules of a preliminary system, not integrating it with nature and seeing the structure as an expression of aesthetic object, working with rules in design, smooth, classic, static and geometric

forms that create simple beauty, and searching for perfect proportions (Hitchcock & Johnson, 1997).

Le Corbusier and Mies van der Rohe were considered as important representatives of the International Style. Therefore, being the first names that come to mind regarding Modern Architecture proved that this approach is the culmination of Modern Architecture. In particular, the five principles known as the combination of contemporary design and technology, applied by Le Corbusier at Villa Savoye, were accepted as the basic principles of the International Style at the 1st CIAM (Congres Internationaux d'Architecture) Congress in La Sarraz, Switzerland in 1929 (Tietz *et al.*, 1999). Thus, the aesthetic values of Modern Architecture were determined by the principles of Le Corbusier known as 'Five Points of Architecture'; pilotis (reinforced concrete columns), free plan and free facade layout, horizontal strip windows and roof gardens (Le, 2009). On the other hand, Mies van der Rohe developed a rational architectural approach. He aimed to achieve full competence with pure geometries and perfection of details in his structures, paying much attention to functional solutions and details. In his designs, discipline, simplicity, perfection, order and the goal of creating a universal architectural language are outstanding. He emphasized that the serving purpose of the building is constantly changing and so cannot be demolished because of that, it is necessary to create flexible spaces for Modern Architecture to be permanent and to adapt to the changing patterns of usage. Thus, he used simple geometric forms in his structures and sought universal (can be adapted everywhere) architectural solutions. He also said that 'beauty is the splendour of truth', and accordingly he distinguished between the structural elements, the filler, and the dividing elements and expressed them clearly on the facades. Mies van der Rohe, in

his own words, searched for ‘almost nothing’ in his works and became a proponent of simplicity in design, and expressed this approach with the slogan ‘less is more’ (Cohen, 2007). The Farnsworth House and the Barcelona Pavilion, designed by Mies, are among the most important works in the history of Modern Architecture. In his works, he denied the concept of ‘traditional room’, and aimed to eliminate the visual barriers between interior and exterior space. Volumes were extended as a neutral place without any structural elements and were only partially divided by panel-like elements that act as screens rather than walls (Curtis, 2013).

Overall, in the period between 1925 and 1965, there was an optimistic belief that a more rational architecture and cities would be created using new technologies of industrialization. This ‘Project of Modernity’ was on the agenda both socially and architecturally. Among the different kinds of modern architectural movements and expressions that emerged in the 20th century, the most dominant and influential one was the ‘International Style’. In the 1920s, modern architectural approaches were divided into a wide range of -isms, which three of them were prominent as ‘Expressionism, Futurism, Functionalism’, and subsequently, they merged and called as ‘Internationalists’. This movement was a global approach not only with its desires and aspirations but also with its architectural appearance as well (Khan, 1998). The desire to attain an International Style emerged in many architects with the consciousness of being a ‘citizen of the world’. In this respect, it has been witnessed that many architects worked indiscriminately as a nomad in one country or another. Whether Stalinist, fascist, Nazi or bourgeois; what the architects from the academy followed was the result of ‘cosmopolitanism’ (Ragon & Erginöz, 2010). Modernist

architects of the period thought that traditional architecture did not reflect the spirit of the new age (Levine, 2018). As Lescaze (1937) declared that;

“Architecture is a social art, and every architectural movement has a social origin. Life, today, differs radically even from that of a hundred years ago, and it is the great change in the fundamental characteristics of our lives that is necessitating a new form of shelter...Our buildings have changed because our life has changed. One cannot architecturally put new wine into old bottles.”

As it is mentioned before, International Style emerged after First World War, around the 1920s, in Europe and was spread across the world by renowned modernist architects, principally Le Corbusier, Walter Gropius, Ludwig Mies van der Rohe, and J.J.P. Oud (Jordy, 1965). In the United States (US), the term ‘International Style’ was first introduced in 1932 by Philip Johnson (architect, trustee of MOMA) and Henry Russell Hitchcock (architectural historian, critic), as a new architectural language, at the Museum of Modern Art (MOMA) exhibition in New York (Khan, 1998). This ground-breaking exhibition had an important place in the history of world architecture with the desire to support and reinforce the theory of international modernism (Tabibi, 2005). Johnson and Hitchcock accentuated the International Style in terms of form and aesthetics rather than social content. Khan (1998) said ‘internationalism was a mode of operation within the globalizing world, and internationalist architecture’ and he continued by emphasizing that ‘architecture not rooted to place but transmittable to all sections of the globe and embodying modern and universal principles’.

Due to its simultaneous development and worldwide distribution in different countries, this architectural movement named as 'International Style'; was unique to the 20th century in both appearance and structure, and is essentially as authentic as 'Greek or Byzantine or Gothic'. Barr *et al.* (1932) pointed out that ‘these technical and utilitarian factors in the hands of designers who understand inherent aesthetic possibilities have

resulted in architecture comparable in integrity and even in the beauty of the styles of the past.’

In parallel with the MOMA exhibition; Johnson and Hitchcock published a landmark book, originally entitled ‘*The International Style: Architecture since 1922*’, in order to define this new architectural style and to represent the work of notable modernist architects in the event (Tournikiotis, 2001). The authors identified three distinctive aesthetic principles of the Style (Johnson, 1969):

“(1) emphasis upon volume - space enclosed by thin planes or surfaces as opposed to the suggestion of mass and solidity; (2) regularity as opposed to symmetry or other kinds of obvious balance; and lastly (3) dependence upon the intrinsic elegance of materials, technical perfection, and fine proportions, as opposed to applied ornament.”

Architecture as Volume:

Owing to contemporary construction methods, before the buildings are enclosed, the skeletal system is installed with its supports just like a cage. These supports, whether made of reinforced concrete or metal, are composed of vertical and horizontal grids. In order to protect against weather conditions, the walls are wrapped like a screen around the skeleton gridded system. However, in traditional masonry structures, while the walls themselves are support elements, they now function as a shell between supports in the modern system. Due to the lightweight skeletal system of modern construction, plans and layouts have been solved in a much more open, wide, free and flexible way than in the past. Even in appropriate cases, instead of supports, the ‘cantilevering’ system was used which has its own lifting feature. In general, the entire façade served as a cantilever, and a gap was created between the screen walls and outside the supports. Symbolically, the supports in modern plans are shown as points, and the lines represent the separation and protection from the air. There is no longer a

masonry system or a solid block of bearing walls as in the past, and the robustness is provided in construction with minimal and customized solutions. The mass effect is no longer static and rigid, but rather the sharp effect of volumes bounded with planar surfaces. So, instead of the dense brick appearance, open boxes were now the main architectural symbols. Hitchcock and Johnson (1995) stated that:

“Style is the character, style is an expression; but even character must be displayed and expression may be conscious and clear, or muddled and deceptive. The architect who builds in the international style seeks to display the true character of his construction and to express clearly his provision for function. He prefers such an organization of his general composition, such use of available surface materials, and such handling of detail as will increase rather than contradict the prime effect of the surface of the volume.”

In order to strengthen this effect, the construction of flat roofs combined with modern construction techniques has also a significant aesthetic value. However, the lightweight single slant roofs that have been applied in some cases have a successful solution in terms of modern, since they are less complicated and simple than the gabled roofs of the past. In addition, flat roofs are much more functional and useful than conventional curved and round roofs. The volume effect is ‘weightless and immaterial’, and feels like a ‘geometrically bounded space’. Parts coming out of the building’s volume can be seen as solid. Henceforth, a ‘compact and unified solution of a complex problem’ is both aesthetic and economical. As a result, light ‘surfaces and volume’ against gravity were felt instead of the coarse and bulky mass of the past architecture. As a result, tough and rigid design rules were broken, and flexible designs brought by Modern Architecture were developed and expanded. Hitchcock and Johnson (1995) noted that:

“Forgetting neither the origins in a certain type of construction nor the possibilities which lie always ahead, architects should find in such principles as that of the surface of volume a sure and continuing guidance as the international style develops.”

Concerning Regularity:

The second significant principle in this new style of architecture is 'regularity'. Normally and typically, the horizontal and vertical supports of the skeletal system are arranged at equal intervals. Therefore, there is already a 'regular rhythm' before the buildings are covered with secondary planar elements. At the same time, the use of such standard parts was an economical solution. Hitchcock and Johnson (1995) confirmed that "good Modern Architecture expresses in its design this characteristic orderliness of structure and this similarity of parts by an aesthetic ordering which emphasizes the underlying regularity." On the other hand; "Bad modern design contradicts this regularity. Regularity is, however, relative and not absolute in architecture." As in the first principle, the fact that the surfaces of the volumes are no longer solid depended on the typical regularity of the skeleton system of the modern structure, and so this applied to the second principle 'regularity' as well. As a result, structures with visible regularity and consistency prevail, which an aesthetic phenomenon was brought about by order in architecture. Axial 'symmetry' was adopted as the main design principle in past architectural styles, rather than the 'regularity' principle of the International style. The standardization of modern has naturally ensured a 'high degree of consistency' in all parts. Therefore, axial symmetry is not needed anymore to achieve an 'aesthetic order' in Modern Architecture. On the contrary, 'asymmetrical design schemes' not only provide more creative solutions in architecture but also are preferred both 'technically and aesthetically'. The asymmetric approaches increase the interest in the overall composition more, while functionality is better expressed in asymmetric forms in most modern buildings. Asymmetric designs are often emphasized at a point further away from the centre, resulting in a stronger and more positive composition. In buildings that comply with the principle of

being regular, the windows and openings are designed to suit both the function behind and the whole. A unique solution must be found for each function in which “every window be of different shape and size, placed without formal geometrical relation to the others” so that all openings must be reflected on the surfaces accordingly. Whether proportional or similar, in anyhow they must be designed in harmony and unity with each other. Hitchcock and Johnson (1995) reported that “analogous to, but separate from, the hidden structural skeleton, a scheme of proportions integrates and informs a thoroughly designed modern building.” The ‘imaginary lines on the plans and elevations’, combine separate parts and elements to each other as a whole. According to the theory of functionalists, working with ‘proportions’ is a tradition coming from the past which they have become the touchstone of Modern Architecture. The emphasis on ‘horizontality’ is one of the most prominent features of the International style. Within the principle of regularity, the expression of general horizontality is further enhanced by the combination of ‘vertical elements’ used according to the function.

Avoidance of Applied Decoration:

The applied decoration was a feature that certainly existed in the architecture of the past, both in a significant or insignificant manner. In Modern Architecture, Hitchcock and Johnson (1995) explained that the “absence of ornament serves as much as regular horizontality to differentiate superficially the current style from the styles of the past and from the various manners of the last century and a half.” So far, architecture has never been thought without ‘ornamentation’. Because decoration was not only an applied ornament, but also added diversity to the whole, increased interest, and added richness to the whole architecture. Architectural ‘details’ are needed in Modern

Architecture as well as in the past so that they can provide the decoration of contemporary buildings. As a matter of fact, 'the fine details' arising from the structure are complementary elements of the 'decoration of pure styles'. Order and regularity are one of the most basic ways of showing the consistency of all parts of the design. Even the detail quality of window frames changes the effect of the surfaces of the volumes. In Modern Architecture, these fine details of fenestration alone are not enough, but when combined together it can completely change the overall effect of a very simple building. The standardized details of plain and simple forms are suitable for mechanical production, but are also indicative of both 'aesthetic' and 'economic desideratum'. A good modernist architect should be sensitive and insightful about the fine architectural and structural details. The finely thought-out details can decorate a modern building, just like the functional pillars in Greek and patterns of Gothic architecture. Apart from architectural details, the use of 'sculpture and painting' can be used as decorative elements to be obtained without sculpting anything in contemporary buildings. However, it should be noted here that sculptures should not be combined with architecture; it should stand in the background as a unique character independent of it. There are also general restrictions on the use of colour, which should be as colourless as possible. What is important here is to reveal the original colour of the natural surface coating materials or details. The 'natural environment' helps the architects to emphasize the values and details of the 'artificial environment' even more and at the same time, the harmony of the contradictions emerges. Trees, vines, greenery serve as a decoration for Modern Architecture. Again, the choice of location and the position or orientation of the buildings on the site are the challenges of the natural environment that architects may face. Therefore, natural beauties should be preserved as much as possible, and the convenience and elegance of nature should be

utilized for the sake of the aesthetically pleasing environment. The terraces and extensions of the building may go outside from the borders, but beyond that ‘reign of nature’ should obviously begin (Hitchcock & Johnson, 1995).

After all, the main principles of the International style played a decisive role in influencing school design and architecture with the emergence of the Modern Movement in Europe in the late 1920s. For instance, the German Bauhaus and Dutch *Nieuwe Bouwen* Movement ‘with experimentally based and socially motivated design ethics’ and approach; adapted to the types of daily use buildings such as hospitals, factories, and housing by adding rationality and functionality, yet was particularly harmonized with school buildings. The coordinated relationship between form and function was crucial both in terms of economy and efficiency, and as a result, the architectural expressions of the schools began to change considering the modern design strategies such as functional space organization, health and hygiene, life safety, application of new construction techniques, and so forth. In addition, these developments in school architecture coincided with the modern understanding of education, with the diversification of activities within the classroom and school, and the spread of new teaching methods. Thus, there was a radical shift from traditional school design to functionalist school architecture which representing the various features of the innovative solutions throughout the 1930s and influenced all of Northern Europe and the United States (Hille, 2012).

2.1.1 Early Modern Era School Architecture (1840-1918)

School buildings; whether it’s architectural and construction history or the type of education they provide to students, have a reasonably important place in all societies as social, cultural and urban aspects. Thus, the design and construction of schools

should serve this purpose, while at the same time they must have substantial functionality and spatial quality to meet public education needs. The large-scale public school buildings, which began in western countries in the mid-19th century and were built in parallel with the transition to the modern education system, were developed differently by each state to serve various levels of education (Alegre & Heitor, 2013). After the Industrial Revolution, educational and societal reformers departed from the one-room schoolhouse to standardized school buildings in order to meet the requirements of the grown population in the developing cities in America and Europe (Figure 1- 2). Some argued that early school buildings “almost universally, badly located, exposed to the noise, dust, and danger of the highway, unattractive, if not positively repulsive in their external and internal experience” (Baker, 2012).

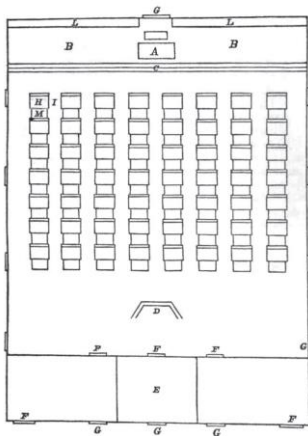


Figure 1: One Room School House Plan, 1938, Photo Credits: Weisser, A., (2006)

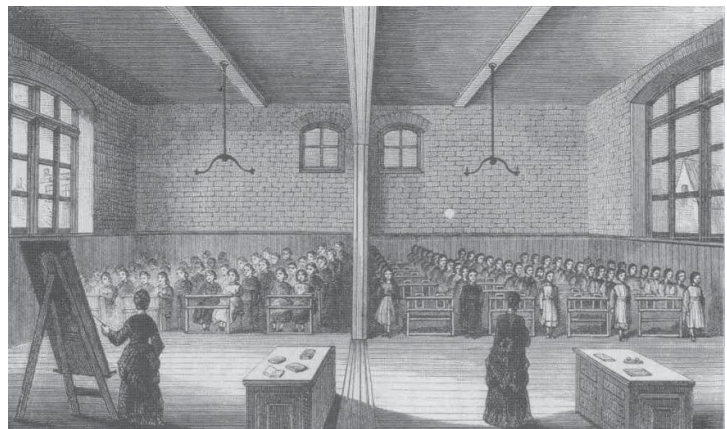


Figure 2: A Typical Arrangement of the Classroom Prior to the Turn of the 20th Century, Photo Credits: Dudek, M., (2000)

Prior to the turn of the century (1870- 1920), classrooms were bigger and standardized with rows of desks, two-sided symmetrical window openings, and to serve other requirements. Although the classrooms were overcrowded and impersonal, the school buildings built during this period were designed in a utilitarian way to accommodate

as many students as possible. Baker (2012) stated that “school facade styles were quite traditional, and generally reflected the Beaux-Arts form, Colonial Revival, Gothic, and other neo-classical styles that were popular at that time” (Figure 3-4). Furthermore, providing natural light and ventilation, taking into account environmental factors, is essential in these schools, and even outdoor views are provided for students to rest their eyes from time to time (Baker, 2012). In order to respond to the development of pedagogical and educational requirements, different principles and strategies were applied in the design and construction of school buildings. Under the influence of the 19th-century Hygienist Movement, there was an increasing demand for creating healthier and hygienic spaces and consequently producing design strategies and technical solutions such as heating, ventilation, and acoustics in the schools (Alegre & Heitor, 2013). For example, during the early 1900s in Europe, the first open-air schools were designed to prevent the spread of infectious diseases such as tuberculosis by exposure to open air and sunlight (Figure 5). For this reason, while large glass openings were used to allow the projection from the classrooms to the outdoors, larger and more complex school buildings were likened to hospitals with the concept of 'hygienic architecture' (Nelson, 2014).

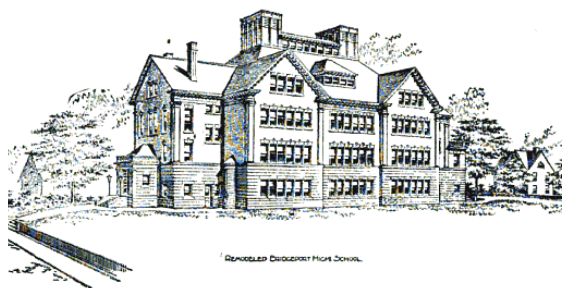


Figure 3: Bridgeport High School, Connecticut, 1879, Photo Credits: Baker, L., (2012)

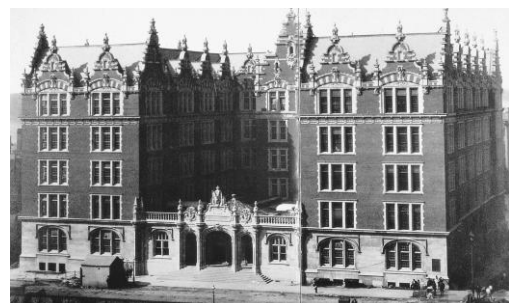


Figure 4: DeWitt Clinton High School, New York City, 1906, Photo Credits: Weisser, A., (2006)



Figure 5: Corona Avenue School by Richard Neutra, California, 1935, Photo Credits: Weisser, A., (2006)

Throughout the 20th century, the supply and demand for school buildings was gradually increasing due to the growing population and the expansion of public education. In this context, there has been a standardization in the design of schools based on new strategies and technical solutions applied by groups of different disciplines such as educators, architects, builders, and industry, while considering the cost-effectiveness and acceleration of construction time (Alegre & Heitor, 2013). Accordingly, it was an extraordinarily fruitful time in many major cities, where the population of children of all ages had to be educated, thus making significant investments in the construction of new school buildings and capital development projects towards the end of the 19th century. Significantly, states and governments have played a major role in maintaining quality in schools and regulating these schools under their own control, although private schools in Europe and America are allowed to be managed independently (Burke & Grosvenor, 2008). In terms of construction history, it is seen that school building production has an important place by creating great awareness. Alegre and Heitor (2013) emphasized that;

“The features of its functional program and spatial organization based on the space of the classrooms and social spaces, which can be repeated and replicated, allowed the development of new solutions in terms of spatial organization (spatial typologies), technical and design solutions regarding both habitability demands and hygienic and health requirements, design

methodologies (multidisciplinary groups and cost-effectiveness strategies), and new building systems and techniques (prefabrication, standardization).”

Within the decade after the First World War, schools have undergone a major change, with social and democratic fluctuations in Europe, influenced by health and hygiene policies, educational theories, and the Modernist Movement. In this context, a school architecture emerged from the transition from monumentality to functionality, more human scale, taking into account environmental factors that provide daylight and ventilation to spaces. Schools had to be physically designed to respond to the new modern education system in which empirical pedagogies, alternative or progressive philosophies emerged during this period (Burke & Grosvenor, 2008).

Schools were influenced by the new attitudes of the architects such as Frank Lloyd Wright and H. P. Berlage, together with the Arts and Crafts Movement towards education, and thus, the basic architectural innovations were introduced for the first time, during the first quarter of the 20th century. For example, basic planning strategies and spatial organizations that are reorganized to integrate and diversify activities in the learning environment are just a few of these innovations. In addition, plan organizations and mass relations in schools were more responsive, expressive and flexibly organized in terms of functionality. Thus, the system of architectural order in school buildings’ mass and layout no longer reflected a formal symmetrical and hierarchical system as in the past. Due to the flexible and free organization of school buildings, site planning enabled outdoor spaces to be used more efficiently to serve various activities and facilities. At the same time, this flexibility in the spaces makes the interiors more versatile, resulting in more efficient use of interactive classrooms, shared common areas and even transition spaces. Moreover, instead of fixed furniture,

a light-weight and movable ones were also preferred for flexible use. Interaction between interior and exterior was strengthened by the use of more openness and transparency on surfaces and spaces. In particular, this indoor-outdoor relationship not only allows for view, appearance and natural light but also for supplementary open-air learning activities in the site (Hille, 2012). The design of these outdoor spaces for active use is directly related to modern educational themes that support activity-based learning (Figure 6-7).



Figure 5: Fabritius School by W. M. Dudok, Netherlands, 1926-28, Photo Credits: Hille, T. (2012)



Figure 6: Kingswood Girls' School by Eliel Saarinen, Michigan, 1929, Photo Credits: Hille, T. (2012)

In general, these innovations aimed to ‘deinstitutionalize the learning environment’ which provides less formal and more flexible plan organizations and mass arrangements in the school buildings. Apart from this, more human-scale learning spaces were provided which reflected more domestic character with ‘reduced heights for ceilings, windows, stairs and railings, and furniture’. Furthermore, natural materials were used particularly in classrooms, such as brick, stone, terra-cotta, tile, and wood, to create a more cosy and friendly environment for students. The colours and textures on the surfaces create a lighter and more playful architectural effect both inside and outside, and this effect is enhanced by architectural forms and images. As a

result, appreciation of these functional and aesthetical qualities revealed the architecture itself in the schools (Hille, 2012).

2.1.2 Inter-war Period School Architecture (1918-1939)

The architectural expression, appearance, and style of buildings, principally schools, underwent a dramatic transformation at the beginning of the 1930s. International Style was claimed to be particularly adapted to school buildings in Modern Architecture, and that the main principle of this new style was functionalism such that schools needed to be designed to respond the modern scientific education.

In the exhibition which was held in MOMA (1932), collaborative works of educators and architects were presented graphically in order to implement the newest education methods and to create the appropriate built environment. In the exhibited models and images, educational buildings in the new international style of architecture were illustrated to show how they developed to meet modern educational needs both in America and in Europe. Philip Johnson, director of the MOMA (1932) exhibition, emphasized the relationship between school buildings and the Style as:

“The international style in architecture is specially adapted to school buildings, because functional planning, the fundamental principle of the new architecture, is exactly what schools need to develop in sympathy with modern trends in scientific education.”

Pointing to the ‘Georgian or English Gothic’ styles of architecture and a traditional, historic pattern that followed in school buildings until very recently (the 1930s), Johnson argued that the architecture of schools and educational buildings had not kept pace with educational methods. ‘They have been civic monuments rather than buildings designed especially for school use’, and hence ‘it was difficult to fit modern educational needs into these outmoded designs’. In modern school buildings, the

interior spaces, as well as the exterior design of the buildings, are designed to be in harmony with the needs to be served. Not being confined to any specific pattern or stereotype, the flexibility of the Modern style has been remarked as its advantage in achieving a harmonious whole. Johnson (MOMA, 1932) also claimed that;

“The architects of the Classical and Renaissance, and often of the Medieval periods, designed their facades and plans in terms of bilateral symmetry. They also usually divided their facades horizontally into three parts. In the international style, these arbitrary conventions of symmetry and triple division are abandoned for a method of design which accepts, first, both vertical and horizontal repetition and, second, flexible asymmetry, for both are natural concomitants of the modern building.”

In the architectural exhibition at MOMA, four school buildings were selected to illustrate International Style, emphasizing ‘freedom of planning’ and ‘abundance of windows’. Doubtless, it created curiosity among educators and architects to come and see this modern school architecture in the exhibition. Two of the school buildings presented were located in the US, while two were in Europe. First, Hessian Hills School (1931–32), one of the American schools, was designed by Hove & Lescase Architects in New York. It represented the ‘simplicity of design’ and ‘frankness of construction’. Due to its simple rectangular prism form, horizontality is emphasized and glass surfaces (windows and doors) are used on the entire wall of the south facade. There was a direct link between interior and outdoor spaces via these glass openings (Figure 8). The second was the Ring Plan School, located in Los Angeles and designed in 1926, but built-in 1960, by the famous modernist architect Richard Neutra. The school’s layout showed a centralized arrangement resulting from curvilinear volumes. There was the repetition of the design elements to create the circular form, which directly opened onto the common courtyard in the middle, where strip windows and private, semi-open terraces were designed on the extroverted parts. In particular, it was designed to be adapted to the warm climate of Los Angeles (Figure 9). The third was

the Friedrich Ebert School (1928–30), the work of Ernest May and Associates, located in Frankfurt in Germany, which had a more compact layout organization than the others. Due to steep site characteristics, the building had a stepped profile, facing south. It also had open private terraces and fully glazed windows on this view. Therefore, it gave an opportunity to take direct sunlight and provide natural ventilation to the classrooms (Figure 10). The last was the Bauhaus School (1919–25), located at Dessau in Germany. It was designed by Walter Gropius, one of the creators and promoters of International Style architecture. The Bauhaus building was divided into three individual units as asymmetrically arranged wings. It consisted of classrooms and administrative buildings, workshops and residential units, linked by bridges (MOMA, 1932). Compared to the horizontal strip windows of the classrooms and administrative units, cantilevered balconies and large glazing windows were used as another arrangement of unity and order (Figure 11). Therefore, in order to provide an ‘abundance of light’, the principle of regularity was used according to the different functions and directions (Hitchcock & Johnson 1995).



Figure 7: Hessian Hill School, New York, USA, 1931–32

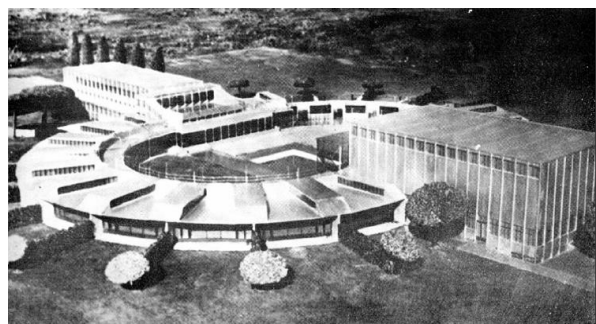


Figure 8: Ring Plan School, Los Angeles, USA, 1926–60

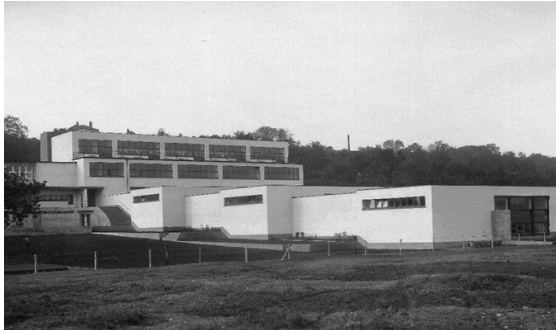


Figure 9: Friedrich Ebert School,
Frankfort, Germany, 1928–30



Figure 10: Bauhaus, Dessau,
Germany, 1919–25

Overall, many modern schools built in the 1930s were unique and invaluable resources for architects with their remarkable design innovations. In the context of environmental design, strategies for utilizing from natural daylight, ventilation, the interaction between interior and outdoor spaces, flexibility, and adaptability were some of the most important architectural features for quality of learning atmosphere linked to health and hygiene (Hille, 2012).

2.1.3 Post-war Period School Architecture (1945-1965)

After twenty-two years later from the MOMA exhibition, around 1945, International Style evolved in a more ‘humanized’ way in American architecture, which this transformation also reflected in European modern, eventually. Even though major influences and principles of the Style were still visible, it was rapidly ‘regionalized’ all over the world in the post-war period (Khan, 1998). Dissemination of International Style since the 1930s, made a great worldwide impact after the Second World War; including the US, European countries, Scandinavia, Finland, South America, Japan and so on (Ragon & Erginöz, 2010). The main architectural identity of forms associated with the International Style continued from the inter-war to the post-war period as a significant element, in spite of many political and cultural turbulent caused by Second World War. The modernization process around the world has led to the

'gradual globalization' of various versions of the International Style in architecture. In light of this, the main aim was to achieve an 'identity in the eyes of an international audience', consequently 'national identity' was not a priority matter as it was in past (Khan, 1998). Most European architects such as Ludwig Mies van der Rohe and Walter Gropius, who had to immigrate to the US in the interwar period, found the chance to advance their earlier works after 1945. Thus, the modernist International Style reborn with all its glory that had 'no undesirable political connotations'. As for materials; the use of reinforced concrete and glass facades became popular in the reconstruction process of the destroyed countries, caused by war (Tietz, 1999). With these positive intentions, new residential and public buildings such as education and health facilities began to be constructed quickly (Peel *et al.*, 1998). As Tietz (1999) emphasized 'from South America to Southeast Asia, architecture took on a unified style' which style has greatly influenced and spread in all cities of the world. It was 'sometimes pushing regional architectural forms into the background, or causing them to disappear from the profile of the city altogether'.

After the Second World War, the creation and emergence of new capitals, which became the symbols of their nations, were appeared either in the establishment of the new republic or in the de-colonization process in different countries. For example, the cities which gained their independence can be named as: Ankara in Turkey (1923), Chandigarh, the provincial capital of Punjab in India (1951), Brasilia in Brazil (1957) and Islamabad in Pakistan (1960) to name a few (Khan, 1998). The International Style offered an easily accessible style option aimed at maximizing large-scale urban development projects, with the surge in the growth in cities. In this context, local architects and planners, politicians and the public agreed that such a development

would bring the city the wealth it needed (Collier, 1975). For post-war period architects, it was seen as a golden opportunity not only to repair the damage or make new plans for the reconstruction process in the cities but also to convey modernist ideas with a global enthusiasm, and eventually earn commissions. They were eager both 'to renovate un-bombed but run-down cities' as well as 'to rebuild bombed cities' (Grewe, 2005).

After its debut, International Style was accepted as one of the most influential architectural styles of the mid-20th century. As it is mentioned before, many European architects had to immigrate to the US as a result of the chaotic situation at home, and thus new, modernist design ideas were disseminated worldwide in the post-war period. Due to its advocacy of the avant-garde philosophy of 'pure functionality of the form', long-lasting influence on Modern Architecture was generated from the principles of International Style. While buildings designed in that period retained this new perspective, different sub-styles and forms were born as a result of dynamic processes of interaction with local contexts which resulted in the appropriation, resistance and even confirmation of dominant aesthetics and design principles.

Undoubtedly, the role of school buildings as vessels for disseminating the International Style during the interwar period was great as is the role of school buildings of the post-war era (1945-1960) in fostering understanding in ongoing educational debates and the unique circumstances of that time period (Aydınlık & Pulhan, 2019). As Ogata (2008) declared that there was a boom in the construction of educational buildings throughout the world, due to the rising population of young children immediately following the war years. In post-Second World War America, there was a significant increase in the population of children, with newly established families and homes, and

as a result, there was an explosion in the construction of educational buildings. The editors of the 'Architectural Forum' drew attention to the construction of new school buildings and the education sector, which were urgently requested due to the increase in births: 'every 15 minutes enough babies are born to fill another classroom and we are already 250,000 classrooms behind' (Ogata, 2008). The 'Architectural Forum' journal, in 1949, had published a special issue devoted entirely to school architecture and design; this volume included articles on important issues related to acoustics, lighting, heating, and ventilation of school complexes. The editors of the journal denoted that "children, not tanks, planes or bombs- were the greatest output of the U.S. during Second World War. These war babies, seven million of them, began hitting the first-grade last year, have taxed every school facility, are giving school men, parents and taxpayers alike a major problem concerned with the future of America." Parallel to this, many other magazines also published articles covering the rapid increase of school construction, which was both an exciting and intimidating task, and addressed similar problems (Baker, 2012).

In contrast to many traditional public educational structures of earlier periods, post-war schools consisted of steel frames, glass plates, and human-scale horizontal masses. In particular, three basic types such as 'finger type layout, compact clusters, open plan', showing the significant changes in the design of school complexes from the mid-1940s to the mid-1960s. For example, Crow Island School (1939–40) designed by Perkins & Will Architects in Illinois, United States (Figure 12), was a pioneer in post-war schools with a finger-type layout and plan organization (Ogata, 2008).

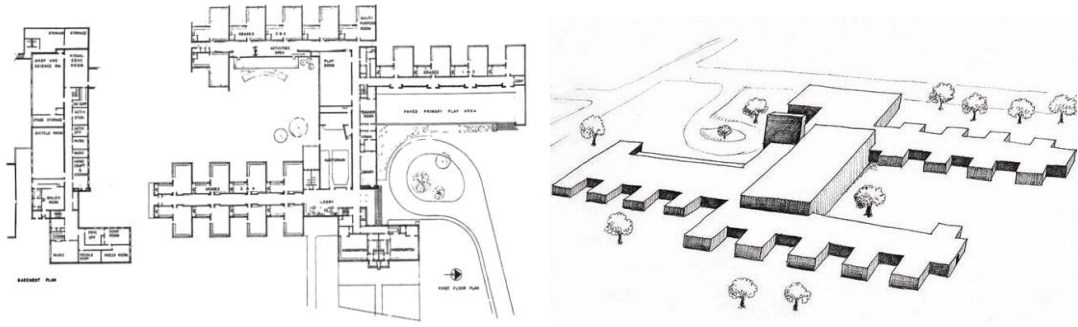


Figure 11: Finger Type Layout and Mass in Crow Island School by Perkins & Will Architects, Photo Credits: Tanner and Lackney (2005) and Neil Gislason (2011)

As Mollon (2013) highlighted that;

“The designs of the schools reflect architectural trends of the time and vary from Neo-formalist to Brutalist; from Modern to the International Style. These design choices reinforce the pedagogical shift that took place simultaneously that moved away from static classrooms to interactive and flexible spaces where the teacher engaged students in new ways. This style of teaching and learning are still the buzzwords today in education, and ensure that these buildings continue to be relevant.” (Figure 13).



Figure 12: Interactive Classrooms Arrangements in Crow Island School, Photo Credits: Hedrich-Blessing

In the post-war period, with the urgent need for school buildings, the school zones in cities had the opportunity to be shaped open to the new technical innovations. Now the appearance of the new school buildings was transformed from classical, colonial, Georgian or Gothic to completely Modern style, with having pure and clean lines, with

a single or two-story height close to human scale, with flat roofs, glass surfaces, and metal-framed windows (Tanner & Lackney 2005). Modernist architects of the time, relying on the logic and efficiency of modern school design, which was quite different from past styles (Baker, 2012). Although the hosts still hesitantly look at the exterior appearance of the post-war architecture, the easy acceptance of modernism in ‘school design can be attributed to an ideological change’ that envisages the modern understanding of the education system and hence ‘transparency and functionality’ (Gamarra, 2018).

Modern post-war school architecture flourished with more ‘functional, affordable and easy to maintain methods’ to fulfil the new education system by architects and educators. Architecturally, functionalism played a crucial role ‘to humanize and deinstitutionalize the learning environment’ in the design of school buildings. Firstly, the ‘lightweight construction’ system emerged with the use of less expensive materials and new building technologies. Secondly, ‘plan layouts’ were much more ‘flexible and adaptable’ to answer continuously changing educational needs while enabling further building growth and extension. Also, they were more ‘user-friendly’ and human-scale structures rather than monumental and formal schools of the past. Last but not least; considering the environmental factors such as getting benefit from natural daylighting, ventilation and convenient connection to outdoors were some of the essential design strategies in these modern schools, which Hille (2012) emphasized that ‘architectural expression is directly influenced by climatic factors, site conditions, and local building methods’. For example, the architecture firm Caudill Rowlett Scott designed many post-war state schools in southwest America (such as Huston School and San Jacinto Elementary School), which they inspired from Crow Island School (Figure 14- 15).

Apart from reflecting the modern language in their school buildings with simple and clean lines, they were also taken care of to provide controlled natural light and airflow to the classrooms, especially with large windows, perforated panels, and broken eaves (Ogata, 2008).



Figure 13: Huston School by Caudill Rowlett Scott, Oklahoma, 1948, Photo Credits: Julius Shulman



Figure 14: San Jacinto Elementary School Liberty by Caudill Rowlett Scott, Texas, 1956, Photo Credits: Ulric Meisel

2.2 Decline of International Style and Rise of Climatic Issues in the Design of School Buildings

International Style was one of the most important architectural approaches within the scope of Modern Architecture. The Style was greatly influenced the subsequent developments throughout the century, but afterward, the idea of rational design within it criticized by many. The term 'international' by its practitioners was distinguished from the word 'universal' because it referred to the 'deep structure' or 'natural laws' of architecture. Accordingly, instead of practicality or ideology, it could be applied everywhere because of its 'natural truth'. Yet, Khan (1998) claimed that 'universal and international modernism still had to confront the idiosyncrasies of rooted non-Western

and local cultures', and this was the reason 'why modernism remained "pure" only for a short time, being quite quickly regionalized'.

Undoubtedly, 'internationalism' was a global approach not only with its ideals, desires, and worries, but also its architectural identity. However, architecturally, this style was not as a single type, it has shown itself in different versions that were rooted in context and region in post-war time. For instance, there were 'regionalized' approach of Hassan Fathy in Egypt, Luis Barragan in Mexico (Khan, 1998), and Manuel Gomes da Costa in Portugal (Agarez, 2018), 'organic' approach of Frank Lloyd Wright in US, 'personalized' approach or sometimes known as 'other tradition' of Oscar Neimeyer in Brazil and Alvar Aalto in Finland (Khan, 1998), 'adaptive modernism' of Vladimir Ossipoff in Hawaii (Ossipoff *et al.*, 2015). Furthermore, International Style is reinterpreted as 'situated modernism' in the context study of Tucson in the US, emphasizing more local, vernacular traditions and contextual approach by local architects (Evans & Brooks, 2005). In addition, Bozdogan and Akcan (2012) expressed the post-war modernism as 'Tropicalization' of the International Style, with the use of climate-responsive design elements such as brise-soleil, pilotis and roof garden invented by Le Corbusier, in Latin America and Caribbean. Thus, use of these aesthetical and functional elements was spread in between the continents from East to West and opened a way of 'cross-cultural exchanges' in Modern Architecture, including Turkey.

Despite this regionalized version of the International style, the reactions were increasingly severe around the world in the late 60s, and subsequently, the main slogan of this movement 'less is more' replaced with 'less is bore' as a new belief of postmodernism. In the late 1960s, masters of the mid-century era, architects, Le

Corbusier, Walter Gropius, and Mies van der Rohe, passed away, and these heroes of the International Style no longer existed, only their ideas were left behind. Only Louis Kahn was portrayed as a possessive figure of modernism. Organizations such as CIAM, which advocated International style and Modern Architecture, were now disbanded, and other architectural institutions with different concerns were established instead. Charles Moored, Robert Venturi and Aldo Rossi, the pioneers of postmodernism in the late 1960s, began to take the stage, and the uprising against the International Style in the West continued at full speed (Khan,1998). The postmodernist architects argued that International Style is identity-less and unexciting, so they repeatedly applied coloured ornaments and decorative surface details in their buildings, by referring to the historical styles. However, against this chaotic-looking architecture, a new thought emerged in the late 70s: 'critical regionalism'. This term was first used by Alexander Tzonis and Liane Lefaivre, and later by Kenneth Frampton. The main goal in this approach was to find a middle ground between the two extremes, modernism and postmodernism. While modernists were trying to create a "universal" architecture with International Style, critical regionalists suggested that the building should reflect the culture and tradition of its region considering the local tectonic form and materials. On the other hand, they pointed out that the stylistic details should be applied only in a measured and meaningful way instead of the exaggerated decorations used by the postmodernists (Canizaro, 2007). Thus, critical regionalism became an initiative that moved towards a culturally and environmentally sensitive architecture, without returning to the vernacular architecture, as opposed to the homogenizing effects of International Style. According to Frampton, critical regionalism should critically adopt the International Style for its universal qualities

and also respond to the building's unique geographical context, such as climate, light, topography (Frampton, 2002).

2.2.1 Design with Climate

The most important contribution to the advancement of modern architectural knowledge in the 20th century was the climate-sensitive design approach in the post-war period. Expressionist modernism, which debuted with the “Brazil Builds” exhibition (1943), had encompassed the entire continent after the Second World War and became popular with its publication of the same name. This climate-responsive movement, especially reputed by external sun breakers used to control the heat and light, reached the African continent in a short time and showed Brazilian influence in its architecture between the 1950s and 1960s. The architects had a very intense interest in this style so that they used *brise-soleil* against sun rays such as exaggerated louvers and egg-crate shading devices in public buildings. Modernism, especially regionalized International Style, became dominant and popular among designers and architects while overshadowing other architectural styles during the post-war era. It played a major role in changing the cityscape with the use of sun control elements and cement blocks in buildings (Sennott, 2004). Although most of the works of these well-known architects and designers were not exactly categorized under the absolute International Style architecture, in fact, they all shared an ‘internationalist outlook’ (Khan, 1998).

In the Mediterranean region, Le Corbusier was the pioneer architect of the International Style, who was reinterpreted the real meaning of the Modern Mediterranean architecture. He made a significant contribution to the development of Modern Architecture and provided its spread to a wider audience worldwide. Goldfinger (1993) expressed that ‘the Mediterranean builders’ intuitive, direct and

honest approach to creating a satisfying environment within limitations of climate terrain, available materials, and structural knowledge is similar to the architects' search for imaginative designs'. Thus, the use of modern techniques and materials provides meaningful living environments both economically and aesthetically (Goldfinger, 1993). The strong connection of Modern Architecture with 'light and space' was affected by the development of Mediterranean modernism in this sense and disseminated all over the region as an organic approach than a style. Le Corbusier, Josep Lluís Sert, and Eileen Gray were some of the leading modernist architects who predominantly worked in this region, considered and took advantage of 'Mediterranean climate and lifestyle' rather than following an absolute style. As Le Corbusier pointed out that 'space and light and order...those are the things that men need just as much as they need bread or a place to sleep'. In addition, Karakus (2013) emphasized that 'in this architecture, flowing space connecting indoor to outdoor areas integrated with the dramatic topography of rock, sea and vegetation highlighted the environment more so than style or form' (Karakus, 2013). As for the eastern Mediterranean, adaptation to climate and region with International Style principles and Modern Movement were strikingly seen in the Modern Israel architecture, particularly in the 'White City of Tel Aviv'. European educated and notable architects such as Le Corbusier, Walter Gropius, and Erich Mendelsohn, had a great influence on shaping the architecture in Israel (Hohfeld *et al.*, 2015) with their 'implementation of the modernist ideas into the local conditions'. Unlike European, large glazing surfaces are reduced in this warm climate, instead, deeply shaded balconies and horizontal ribbon windows were preferred to use against excessive sun rays. In addition, Le Corbusier's 'pilotis' and 'brise-soleil' were widely used to allow ventilation through the building, and latter to provide efficient sun control. These climate control methods were not only

used for functional reasons but also enriched the ‘plasticity of the architecture’. Furthermore, some of the main characteristics such as the use of flat roofs and local materials reflected the regional language of Modern Architecture (UNESCO, 2009). Overall, in modern Mediterranean architecture, expression of climatic elements and simplicity of details has served as the basis for a ‘richness of fenestration and humanization of scale without the introduction of applied decoration’, which means these modern architectural details used for both functional and aesthetic purposes (Goldfinger, 1993).

Regarding modern school buildings, as Hille (2012) emphasized, providing natural daylight and ventilation was one of the main principles to create a hygienic, healthy and quality learning environment during the post-war period. Accordingly, climatic factors, site conditions, and local building methods play an important role in the design of school buildings. Related to this, certain types of plans and layouts associated with the natural environment, providing easy access to the outdoors, the orientation of the masses relative to the sun and wind, and so forth, were some of the regional and contextual responses specific to the location (Hille, 2012).

In the years following Second World War, new urban and architectural projects were initiated across the African continent in accordance with the principles of the Modern Movement. Towards the 1950s, school buildings were among the first works of modernist architects who moved to countries with tropical climates, such as Angola and Mozambique. They considered the hot and humid characteristics of the tropical climate and accordingly implemented the design strategies suitable for the local climate in modern school buildings by providing solar control and adequate ventilation (Caldas, 2011). Therefore, many school buildings built during the modern period were

designed to respond to the climate and successfully reflected the features of the ‘tropical modernist architectural style’ with the use of ‘brise soleil, louvered facades, and reinforced concrete shells’, to name a few. For instance, the passive cooling and environmental design strategies needed due to climatic requirements are exemplified by both school buildings in Lagos as Godwin and Hopwood’s Christ Church Cathedral School (1956) (Figure 16) and the ACP’s Olowogbowo School (1953) (Uduku, 2006).



Figure 15: Christ Church Cathedral School, Godwin and Hopwood, Lagos, 1956

The main challenges for the design of school buildings in tropical zones rely on optimizing solar gain and rain protection, as well as providing maximum air circulation against the effects of humidity. To ensure a particularly favourable environmental performance, the classroom blocks are designed as a single partition between two opposing facades with a powerful connection with the outside. Particularly, the modernist architects reflected the importance of climatic concerns in Mozambique school buildings (such as Polana High School and Nampula Technical Schools) during the mid-century period (Figure 17- 18). Thus, the placement of school masses according to sun paths and wind directions was one of the most representative principles of design with climate (Ferreira, 2013).



Figure 16: Polana High School, João José Tinoco and José Forjaz, 1969–1973, Mozambique, Photo Credits: Ana Tostões



Figure 17: Nampula Technical School, Fernando Mesquita, 1953–1973, Mozambique, Photo Credits: Ana Tostões

Because schools have a variety of functions, they are very convenient in implementing climate-sensitive design strategies. The form and orientation of the school building, which is one of the most important principles of ‘design with climate’, should be determined in parallel with the selection of ventilation and shading devices. Due to the low exposure of sunlight from the east and west directions of the building masses, the rectangular blocks, particularly classrooms, are rotated along with this (east-west) axis and are designed to have minimal openings on the surfaces (Caldas, 2011). For example, rectangular classroom blocks are slightly rotated towards the east to take the morning sun which is less harmful (Ferreira, 2013). Subsequently, the long sides of the buildings (north and south) are positioned towards the prevailing wind direction and thus cross ventilation is provided to cool the interiors. In terms of openings on the surfaces, sun control, shading, and natural air flow are provided by using either *brise-soleil* or beta type windows (horizontal strip windows) according to the sun direction in the schools, such as Comandante Valodia Secondary School and former Pio XII Institute (Figure 19- 20) (Caldas, 2011). With regard to exposure to sunlight, the main challenge was to reconcile the need for adequate shading while providing the appropriate amount and quality of light in spaces depending on their function.

Horizontal shading devices and sunbeams were used on the southern facades to control the sun during the hot months to prevent overheating, while beta windows helped to diffuse lighting inside the classrooms on the western or eastern directions. Apart from being climate-sensitive, these elements were preferable due to low maintenance problems (Ferreira, 2013).



Figure 18: F. Comandante Valodia Secondary School, Castro Rodrigues, Lobito, Angola, 1966–1967, Photo Credits: Ana Tostões

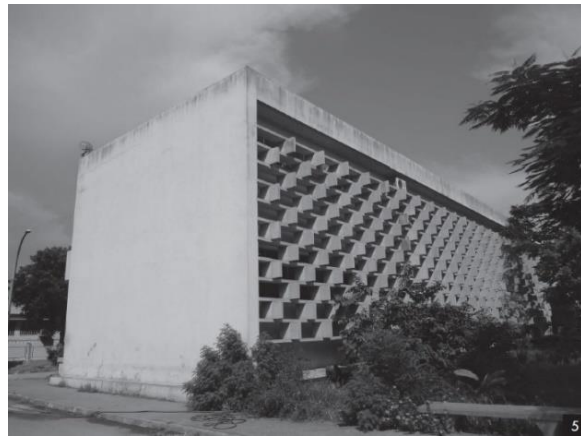


Figure 19: ICRA (former Pio XII Institute), Vasco Vieira da Costa, Luanda, 1968, Photo Credits: João Vieira Caldas

On the other hand, post-war architects in the United States designed school buildings according to their context and climate. In this way, they were actually created the first models of ‘regional modernism, inventive designs which are of a place, by a place, and for a place’. For example, McDonogh No.39 primary school (1954) has a “finger-type’ layout and consists of four main classrooms and administrative wing. All classroom blocks are connected to each other by a one-way semi-open circulation line. Through the operable aluminium and glass windows on both sides of the classrooms and the hall, plenty of natural light and ventilation is provided, while at the same time reducing the heat gain by filtering the sunlight from the classroom. In the spaces between the class masses, green courtyards lie and connect with the outside. In

addition, the Phillis Wheatley Elementary School is one of the most notable modern school building designed by Charles R. Colbert in the city of New Orleans, 1955. The one-story school structure raised above the street on the steel pillars, and thus an additional playground created underneath of the building in a very compact urban context. The light-weight school building looks like a modern tree-house in the city as it is floating on the air, while classrooms filled with natural daylight and ventilation (Figure 21). Furthermore, Thomy Lafon Elementary Schools (1954) were also built on piers like Phillis Wheatley, raised from the ground to avoid possible flooding in a manner sensitive to local environmental conditions. The semi-open space beneath the structure raised to the air above the poles, responds to the climatic necessity so it helps to cool the building with natural breezes. In addition, this semi-outdoor area houses a sheltered playground for the children (Figure 22). The glazing surfaces applied on the facades in consideration of the direction of the sun provide plenty of natural light and ventilation while providing new perspectives for the children by making visual connections with the outside (Stock, 2008).



Figure 20: The Phillis Wheatley Elementary School, Charles R. Colbert, New Orleans, 1955, Photo Credits: Frank Lotz Miller



Figure 21: Thomy Lafon Elementary School, Curtis and Davis Architects, New Orleans, 1954, Photo Credits: Frank Lotz Miller

Referring to these post-war school buildings all around the world, it is seen that they were designed in sympathy with the climate and regional sensibilities. Particularly,

considering the sun and wind factor with the orientation of building mass and also the use of *brise-soleil* on building surfaces. These passive design strategies, particularly highlighting the sun control elements, was an important value to determine a new conception of function and aesthetic in the mid-century period. Thus, design strategies can be given as an example of the scientific understanding and aesthetic appreciation of climate-responsive, regionalized and localized Modern Architecture.

2.2.2 Orientation and Layout of Building Mass

Orientation in architecture involves a wide variety of different ideas and approaches. Ramsey *et al.* (2000) stated that the term ‘total orientation’ is divided into two, as physiologically and psychologically in terms of design. With regard to the psychological aspect of the orientation, privacy issues and view mostly override the physical aspects. As for the physiological aspect, the factors that affect our senses should be considered as follows: ‘the thermal impacts- the sun, wind and temperature effects acting through our skin envelope; the visible impacts- the different illumination and brightness levels affecting our visual senses; the sonic aspects- the noise impacts and noise levels of the surroundings influencing our hearing organs.’ Also, human beings' respiratory organs are even affected by the dust, smoke, and smell of the environment. All in all, a building is only a part of the mosaic on an urban scale. Orientation plays an important role in positioning a building in different considerations, whether it's spatial influences and social proximity, with its representative stance regarding aesthetically, politically or socially in the city (Ramsey *et al.*, 2000). In this context, Olgyay and Olgyay (1957) also highlighted the orientation issues of buildings that consisted of many factors such as ‘local topography, the requirements for privacy, the pleasure of a view, reduction of noise, and climatic factors of wind and solar radiation’.

Considering the mid-century Modern Architecture, being sensitive to the sun was one of the main missions, as mentioned before. Regarding the orientation of the buildings towards the sun, Le Corbusier pointed out that ‘a building cannot be energy efficient if it is not solar responsive. Orientation is the most valuable energy-saving strategy’ in architecture, in his letter to Spanish architect Josep Lluís Sert (Lechner, 2001). Another renowned modernist architect of that time, Frank Lloyd Wright, was also created environmentally sensitive buildings. In particular, these buildings integrated well with the natural conditions of the site and context, taking into consideration of sun orientation and using the local materials. However, it should be noted that some historians argued about Wright's architecture which was only metaphorically responded to the environmental consequences of industrialization, not materially (Sennott, 2004).

Solar orientation in public buildings such as schools, has vital importance both for the design of the site, layout and building surfaces, because of being multi-functional complexes. For instance, in many schools, break times are provided for recreation and relaxation of students on a routine school day. Specifically, in mild and moderate climates, lunches and recess breaks take place outside. However, in continental climates with extreme temperature changes, indoor and outdoor space arrangements should be made according to the seasonal needs for eating and playing activities. In particular, a variety of micro-climates should be provided where outdoor activities take place. For example, living and socializing areas should be sufficiently warm and sunny, or in hot weather, adequate shading should be ensured for comfortable relaxation areas. Design strategies such as correct co-ordination of the context, building layout, use of appropriate vegetation or trees can contribute to a variety of

spaces. In order to make more use of the site, edible school grounds or photovoltaic panel arrays that require direct sunlight can be added as another factor in solar orientation issues. According to the form of the mass and the characteristics of the site, adapting the building to the sun orientation, making optimum use of daylight, avoiding excessive heat intake also affect the site (Gelfand & Freed, 2010). Lechner (2001) emphasized that, for school buildings, it is required to take direct early morning sunshine for sufficient heating and in afternoon times controllable slight heating (to prevent overheating), so that classrooms should be oriented to the east direction about 30° angle for optimum results. As in schools with night classes, it may be desirable to use combined systems, each with a different orientation.

Since the natural environment is significantly affected by the built environment, the environmentally friendly design approach is required to be a key factor, not only for design and construction but also for entire building life cycles. Orientation and massing are two major design concepts and strategies in terms of climate-responsive architecture in the early stages of the project. Regarding orientation, the most essential physical factor to be considered is the sun, which provides us two vital values of daylight and heat, in terms of energy use and comfort in design (O'Donnell, 2018). Koch-Nielsen (2002) pointed out that since solar radiation is the largest source of heat gains, four effective methods are used to diminish it as 'orientation, external shading devices, internal blinds or curtains, and special glass' to name a few (Koch-Nielsen, 2002). In all types of climates, directing the long façade of the building relative to the sun will yield positive results. Particularly in hot climates, suitable shading methods always have a priority according to the angle of the sun. However, in cold climates, maximum utilization of sunlight and heat dissipation is an important strategy for

reduced heat loading. In any climate, the proper orientation of the building allows the best use of daylight, as a result, it makes use of less high-consuming artificial lighting and without dealing with the complicated shading devices. In any climate, the proper orientation of the building allows the best use of daylight and as a result, the use of less-consuming artificial lighting is achieved, as well as no need to deal with complicated shading devices. In parallel with orientation, building massing has an impact on energy use, lighting and comfort, which is dramatically related to the type of building. Large masses are generally complex structures that contain many functions in it, such as hospitals, schools, mixed-use public buildings and so on. Such buildings allow many alternatives in terms of design in spite of being massive, heavy and big in scale. Apart from the location, which is one of the primary determinants of a building mass, 'geography and climate' are also rather decisive criteria in design decisions (O'Donnell, 2018). Ramsey *et.al* (2000) highlighted that climatic factors such as sun, wind, and temperature play a major role in the orientation of a building. It is a fact that northern and southern latitudes differ significantly when determining the position of a building relative to the sun. Since the weather is usually cold in northern latitudes, buildings should be oriented to receive maximum sunlight and not to be exposed to the prevailing wind. On the contrary, in southern latitudes, buildings should be rotated to prevent unwanted solar radiation and benefit from the cool airflow (Ramsey *et.al*, 2000). To illustrate this, the formation of seasons can be explained. Due to the inclination of the Earth's axis and its revolving around the sun, four different seasons are formed. Similarly, the quantities of solar radiation vary in different directions and at different times of the day, depending on the orientation of a building. In winter, the exposure to the sun from the south direction of a building located at a latitude of 40° is almost three times as much that of the solar energy it receives from

the east and west directions; whereas in summer, the amount of solar radiation falling in the south and north is almost half of the radiation absorbed from the eastern and western surfaces. These rates are even more distinct at lower latitudes and the difference between ‘comfort and distress’ can be easily expressed (Olgyay & Olgyay, 1957). In this context, as Lechner (2001) stated that ‘lowest hanging and most important solar “fruit” is orientation’. Orientation has a crucial role in terms of solar energy strategies among all others, and also it is free. He continued to express that ‘if all windows face south and north, solar energy collection, shading, and daylighting can all be maximized at great savings of both energy and money’ (Lechner, 2001). To sum up, building orientation and massing are one of the most critical main design strategies by being sensitive to the climate while protecting the natural environment.

Orientation and Layout of Building Mass in Schools:

The ‘massing’ of a building describes its overall shape and size. Thus, according to the needs of the building, whether long or short, thin or thick, is it going to have a solid appearance or having more voids on the volumes, and such features are all determined in the massing process of design. The overall shape and size of a building should be built to maximize the use of natural resources, such as the efficient use of solar energy and natural ventilation. Thus, mechanically supplied energy use in buildings ought to be minimized in a successful massing formation. Orientation is simply the direction in which a building is facing, for example, whether the surfaces are facing south or facing 30 degrees north-east. Orientation and massing should be considered together in the early stages of the design, as both reinforce each other's effect, and as a result passive thermal and visual comfort is ensured by the good combination of the two. For many types of buildings, the massing and orientation phase allows for the most important

factors to be taken into accounts, such as passive heating, cooling and daylight utilization. It is essential to consider passive design strategies in the mass and orientation phase of a building, so that surface area exposed to sunlight at different times of the day, building width and height can be all optimized for providing passive comfort. Specifically, in buildings with dense populations, such as schools, where many activities take place, there is a need for mechanical devices such as heating, cooling, and ventilation which cause intensive energy consumption. Therefore, in all climates, proper arrangement of layout, mass, and orientation of the buildings will minimize the use of any artificial equipment and ensure the exploitation of natural resources. One of the simplest methods in mass, for example, is the use of linear and thinner volumes for such multifunctional complex buildings to provide natural and free cooling and heating (Building-massing-orientation, n.d.).

The spatial formation of a building defines the general form and volumes that make up the mass of the building while expressing the configuration of its and its parts. This parameter is highly effective in the organization of functions and spaces in multifunctional complexes such as schools, as well as determining the relationship between indoor and outdoor spaces. In the design of many modern school buildings, it is seen that they carried a highly unique architectural character, consisting of multiple numbers of small volumes to serve various teaching fields. In particular, the architects of the modern era preferred an additive design method, which was formed by the addition of multiple volumes to each other. By this arrangement of the masses in general, the individually formed volumes extend into the landscapes, thereby establishing a connection between schools and close surroundings, creating an outward-facing environment (Knapp *et al.*, 2010).

Throughout the years, a wide variety of morphological and spatial patterns were used in the design of the school buildings, some of which still reflect a traditional architecture, while others bear the traces of a modern style. Obviously, the main characteristics and theme of the school, the level of education and the number of students play a role in the selection of a particular architectural type for school buildings by the architects and designers. At the same time, the educational philosophy of the school, climatic conditions of the area and its position in the region (urban, suburban or rural) are decisive factors in the formation of the school building's layout and style. Predominantly, the pedagogical type which covers different learning methods often has a strong impact on the spatial layout of the school buildings. For instance, in modern 'flexible open-plan' types, which are preferred over 'traditional cell-type' plans in classrooms, the 'served spaces and servant spaces' should be carefully evaluated. In addition, with the increasing demand for spaces intended for breaks and group works, the circulation areas need to be reorganized and expanded to ensure that learning activities take place in a comfortable environment. However, since the educational systems and management of schools change over a period of time, it is highly risky to design a school according to the pedagogical genre. Therefore, identifying architectural design and didactic criteria together is one of the important strategies in the design process of school buildings (Rigolon, 2010).

Based on Rigolon's (2010) research, case studies were conducted to classify the fundamental design patterns in educational facilities, particularly in the spaces of learning and socialization in order to identify innovative design strategies in schools. As a result of this study, four different types of school design layout were found as the courtyard type (closed, multiple and open courtyards), block type (block atrium and

block learning street), cluster type (main atria, main linear, unit atria, and unit linear) and town-like type (complex blocks and compound structures). In this process, apart from the general morphology and internal layout of the schools; especially the relationship between different functions, the exclusive position of classes in this general layout, the hierarchy between public, semi-public and private areas has been considered (Figure 23).

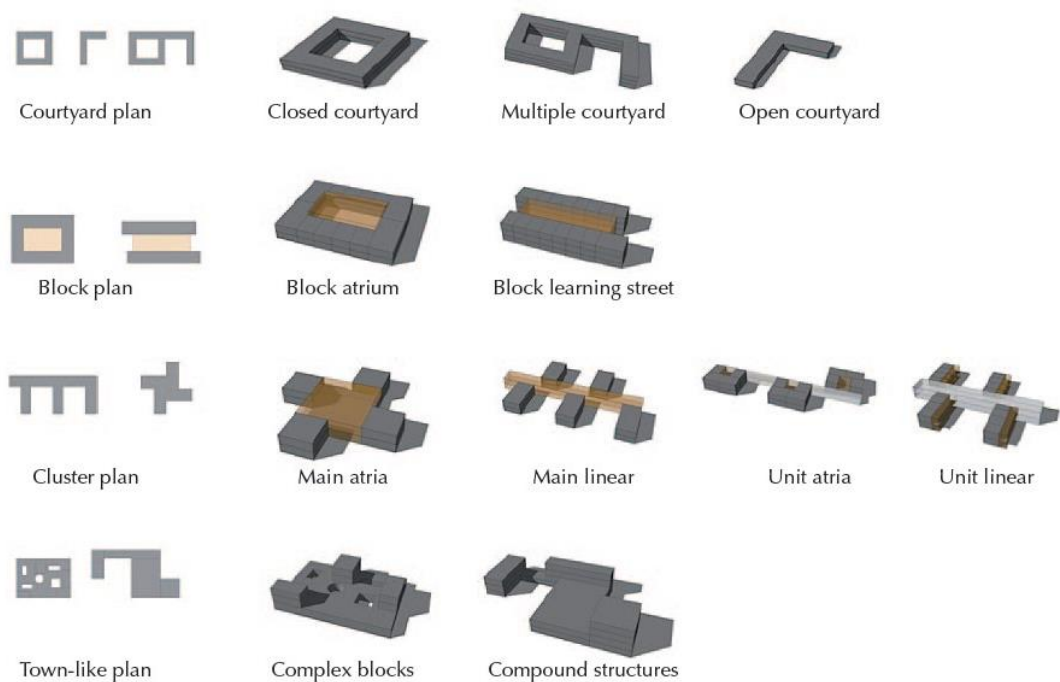


Figure 22: School Building Layout Types by Rigolon (2010)

In respect to the environmental point of view, after the analysis of all school layout types, it is determined that the schools which are arranged as 'courtyard type' are more compatible with modern education concept and more sensitive to the environment. Highlighting the outdoor learning activities in the schools, the courtyard type layout ensured the use of school grounds efficiently while at the same time strongly connected with the interior spaces. Furthermore, this type of school layout design has become

particularly essential in the context of ‘environmentally conscious’ education and architecture. When the school buildings in northern Europe were examined, it was seen that many pedagogical experiences took place open air, both in the recent past and present. In contrast to other school layout types, only block types do not allow volumes to overflow outdoors. On the other hand, the importance of outdoor spaces is naturally emphasized in the courtyard type school layout and at the same time has a central position both in terms of education and architectonic value. As a result of Rigolon's (2010) study, despite the diversity of school building designs, approaches to these designs develop in parallel with pedagogical thought, which means that learning environments evolved according to the new educational visions of the developing age. Instead of simple transmission of the knowledge to the students in the past, nowadays, the project-based learning approach gained the popularity that actively involves all students together. Thus, two consequences have been drawn that affect the design of school buildings. Firstly, due to having a limited number of teaching activities, traditional classrooms are not accepted as an only learning space in the schools anymore. Secondly, the special position of the classrooms in the general layout of the schools was carefully considered in terms of their connection with the outdoor spaces, flexibility, effective use of spaces, size, and so on. According to Rigolon (2010), these are seen as the biggest challenges in today's and tomorrow's school building designs.

Hille (2012) stated that modern school buildings were much more advantages both as practical and functional manner, compared to traditional massive brick schoolhouses. In modern school architecture, besides lightweight construction techniques and use of modern materials, the layout of the plans was much more flexible and adaptable which could fit any changing educational circumstances, environment, context and the

prospect of building growth. As an architectural point of view, Hille (2012) particularly expressed that ‘the modern school was seen to be more user-friendly and more appropriately scaled for neighbourhoods’, which was known as ‘a reaction against the monumentality and formality of traditional schools’. As a result, these school facilities allowed for greater connectivity with outdoor spaces, while at the same time optimizing the use of open sites and environments for both education and community use in the context of urban growth. After the general layout prototype of modern schools, a number of different variations were also developed. Hille (2012) declared that the most common layout types of school buildings by the mid-1950s as it follows:

“the loft or open plan—a flexible layout based on a contemporary industrial model that utilizes movable partitions, with skylights rather than windows for fenestration; the campus plan—a group of separate, smaller, and somewhat simplified buildings in a landscape setting with open outdoor circulation; the pavilion-type or finger plan—a series of freestanding buildings with intervening courtyards and covered connecting walkways organized in a series with consistent orientation for natural light and ventilation; schools-within-a-school—a large building divided into neighbourhoods with separate wings for different age groups and a centralized facility for shared activity spaces; the cluster plan—a collection of small schoolhouses or classroom clusters, with connecting corridors or hallways that create a series of small-scale intervening spaces; the courtyard plan—with classrooms organized in wings around a central outdoor multiuse activity space; and the hall-type or forum plan—with a central indoor multiuse activity space surrounded by classrooms, with gallery circulation on the upper floors.”

With regard to school layouts, Gelfand and Freed (2010) stated that it may consist of many different alternatives such as ‘single-loaded bars (finger schools), double-loaded bars (wing schools), courtyard schools, and a variety of open-plan or pod schools, radial panoptic on schools, mall types, and multi-story complexes’. However, among all, only the finger-type arrangement was found to benefit most from daylight. In the formation of other school layout types, such features have played a significant role as; ‘ideology or theory of education (courtyard and pods), supervision (panoptic on and mall), space constraints and harsh climate (wing schools and multi-story)’.

Gelfand and Freed (2010) particularly pointed out the finger-type school layouts of the 1950s, was substantially appropriate to utilize daylight and natural ventilation at an optimum level because of their continuous repetitive rational and proportional arrangement. They continued to express that even though this layout may address the ‘quantitative exposure to light and air’, it might not address all planning needs of the site. If this arrangement is not designed correctly, the narrow east-west blocks lined up on a grid system may create a monotonous repetition, and at the same time, the use of open spaces which formed between the buildings, as an outdoor extension of classes for either learning or breaks or any other sport activities, may not be sufficient enough. Since schools are often multi-functional environments, it should be noted that there may be a need to expand time beyond the space occupied by each building to potential additions.

The design of the campus and layout of schools on-site is often subject to many challenges. Gelfand and Freed (2010) emphasized that in most school buildings ‘the daily circulation of masses of students can have the same intensity as a fire drill for another kind of building’. They argued that schools host a variety of functions within themselves and that layout and plans are strongly influenced by this. In a public school complex in general; there are functions that affect school layout, such as ‘outdoor learning, gathering, playing, eating and parking’. However, among all these mandatory functions, the most important strategy is to determine the daylight coming to the site at the initial stage of the school design. Taking into account the climatic factors, the latitude of the terrain and changing seasons, the position of the sun can be determined in the sky. Thus, while utilizing the sun as a heat source, shading techniques should be considered for the required spaces.

2.2.3 Shades and Shadows of Building Surfaces

The importance of shading in architecture has been examined by many architects and designers throughout history, both to create powerful visual expressions and to provide environmental control. In terms of the Modern era, Le Corbusier was the most prominent and interested architect, among many other modernists, in the design of sun shading elements based on aesthetics and function. As Lechner (2001) pointed out that he especially appreciated ‘the dual nature of the sun our friend in the winter and our enemy in the summer’. Accordingly, shading has been one of the most dominant features in his buildings which he realized the aesthetic appearance was as important as sun protection. Consequently, he used sun control devices as a strong visual element in many of his architecture (Lechner, 2001). Apart from being one of the most influential modernist architects of the 20th century, he was a leading pioneer in the development and advancement of climate-responsive, energy-conscious and sustainable architecture. Since the early 1930s, he worked mostly in hot countries such as Morocco, and thus Islamic architecture of the Mediterranean region was the main base for this development.

The most prominent result of this experience was ‘Le Corbusier’s invention and refinement of the *brise-soleil* or sun breaker’ to deal with heat gain and glare problems in Mediterranean architecture. Le Corbusier was inspired by the masonry screens of vernacular architecture while working in North Africa, and then he applied perforated concrete screens on the glazing surfaces of his buildings in a similar manner. Sobin (1994) did research to find out how Le Corbusier was inspired when he invented solar control elements, so he compared veil and *brise-soleil* to one another and discovered that they were actually quite similar. The veil primarily represents a religious and

cultural function as a ‘concealment of a woman's face and body’, and it also constitutes a mystery, darkness, curiosity, and allure. As for *brise-soleil*, its main function is to provide ‘more humane thermal and luminous indoor environments through shade and glare control’ while creating a new order on the building facades as an external effect, secondarily, it adds pure aesthetic qualities to the buildings with its sophisticated play of light and shadow, richness, fine details, layering, and depth effect. Because of being both functional and aesthetic, this new architectural expression which was discovered by Le Corbusier, soon contributed to the formation of the extraordinary man-made urban environments in the Mediterranean region (Sobin, 1994). The term *brise-soleil* is defined in the dictionary as ‘sun baffle outside the windows or extending over the entire surface of a building’s façade’. There are many traditional shading methods with the same effects as venetian blinds to reduce and control the effects of the sun's rays like; lattices (*mashrabiya*) in the Middle East countries, perforated screens (*qamarīyah*) in India, or bamboo blinds (*sudare*) in Japan (Encyclopaedia Britannica, 2008). However, Le Corbusier did not embrace the word ‘baffle’ which means ‘nothing’, to define the *brise-soleil* term. He emphasized remarkably that ‘all Modern Architecture has a mission to occupy itself with the sun. Brise-soleil is, therefore, the most correct term’. The word ‘brise’ itself expresses substantially strong meanings such as breaking, crashing or shattering. Hence, Samuel (2007) stated that ‘*brise-soleil* was a place where sun met shadow, in Le Corbusier’s terms a site of great significance’ (Samuel, 2007). This effective environmental control technique such as perforated screen walls was especially used on the full glazing walls and windows to create shading into the spaces while controlling the sun. Apart from its pioneering contribution to environmentally responsive (sustainable) architecture, this sun control technique has had a strong and decisive impact on the aesthetic and functional

evolution of Modern Architecture after the 1930s (Sobin, 1994), and especially during the post-war period (after 1945), its use has become widespread throughout the world and has experienced its most glorious period.

After Second World War, the works of the Le Corbusier shifted from the unquestionable belief in modernism and the new machine age to a more environmentally conscious architecture, thus emphasizing more rustic and regional aesthetic, instead of pure machine aesthetics. Even in his interwar period designs, the architect showed an irresistible interest in environmental control, but essentially the emphasis was first given to mechanical technology as a machine aesthetic rather than the natural environment. Without a doubt, these designs reflected the machine aesthetic in the best possible way, but eventually, it was inevitable to just rely on mechanical environmental control which would arise bigger difficulties and problems in the future. Hereby, Le Corbusier became more interested in developing the idea of *brise-soleil* and *grille climatique*, which were passive means of environmental control. In this context, his sketches of sun path diagrams have been found as well as CIAM's 1951 Charter of Athens later announced that at least two hours of daylight per day should be entered in each building on the shortest day of the year (21st June). After the war in 1946, British architect Clive Entwistle, who translated many of Le Corbusier's publications, wrote him a letter (Mackenzie, 1993):

“I take this opportunity on behalf of young people here to thank you or your latest gift to architecture: the *brise-soleil*, a splendid element, the key to infinite combinations. Now architecture is ready to take its place in life. You have given it a skeleton (independent structure), its vital organs (the communal services of a building), a fresh shining skin (the *piloti*). And now you have given it magnificent clothes, adaptable to all climates! You must be a little proud!”

The concept of *brise-soleil* was a solution by Le Corbusier to control the sun in architecture, so by this way overheating and glare problems would be solved without the need for any mechanical devices during the summer period. Apart from its aesthetical qualities, it provides a permanent sun-shading technique either with simple patterned concrete walls or vertical or horizontal projections extending outward from the heavily glazed facades which exposed directly to the sun. These sun-shading elements are designed to prevent high-angle solar rays during the summer and provide shade, while at the same time allowing low-angle solar rays to provide passive heating during the winter months. To give an example, office blocks are framed with deep concrete *brise-soleil* in Palace of Assembly in India (1964) by Le Corbusier (Figure 23).



Figure 23: Palace of Assembly, Le Corbusier, India, 1964, Source: <https://www.archdaily.com/155922/ad-classics-ad-classics-palace-of-the-assembly-le-corbusier>

Le Corbusier made a significant influence on world-wide architecture, with the invention and use of these sun breakers. Many other modernist architects of the time such as Lucio Costa and Oscar Niemeyer, were also inspired by him and applied the “brise-soleil” concept in their works (Groot, 2007). He wrapped pure glass boxes, which are the machine aesthetics of International Style, into concrete veils, so that improving thermal comfort and liveability of the spaces. In addition to being

functional, he designed these elements successfully to create aesthetically pleasing, charming, mysterious and remarkable architecture. Above all, after the Second World War, the architect considered these elements as one of the most significant environmental and architectural innovations of the 20th century (Sobin, 1994). As Marcel Breuer pointed out that ‘the sun control device has to be on the outside of the building, an element of the façade, an element of architecture’ and he continued to express that ‘and because this device is so important a part of our open architecture, it may develop into as characteristic a form as the Doric column’ (Olgyay & Olgyay, 1957). While emphasizing the place of climate in Le Corbusier’s architecture, it is stated that climate-based design methodologies dealing with the issues of shading, ventilation and interior comfort, are actually an important and less well-known aspect of Modern Architecture as a social project. Brise-soleil's brief history reveals that there is an essential relationship between the formal consequences of Le Corbusier’s vernacular turn and the geo-economic and geopolitical importance of climatic management which made a new impact on current concerns about global warming (Barber, 2012).

Considering the ever-changing global problems, climate-responsive design approach have become increasingly important nowadays. For instance, in order to prevent or reduce solar heat gains, there are many different climate sensitive design methods in architecture. These can be categorized as orientation, massing, proportion, and location, and also measures related to building envelope like roof overhangs, colonnades, balconies, and so on. Nevertheless, Koch-Nielsen (2002) particularly claimed that ‘the most common and effective form of protection is the use of shading devices’ among others for glazing surfaces and openings. The shading elements not

only decrease or block the solar radiation, but also reduce glare, ensure protection from rain, and affects indoor airflow, last but not least enriching the architectural quality of the buildings' envelope as well. Furthermore, when choosing the most appropriate shading element for a building, it is not correct to adopt a uniform or universal shading method for all openings of a building. Unlike, it is vital to determine the shading elements to be selected according to the orientation of building on the site and to the current climatic conditions of the region.

In general, shading devices or sun control elements or in modern-era terminology the 'brise-soleil' can be divided into two main categories as fixed or movable types. Fixed shading devices include vertical louvers, horizontal louvers, and egg crate systems. The vertical shading devices are more efficient when the sun passes low in the sky to exclude the sun rays, on the east and west-facing directions. Whereas, horizontal shading devices are effective when the sun passes high in the sky to prevent solar radiation, on the north (in the southern hemisphere) and south (in the northern hemisphere) facing directions (Koch-Nielsen, 2002). The egg crate shading devices, which combined by both horizontal and vertical elements, are rather effective on the westerly orientation to minimize the angle of solar radiation.

On the other hand, movable shading elements might have more possibilities as they can be adjusted according to the movement of the sun in order to get more benefit from the winter sun and directly cut off excessive sun rays during the summer (Energy & Resources Institute, 2004). Nonetheless, according to Lechner (2001) rather than movable shading devices, the use of fixed structural shading elements is more preferred because of their simplicity besides being economic and having low maintenance requirements (Figure 24).

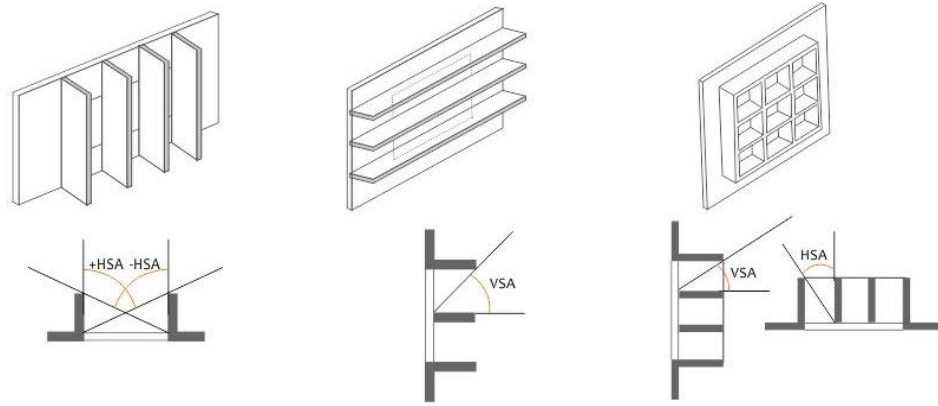


Figure 24: Vertical, Horizontal and Egg-crate Types of Shading Devices, Respectively Olgyay, A., & Olgyay, V. (1957)

Chapter 3

HISTORICAL EVOLUTION OF EDUCATION SYSTEM AND MODERN SCHOOL ARCHITECTURE IN CYPRUS

In this chapter, the concise Modern history of Cyprus is divided into three significant eras as Ottoman Period (1571-1878), British Colonial Period (1878-1960) and Republic of Cyprus Period (1960-1974), respectively. It is aimed to understand; how nationalism dramatically increased in between two Cypriot communities (Turkish and Greek) during these periods, how education system of colonial government left an overwhelming impact on these societies, and consequently how school architecture was formed in the environment, filled with socio-political and ethno-nationalist conflict.

3.1 Modern Reforms and Education in the Ottoman Period (1571-1878)

When the recorded history of Cyprus is examined, it shows that the island has been conquered and ruled by various civilizations and communities since ancient times due to its geographical location and strategic importance (Latif, 2014: 46). According to historical sources, Cyprus was first conquered by the Egyptians in 1450 B.C. Subsequently, the Assyrians, Persians, Ptolemians, Romans, Byzantines, King Richard I of England, the Crusaders, Lusignans and Venetians, respectively, continued to dominate the island until 1571 (Keshishian, 1972: 43). On this date, under the auspices of Sultan Selim II, the island of Cyprus was captured by the Ottomans. By the end of

the 15th century, the Ottoman Empire began to expand its control over the Aegean islands and conquered Egypt in 1517 and Rhodes in 1522. Later, in 1571, Cyprus was conquered due to the powerful sovereignty of the empire in this region as well as the high tribute payments of Venetians (Rogerson, 1994; Keshishian, 1972). Cyprus was ruled as a province of the Ottoman state until it was rented to the British in 1878. Subsequently, the island became a 'Crown Colony' in 1925 and ruled by the British until the independence period in 1960 (Dodd, 1993). As a result, since the Middle Ages, these religiously and culturally rich lands have been home to a wide variety of identities, such as 'Greeks, Turks, Maronites, Armenians, Latins, Orthodox Christians, Muslims, Catholic Christian Jews, Gypsies, Lino-bambaki, and others' (Varnava, 2010). However, the development of ethnic-national ideologies within this multi-religious and cultural system led to a strict separation of their identities, especially by the Greeks, Turks, Maronites, Armenians, Latinos, and Gypsies. During the Catholic Lusignan reign of the 12th and 15th centuries, communities of the island, which religiously and culturally different from each other in an integrated way, continued until the end of the Venetian rule and the beginning of the Ottoman siege in 1571 (Latif, 2014: 46; Varnava, 2010).

The conquest of the island by the Ottoman Turks in 1571 brought freedom to a large part of the Greek Orthodox population, and even in some regions, the Ottoman forces were supported against the Venetians. Many religious buildings were either converted into mosques or sold to the Orthodox Church by the Ottoman Empire. Catholics on the island were given the option of converting to Islam or Orthodoxy, and those who did not comply were forced into exile from the island. The agreements and promising developments between Orthodox and Islamic populations suffered tremendous

damage to the 1821 rebellion. Archbishop Kyprianos and other respectabilities of Christianity who planned to establish a Greek state independent of the Ottoman Empire were punished and executed by the Ottomans for the betrayal of the 1821 revolt. Even though this raid was eradicated, there was an irreversible tension and conflict between Muslim and Christian communities. Hence, Enosis, which aimed the island to be connected to Greece, gradually continued to grow stronger (Rogerson, 1994).

Under Ottoman rule (1571-1878), communities in Cyprus divided based on their religion as Orthodox Christian and Muslims. Thus, in order to rule the people of the island, the Ottomans formed the ‘millet’ system and defined them according to their religions. In this context, religiously oriented communities used their own land and institutions to act under their separate religious leaders. Thus, each ‘millet’ had a great degree of autonomy in itself socially, culturally and legally. This system encouraged the formation of segregated public institutions for each community, such as schools and hospitals, while providing an important infrastructure for effective use of political and economic power as well as religion (Nevzat, 2005; Latif, 2014:47). Considering the education, many schools and educational institutions were opened in different parts of the island, providing training at different levels for Muslims and Christians. These educational institutions were supported by foundations established by philanthropists so that efforts were made to improve education on the island under Ottoman rule (Özkul *et al.*, 2018). Between 1839 and 1876, the Ottoman Empire entered the process of reorganization and modernization with the ‘Tanzimat’ reform. During this period, the formation of different ethno-religious groups also led to the development of nationalism. Because of the distinction between communities on the island, a religious-centred education emerged (Georgiou, 2012). The Turkish Muslim community on the

island was given education in the style of educational institutions in Anatolia, based on Islamic law. Whereas, education was provided for the Greek communities were based on their language and Orthodox religion (Özkul *et al.*, 2018).

As for the Muslim education system, mosques, masjids, tekkes, primary schools, sibyan, iptidai schools, madrasahs, and libraries were established on the island; which some of them were supported by foundations and others were supported by the general budget of pious foundations, 'Evkaf'. Education in the Ottoman period was divided into two as formal and non-formal education for Muslims. Formal education institutions were Sıbyan Mekteps, İptidai'es, Rüştiye and Madrasahs; the non-formal education institutions were Tekke, Mosque, and Libraries (Sözgün, 2015). As Feridun (2001) the school system for formal education is divided into two main categories as Iptidai schools and madrases, before the Tanzimat reformation. Iptidais were the private elementary schools along with the sibyan schools which their expenses paid by the waqf (pious foundations) and also provided by other special sources. Madrases served as higher education for the students after graduating from the Iptidai schools which expenses of them covered by waqfs as well. In the modernization of the education system, new schools were opened with the contributions of various institutions and organizations (Yıldız, 2009). After the Tanzimat period, Rüştiyes (high school) were also added to these institutions (Özkul *et al.*, 2018). After completing the sibyan (elementary) schools, students were entering the medreses, but the level of the pupils was not enough to follow the programs of these schools. In order to end this situation, it was decided to open three-year term Rüştiyes in 1828, based on the sibyan schools in Turkey. The first Rüştiye school in Cyprus was opened as 'Selimiye Rüştiyesi' that is located next to the Selimiye Camii in Nicosia and under

the name of “İlmiye Mektebi” in 1863; and accordingly, new ones continued to be opened in other regions (Feridun, 2001; Yıldız 2009).

The Orthodox Christians, considered a separate 'millet' in Cyprus, were ruled by the Orthodox Archbishops who served as political leaders. Latin-Catholic or other religions were assimilated by joining either the Moslem or the Orthodox. Although Orthodox schools were allowed under Ottoman rule, the recognition of education and state aid was limited only to the Muslim population. The highest authority in all matters with Christian education belonged to the president of the Greek Orthodox Church (Latif, 2014; Varnava, 2009). Christian schools and education on the island were economically supported by the Church and voluntary private institutions and organizations, such as bourgeois, intellectuals, merchants, etc. (Varnava & Michael, 2013: 104). There were three types of schools in general: Greek schools (which keep national and religious sentiments alive as a pioneer of higher education in the cities, Lefkosa, Larnaca, and Limassol), public primary schools, and private schools, located in many cities and villages (Latif, 2014; Varnava, 2009).

At the end of the 18th century and the beginning of the 19th century was a period in which the Greeks' struggle to gain independence from the Ottoman Empire was fuelled. The Orthodox Church, which expanded its power and wealth over time, made great efforts to bring Greek education into a better organization. Apart from their close relationship with the Church, they established a new educational system, which was especially based on Hellenic ideas. The spread of Hellenism in the Greek school began in 1742 with teachers brought from Greece by the archbishop of the time (Yıldız, 2011).

In 1812, the Pancyprian Gymnasium, the oldest and largest known secondary school in Cyprus, was founded by Archbishop Kyprianos, who made great efforts to improve the island's education (Pancyprian archives, 2016). Pancyprian Gymnasium operated in the area, known as the Hellenic Museum during 1753, in Nicosia and was so-called the 'Hellenic School'. The central organizing principle of this school was based on ancient Greek language and history and aimed to create Hellenic citizens. Most importantly, it was the training centre for teachers to provide education in village schools. For this reason, the school was served by instructors from Greece, while graduates were being sent to Greece for higher education (Pancyprian archives, 2016; Yıldız, 2011). Before the 1830s, teachers in Cyprus consisted of priests and people with literacy skills. After 1830, with the establishment of teacher training institutes in modern Greece, the teachers who received their first education began to return to Cyprus (Persianis & Polyviou, 1992). The educational activities developed by the Orthodox to promote modernity and continued under Archbishop Makarios I consisted of a combination of religious education and secular education. In this context, informal schools were established to promote literacy and in 1859 the first girls' school, Phaneromeni, was opened in Nicosia (Varnava & Michael, 2013: 102-103).

3.1.1 Religion-Based Outlook in Late-Ottoman School Architecture

The Ottoman state, as a central authoritarian power, had spread their own architectural preferences to the built environment of Cyprus, just as in the eastern and western urban histories. The Ottomans reflected their lifestyles and cultures, which were shaped in the economic field, to the island's architecture as in other provinces (Özgüven, 2004). In this context, the newly constructed public building such as education and trade facilities in the city cores, especially the capital of Nicosia, had a religious identity inspired by Islamic architecture. Apart from public buildings, aqueducts, baths,

fountains, and bridges were also built under the Ottoman rule. (Yıldız, 2009). Many Gothic churches were turned into mosques and educational institutions such as madrasahs were established around them. The architectural layouts of classical Ottoman madrasahs, which usually arranged around religious complexes, consisted of a large classroom lined around a courtyard and cells attached to it. Since the largest classroom was the most dominant space in the layout and as for function, mostly dome structure attached above it. The establishment of madrasahs as one of the main sections of religious complexes dates back to the Nizamiye Madrasahs of the Seljuk period. The mosques next to the madrasahs served as sibyan schools and libraries. Thus, it was understood that public education and religion were inseparable at that time. The most significant madrasahs in the city centre of Nicosia were known as the ‘Büyük Medrese’ and ‘Küçük Medrese’ (Figure 25). In front of these buildings, there was a small fountain that addressed the inner courtyard (Özgüven, 2004; Yıldız, 2009).



Figure 25: Küçük Medrese and Fountain in the Front Gate, Photo Credits: Özgüven B. (2004)

On the other hand, in the Greek quarter of the Lefkosa city, new churches were built by the archbishops and eventually established their own centres. Alongside churches, schools, public spaces, monumental statues were built and they all reflected the eclecticism of Hellenistic and Byzantine influences as a mix of architectural styles.

Specifically, in religious and educational structures, the tendencies of westernization in the architectural style were adopted more in Christians than in Muslims. Thus, for Christians, architectural lines were transformed from curves to angled ones; and more emphasis was placed on triangular pediments or gabled roofs. Located in an important Hellenic centre close to the Church, the Pancyprian Gymnasium was designed in a neoclassical style, with a portico supported by Ionic columns. This Gymnasium, known as the Hellenic School, was a powerful symbol of Hellenistic propagandas which was established in 1742 and rebuilt in 1893. Many school architecture in different cities of the island was inspired by this school building. Reflecting a strong Hellenic symbol, the widespread use of triangular pediment and porticos with ionic columns were seen in many school buildings and ironically even some Turkish school buildings were later designed according to this style (Yıldız, 2011; Given, 2005).

3.2 Rise of Nationalism and Education during the Inter-War Period (1918-1945)

Cyprus has a rich heritage because of the multiplicity of societies living on the island throughout its history. By and large, Greeks, Romans, Persians, Arabs, Byzantines, Crusaders, Ottomans and British colonists had been dominant on the island (Spilling & Spilling, 2010). In 1878, Britain took over Cyprus with the agreement of the Ottomans, in exchange for military support to the Ottoman Empire against possible Russian aggression. Declaring war against the entente powers, including Britain, resulted at the end of Cyprus' status as a protectorate of the British Empire in 1914, and led to the declaration of Cyprus as a Crown Colony in 1925 (Dodd, 1993). British rule in Cyprus lasted until the declaration of independence on 16 August 1960. To a great extent, the island population comprises the two ethnic communities, 'Greek Cypriots' and 'Turkish Cypriots'. Throughout history, there has been an ongoing

conflict between these communities, which rose dramatically during the 1950s, and civil war continued intermittently until 1974, resulting in the division of the island into two. Consequently, constant conflict between both communities led to the emergence and ‘development of nationalism’ on the island (Rappas, 2014). Most of the literature highlights the significant ‘impact of the international environment’ as one of the most significant reasons for ‘ethnic violence in Cyprus’. In particular, ‘regional rivalry’ between the motherlands, Turkey and Greece, is emphasized, as is ‘cold war politics’. Lange (2009) stated that apart from the significant impact of ‘international factors’, also ‘domestic factors’ cannot be disregarded, as they both had an ‘independent impact of ethnic violence and interacted with international factors’ (Lange, 2009). On the one hand, Greek Cypriots created ‘Enosis’ as a rigid and persistent power to unite the island with Greece which was apparently the most imperative reason for ethnic violence in colonial Cyprus; and on the other, ‘Taksim’ emerged from the Turkish Cypriots, against the idea of Enosis and aimed at dividing Cyprus into two (Joseph, 1997; Lange, 2009). Greece and Turkey supported rioting between the two communities. Furthermore, the ‘divide and rule’ policy of British rule, which led the division of two ethnic communities (Özmatyalı & Özkul, 2013), was preserved and the ethnic, administrative and political divisions were strengthened during the colonial period (Joseph, 1997). Based on the different religions, languages and social hierarchies, the British government separated the administration into three groups – ‘Greek’, ‘Turkish’ and ‘Other’ (Rappas, 2014). Under these conditions, Christians and Muslims were introduced to a ‘modern education system’ in separate schools. There were two types of schools, governed by separate ‘boards of education’, in Cyprus: ‘Greek Christian schools’, financially supported by the Orthodox Church; and ‘Muslim schools’, assisted mainly by ‘Evkaf’, the Moslem religious establishment and

colonial administration (Georghiou²⁰¹³). The British colonial administration gave almost full control over the provision of education to the two societies. As mentioned above, Greek Cypriot schools were informally managed by the ‘Orthodox Church’, due to its central cultural and political position during British rule. However, after Atatürk's revolutionary modernization of Turkey, Turkish Cypriot schools kept themselves apart from religious institutions, unlike their Greek Cypriot compatriots (Lange, 2009). Nevertheless, while both communities applied their own separated ‘policies of ethnicity and race’, British government transformed the system from ‘religious identity to an ethnic-national identity’ compared to the past, as from Orthodox Christian Cypriots to Greeks and from Muslim Cypriots to Turks. Education was used as a key instrument of ‘ideological control’ and ‘transformed into a vehicle for nationalism’, which Colonial administration promoting patriotism and developing the ‘Cypriot identity’ in schools (Latif, 2014; Bryant, 2001). However, in 1931, the Cyprus revolt had begun under the leadership of the Greek Cypriots nationalist against British authorities, who attempted to de-Hellenize the island and seen as a threat to lose their own ethnic identity. Consequently, the rise of nationalism and ethnic conflicts were further exacerbated on the island, particularly by the head of teachers from Greece and Turkey, who have supported the ‘propaganda’ and seen as ‘political agents’ in Cypriot schools (Latif, 2014). Bryant (2001) summed it up as ‘high cultures of nationalism were not an imposition but an aspiration’.

3.2.1 Ethnicity - Based Image of Inter-war School Architecture

The British colonial era was a milestone of modernism in the island, in terms of architecture and the built environment. The adoption of modernist ideas and the first practices of Modern Architecture in Cyprus were in the 1930s, along with the establishment of architectural works by ‘European-educated architects’ on the island

(Pyle & Phokaides, 2009). Georghiou (2013) indicated, a 'representational style of the architecture' ensured emphasis of the authority of the Colonial administration, and helped to gain the trust of Cypriots, therefore 'British Imperial symbols' were used together with local architectural elements during the inter-war period in Cyprus. As mentioned by Özgüven (2004), this was aimed at highlighting the British government's 'authoritarian image' in Cypriot colonial architecture. The dimensions of the buildings generally exceeded those of the surrounding buildings. In order to capture the attention of the people, remarkable courtyards were designed to show a comparison between formal splendour and local circumstances. The buildings' massive form and the serious impact could be seen as a contribution by 'rustication'. According to Given (1997); 'the most straightforward mechanism for representing a culture or "national character" in architecture is by historical quotation'. He continued that the best way to display the autocracy and the power of the colonial government was through the facades of public buildings, particularly schools due to its prominent character in societies. In this context, the widespread use of 'Greek Revival Style' was noticeably to be seen in the public buildings around the 1920s, as a result of the overwhelming desire of Greek Cypriots for union with Greece. As Given (2005) emphasized that this style was particularly appropriate for Greek Cypriots in order to reflect their nationalist identities which also had strong links to their 'glorious classical past, and most importantly, the best carriers of this national message were schools buildings (Given, 2005). In particular, the Pancyprian Gymnasium (1923) in Nicosia, is one of the most significant representatives of Greek revival style, designed by Theodoros Fotiades, who was educated in Greece and applied this style widely on the island (Figure 26). The building has a projected porch supported by four Ionic columns and the facade was embellished with more details and symbols of the

neoclassical style, reflecting the nationalist identity in the best way. The effect of the Style became more noticeable by the use of symbolic details of the classical past, decorative elements, and inscriptions on the facade, to name a few (Given, 1997). Moreover, designed by Fotiades in the early 1920s in Nicosia, Faneromeni High School reflected both Hellenistic style and European rationalism with its local sandstone facade and neoclassical style (Pyle & Phokaides, 2009). In addition, it has also been highlighted by Yıldız (2007) that ‘the schools set up by the Greeks since the early 19th century, were more Hellenic than any other buildings.’ It was mentioned that it was surprising to see that one of the Turkish school, known as ‘Famagusta Boys Elementary School’ (Figure 27), was designed with this Hellenistic, ‘Greek Revival’ style in 1926 (Yıldız, 2007). ‘Evkaf’ invited Greek Cypriot architect Fotiades to design this school building, due to the absence of Turkish Cypriot architects on the island during the 1920s. According to the records, there was no reaction against this Hellenistic style from Turkish Cypriots, which apparently show their awareness to a certain architectural style based on ethnic identity, was not yet developed at that time (Bilsel & Dinçyürek, 2017).



Figure 26: Pancyprrian Gymnasium, Nicosia, 1923, Photo Credits: Sevil Aydınlik



Figure 27: Famagusta Boys' Elementary School, Famagusta, 1926, Photo Credits: Sevil Aydınlik

Yet, apart from all these ethno-nationalistic images in the school architecture, ‘the English School’, constructed by architect Odysseas Tsangarides and the Colonial Public Works Department (PWD) between 1936 and 1939, demonstrated the characteristics of traditional British style in combination with local architecture, applying arched arcades and using yellow sandstone materials (Pyle & Phokaides, 2009). Therefore, it can be concluded that ‘the English School’ is one of the foremost examples of the new hybrid architecture in Cyprus (Figure 28). Overall, Georghiou (2013) best encapsulated the ‘architectural style’ of the schools, not only by the type of education served but also the character, meaning and objectives expressed. In particular, there was an architectural approach to emphasize ‘ethnic and cultural identity’ in the schools of the two Cypriot communities. For example, the use of the ‘neo-classical Greek revival’ can be seen in the Greek Cypriot schools, while ‘Ottoman themes and details’ were applied, but not very often, to the Turkish Cypriot schools. On the other hand, there were reflections of the ‘Neo-Gothic or Neo-Tudor’ architectural style in the English schools, including public and grammar schools.

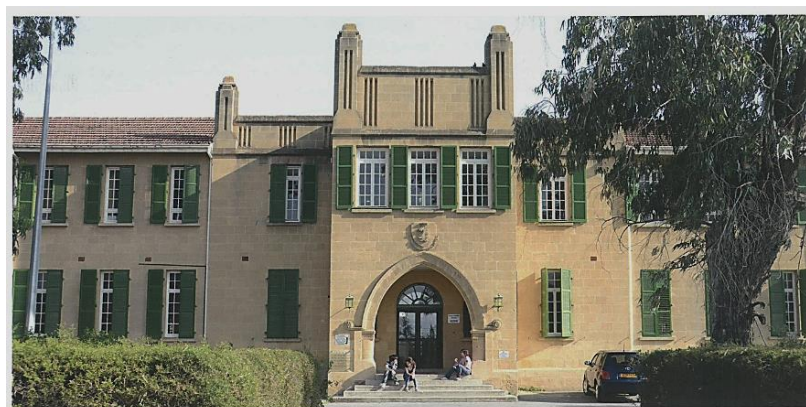


Figure 28: English School, Nicosia, 1939, Photo Credits: Costas Georghiou

3.3 Independent State and Education towards Post-Colonial Period (1945-1974)

In parallel with the strong socio-political ties, both communities were intimately tied to their motherlands such that the modernism and Modern Movements in Turkey and Greece ultimately affected the education system and architectural appearance of schools in Cyprus by the mid-1940s. Due to the absence of higher education in Cyprus, the majority of Cypriot students left the island for university education abroad, mostly in Turkey and Greece, which generated stronger ‘ethnic links and national loyalties’ (Joseph, 1997:41). At the same time, with the leadership of teachers who came from the motherlands to the island, Greek Cypriots were trained as Orthodox Hellenes and Turkish Cypriots became followers of the Kemalist reforms in secularized Turkey (Latif, 2014; Bryant, 2001). For all, this was an aspiration rather than an imposition (Bryant, 2004:155). Because of devotion to the motherlands, education policies, goals and orientations developed independently in the two communities, and thus two rival ethnic groups emerged rather than a united Cypriot state (Latif, 2014; Doratlı, 2002). Consequently, education was further tied to the nation-building project, aimed at advancing the sovereignty of each community’s state (Hajisoteriou & Angelides, 2013).

In the interest of maintaining ties to the motherlands, Cyprus remained under the influence of modern Turkish and Greek architectural culture. Undoubtedly, the role of modernist local architects educated in the universities of Turkey and Greece had tremendous influence in this cultural interaction. In respect to modern Turkish school buildings, a modern education system that considered the ‘changing identity and public visibility of women’ gained increased significance in Turkish-Cypriot schools and

their formal language had to represent these ideals of the new regime. It was declared that schools should not be designed like uniforms with an official style that represented the state, but that the architecture of schools should reflect local expression with an international image, considering environmental factors (Bozdoğan, 2001). As for Greece, in spite of insistent attempts of traditionalists to revive the classical architecture, the modern style had its most glorious time in the post-war era (Skousboll, 2006). So the new architectural style, which was a combination of regional traditions and the Modern Movement, was evident in residential and public buildings at the end of Second World War (Moussa, 2012). Modern school buildings in particular, which consisted of flexible and functional design solutions, climate-sensitive strategies, radical identification between architectural and structural forms and the adoption of rationalist principles (Ferro, 2004), had profound influences on modern discourse and practice among Greek-Cypriot architects.

In general, the British colonial administration had profoundly contributed to the development of the socio-cultural environment in Cyprus. Also, they provided the necessary ground to welcome and follow modern thought and way of life which was appreciated in the motherlands as well. People living on the island had already met with the western and modern entities so that their engagement with the developments in the motherlands was smoother and gentle. In line with this, both Cypriot communities continued, and even further strengthened, their respective 'ethnic ties and loyalties' to Turkey and Greece in regards to modern education, culture, language, religion, and history during the colonial period and even after independence (Aydınlik & Pulhan, 2019).

Towards the de-colonization process, the Greek Cypriots first launched a political and violent conflict against the British and then targeted Turkish Cypriots in between 1955 and 1957, known as the 'Cyprus Crisis'. The EOKA (the National Organisation of Cypriot Fighters) started an aggressive campaign for 'Enosis' with the series of bomb attacks and assassinations (Dumper & Stanley, 2007:279). After all, Cyprus gained its independence from Colonial rule in 1960, and the establishment of the new republic was seen as a boom in terms of transition to modernization, in spite of the prominence of nationalist ideologies between the two communities (Trimikliniotis & Bozkurt, 2012). Even foreign politicians were quite optimistic about the emergence of the new republic as a nation, considering developments on the island. However, this actuality manifested in further disputes between the two dominant communities, and also their motherlands, which caused the extinction of such hopes. Georgiou (2012:67) stated that 'people were not ready to bridge the deep gap that separated them from one day to another', particularly 'when their aspirations for union or partition were met with disappointment.'

During the British rule, 'nationalism' and 'national identity' increased due to segregation in the new education system and afterward, when independence from the colonial government was declared, both Cypriot communities continued and even further strengthened, their respective 'ethnic ties and loyalties' with Turkey and Greece. Education, religion, culture, language, history and military ties were the key elements in order to achieve 'preservation and revitalization of cross-boundary ethnic bonds' for both societies (Joseph, 1997:40). With regard to education in independent Cyprus, Joseph (1997) pointed out that:

“In the educational field, harmonization of the educational systems of the two Cypriot communities with those of their motherlands came into effect after the declaration of independence. Educational co-operation was also facilitated by the educational ties inherited from the colonial period and by constitutional provisions encouraging the establishment of separate cultural and educational relationships between the two ethnic groups and their motherlands.”

Due to ‘the absence of higher education in Cyprus, the majority of Cypriot students left the island to gain a university education abroad, mostly in Turkey and Greece, which generated stronger ‘ethnic links and national loyalties’ (Joseph, 1997:41). Gazioğlu (1997) pointed out that the expansion of Hellenistic ideals was put in the minds of the younger generation in the Cypriot Greek schools by initiatives of the consuls and teachers from Greece. Because of the devotion to their motherlands, education policies, goals and orientations have developed independently from each other, and thus, two rival ethnic groups emerged rather than a new united Cypriot state (Latif, 2014:48). Under these circumstances, Turkish and Greek Cypriot hostility was transmitted to the people via education, despite being one of the most important tools of ethnic socialization. This educational policy completely divided two communities from each other and led to the creation of a ‘psychological gap and ethno political controversies’, which left behind a growing debate (Joseph, 1997:41). The ‘uneasy truce’ between the two communities, brought by the new republic in 1960, only survived three years. Due to violent inter-communal clashes in late 1963, the constitutional rule collapsed and resulted in the complete political separation of the two races (Doratlı, 2002). In between the years 1964 and 1974, they had separate administration and educational systems, which Greek Cypriots trained as Orthodox Hellenes; however Turkish Cypriots had no religious teaching until 1976, because of the Kemalist reforms since the 1920s in secularized Turkey. During the decade, ongoing inter-communal tension had ended up in the 1974 war, known as a dark time

of Cyprus, and consequently island divided geographically and demographically into two as North and South (Latif, 2014:52). The 1974 war was a historical landmark in Cyprus with the complete division of the two communities, and the subject of education was further tied to the nation-building project which aimed at advancing their sovereignty of the state (Hajisoteriou & Angelides, 2013). Thus, education and nationalism continued to be transferred to new generations after 1974 as an inseparable pair of Cyprus conflicts (Olin, 2011).

Consequently, when Cyprus gained its independence from colonial rule in 1960 the new republic was established with the hope of opening an era of peace, freedom, and prosperity during which the two communities would work together to develop the island for their common benefit (Georgiou, 2012). Although intercommunal cooperation did not survive long and the new republic never emerged as a nation, this era ushered modernization into different aspects of life and the environment in Cyprus. Markides *et al.* described this modernity in Cyprus as not only a substitute for tradition, but also as a form of economic development, a source of differentiation in the physical environment, and a means of adopting universal worldviews and social practices among the local people (Papadakis, 2007:24). In that sense, the main goals of the Republic of Cyprus were to create a flourishing economy, increase living standards and to create a strong cultural life via a well-educated society. Therefore, the new government gave great significance to education (Solsten, 1993:73) and new school buildings flourished throughout the island as physical manifestations of the modern education system.

The understanding of 'modern education' and the modern image of school buildings, which had been initiated by the British colonials, were instituted by modernist Turkish

and Greek-Cypriot architects according to mainstream styles in Europe and the US. Spatial layouts and formal configurations were employed and blended with local concerns and values by passionate modernist architects to create the 'other modern'. The 'other modern' created in Cyprus was, in fact, the new appearance of elite individuals, motherland oriented-communities and the young state; all emulating the modern contemporaries and struggling for identity. In this challenge architecture was a strong tool for conveying and practicing the ideologies of the state and the communities, especially by means of environment-based post-war school buildings (Aydınlık & Pulhan, 2019).

3.3.1 Environment-Based Forms of Post-war School Architecture

The processes of 'de-colonisation and modernization' were accelerated, with respect to architecture and built environment through the independence period. Construction of new urban areas was not only due to the formation of the new government, but was also linked to the increasing tourist industry. Subsequently, new buildings and modern districts emerged, stretching outwards from the traditional and historic centers of the cities (Pyle & Phokaides, 2009). Environment-based post-war school buildings in Cyprus embraced the discourse of modernism and its faith in the power of design to change behaviour and improve society. Post-war school buildings were in sync with modern trends in scientific education and designed according to principles of the International Style, which brought educators and architects together in a collaborative effort to implement the newest educational methods and to create appropriate built environments in Cypriot towns under the influences of modernization, immigration and urbanization. Schools emerged from a complex interaction of technical concerns, modern education methods and the impacts of post-war expansion (Aydınlık & Pulhan, 2019). Pyle and Phokaides (2009) highlighted that the construction of new public

buildings reflected ‘an awareness of the post-war rethinking of modernism’ with the use of new materials such as exposed concrete and glass; climate responsive solutions such as structural shading devices and *brise-soleil*; simple and clean volumes; and sculptural overhangs such as folded plate or parabolic shapes, to name a few. In addition, according to Given (1997), through the end of the colonial period Turkish and Greek-Cypriot architects educated abroad had embraced ‘European modernism’ in their buildings and had moved away from using ‘traditional forms and motifs’, while the British continued to apply ‘local village traditions’. Furthermore, Özay (2005) asserted that even though ‘local materials and traditional techniques’ decreased in importance, a climatic design approach came to the fore due to the frequent use of reinforced concrete. According to Özay (2005), ‘the sensitivity on the orientation, planning and building elements such as shading devices, the size of the openings and use of the vegetation all supported the climatic design’. On the other hand, Uraz *et al.* (2010) pointed out that Modern Architecture in Cyprus was enriched by the moderate use of local materials such as yellow sandstone and river cobble without sacrificing the simplicity of modernity. Thus, using local materials did not only strengthen the bond between building and environment but also created dynamic surfaces and volumes with the play of light and shade, the solid-void relationship and so forth. Furthermore, Pyle and Phokaides (2009) also reported that combined use of ‘rational aesthetic’ and ‘local vernacular preferences’ was frequently applied in both the public and domestic architecture of Cyprus. Consequently, the architectural heritage of the Modern Movement was chiefly developed in post-war Cyprus and marked the transition from classical and traditional expression to the modern and rational aesthetic. Old traditional methods of buildings were replaced by new materials and technology of the modern era, thus the image of the new buildings and urban zones

began to be shaped and developed with the new spirit and enthusiasm of the architects of the time. While some buildings were ‘standardized and stereotyped’, some could be ‘inspiring and pioneering’, but as a result, they were built ‘within the spirit and philosophy of the modern’, and at the same time ‘in juxtaposition with the historic forms of the past’ (Michael *et al.*, 2009:5). In this sense, the architects who carried the spirit and philosophy of the modern designed post-war school buildings as a catalyst for modern education.

Prior to independence, around the mid-1950s, the first elementary schools were erected following the stylistic theories of rationalism. Lefkoşa Atatürk elementary school (1950) in Nicosia and the First elementary school (1955) in Limassol were both designed by the architects Rousou and Pericleous (Georghiou, 2018:273). These two buildings were almost identical in terms of massing, general planning, and details. Ataturk elementary school is one of the first Turkish Cypriot public schools built in modern style. In both elementary school building, Ataturk and Limassol First, which is far from the influence of colonial architecture, a contemporary and new material, concrete, was used (Bilsel & Dinçyürek, 2017). In addition, Lykavitos elementary school (1957) in Nicosia, designed by Dimitris Thymopoulos, has one of the most significant features: *brise-soleil*. Furthermore, Koskluciftlik elementary school (1955) in Nicosia, designed by Ahmet V. Behaeddin and Nursery school (~1955) in Famagusta (unknown architect), which both of them are composed of clean lines and simple geometric forms, referring to the horizontality of modern International architecture.

Due to the rapidly developing economy, technicians and skilled workers were needed throughout the island as part of the modernization process. Thus, new technical schools

were built in different towns and regions to meet this urgent necessity, particularly in fields such as particularly in the field of carpentry, construction, plumbing, iron, commerce, art and industrial crafts, agriculture, and so on. Along with European-educated Cypriot architects, technical school buildings in Cyprus were designed by foreign architectural firms, principally from the United Kingdom. Accordingly, Lefke Technical School and Limassol Technical School were designed by Orman and Partners, whereas Lefkoşa Technical School in Nicosia was designed by Tripe and Wakeham in 1955. Apart from the climate-responsive design approach of these schools, foreign firms also paid attention to the use of local river cobbles on the planar surfaces at the entrances of the complexes to show the elegance of texture and the material itself (Aydınlık & Pulhan, 2019).

When modernism was widespread during the first years of the republic and ‘the potential for both spiritual and economic development’ was high, one of the most significant characteristics of school architecture was its unified modern style (Fereos & Phokaides, 2006). These conspicuously avant-garde buildings received considerable publicity and were widely known. Hence, some of the schools were published in prestigious architectural magazines at both the national and international levels.

Firstly, Lefkoşa Turkish Boarding School for Girls (1960) in Nicosia was designed by Ahmet Vural Behaeddin, who was one of the pioneering modernist architects in Cyprus. It is not only a generic modern building of the period but also a significant award-winning architecture. This building was featured in the international architectural magazine ‘Baumeister’ in 1964, solidifying its importance in the history of Modern Architecture in Cyprus. This building was celebrated due to its efficient design that was sensitive to both the climate and the urban context. In fact, this is the

building asked by the authority of the Turkish Cypriot community and expressing the given attention to the young generations and their education during the first years of the republic. However, the building as the representations of modern thought, material and technology of the time and the home of modern education, it had to dramatically serve as a hospital just after the construction completion in 1963. Due to continuing ethnic conflict between the two communities, the building was used by the Turkish-Cypriot security forces for health and rehabilitation purposes until 1968. Though it was not designed as a health building, the sensitive response of the building towards the natural environment made the adaptability more compatible and efficient. The school building offers energy efficiency as a result of passive design strategies such as utilizing and controlling the sun and wind (Aydınlık *et al.*, 2016). The folded plate roof on the front facade of the school was another remarkable feature that enriched the building's volume and created visual interest. However, the roof of the multi-purpose hall was not only an aesthetic element; it also represented Behaeddin's modernist experiments that attracted many followers from both communities (Uraz *et al.*, 2004).

Secondly, Kykkos High School (1960) in Nicosia, designed by the Iakovos and Andreas Philippou brothers, was featured in the Greek architecture magazine 'Architektoniki' in 1966 (Fereos & Phokaides, 2006). This school complex consisted of rectangular prisms horizontally developed to humanize and deinstitutionalize the learning environment, which was designed according to International Style principles and design approaches of modern school buildings. With the environment-responsive abstract forms of school buildings designed by both Turkish and Greek-Cypriot architects, the formal language had nothing to do with the ethnic identities of the architects or institutional representations of the communities. Yet, the realization of

such kinds of projects with daring architectural language conveyed the cultural rivalry between the two communities in terms of modern thought, form, and technology (Aydınlık & Pulhan, 2019).

Access to modern building materials and technology was severely limited during the conflict years. Since importing cement into the Turkish-Cypriot sector was strictly prohibited, there could be dramatic delays in the completion of construction. This prohibition was designed to impede the Turkish-Cypriots' ability to build defensive structures as reinforced concrete buildings were the primary defence structures during the period of intercommunal violence. For example, Lefkoşa Turkish Lycee (1960) in Nicosia, designed by British architect Alister MacDonal, was used for defence purposes during the bi-communal clashes of 1963 (Figure 29). Beyond being a modern and climate-responsive building, facade treatments of such buildings also made defence more convenient (Aydınlık & Pulhan, 2019).



Figure 29: Lefkosa Turkish Lycee, 1962-63, Photo Credits: Kyrenia National Archive

Similarly, in Pallouriotissa Female Gymnasium (1962) designed by Demetris Thymopoulos in Nicosia, inset windows and egg-crate systems, in which both vertical

and horizontal elements were equally projected from the volume in the southern direction, provided highly effective solar control (Figure 30). This was one of the modern approaches to shading used in many post-war school buildings as well as other public institutions on the island due to its vertical and horizontal orientation options. In effect, these shading systems emphasized the functionality of the modern International Style and unexpectedly served to provide safety against attack (Pallouriotissa school archives, 2018).



Figure 30: Pallouriotissa Female Gymnasium, 1962, Photo Credits: Demetris Thymopoulos Archive, in Georghiou (2018)

The abstract language of the Modern Architecture was traced even in religious school buildings of the modern republic. Two Italian catholic schools known as ‘Terra Santa’ in Famagusta (1960) and in Limassol (1965) designed by Stavros Economou, are unique cases of this modernist experiment. Accordingly, horizontality and pure geometric volumes, as well as the movement of distinctive parabolic eaves, characterized both schools. The level of abstraction was so high that even religious symbols such as sculptural cross figures were brilliantly stylized. Overall, the technical details of structural elements, proportions, surface texture and material of pure volumes created both functional aesthetics and simplified decoration along the lines of

International modernism in many post-war school buildings of Cyprus (Aydınlık & Pulhan, 2019).

Chapter 4

DISSEMINATION OF INTERNATIONAL STYLE THROUGH POST-WAR CYPRUS SCHOOL BUILDINGS

In the quest for International modernism in architecture, the new republic of Cyprus had its golden age from about the mid -1950s to the mid-1960s, in spite of growing ethno-nationalism in the island. Architects applied the principles and strategies of Modern Architecture in their buildings, reflecting local traditions and Mediterranean climate, compared to the imperialist and nationalist image of the post-colonial period. As a result, traditional features were not completely rejected in the developing towns of Cyprus but actually renewed, reshaped and reformed by new modernist ideas of architects considering rational planning and scientific reasoning. Eventually, traces of International Style, which had become dominant in world architecture after Second World War , were also to be seen in Cyprus, especially coming to the fore in school buildings as one of the strong representations of the modern face of the new republic, in spite of all ethnic conflict between the two communities.

Accordingly, it was striking to observe Modern Cyprus school buildings influenced by the main principles of the International Style determined by Johnson and Hitchcock but especially integrated with environmental factors such as respecting the topography of the land, considering climate, sun orientation, wind direction, and so on. Despite the struggle and competition to establish the identity between the two ethnic communities in Cyprus, school buildings were the places to implement this initiative,

reflecting the architectural language through to the end of the 1950s (post-war). The prominence of International Style principles and the use of abstract elements were seen independently from past forms, even though elements reflective of national identity had been vigorously deployed in the school buildings before the 1950s (interwar). Thus, a new school design emerged with respect to the principles of the Style, the climatic conditions, and local constraints, which stripped to a great extent of the political and nationalist influences. In this context, it is highly important to understand how universal principles of International Style were localized and created its own unique architectural characteristics, especially by responding to the environmental conditions of Cyprus as a Mediterranean island. In light of this, traces of International Style which were initiated by Johnson and Hitchcock, are examined and the design of post-war school buildings of Cyprus interpreted.

4.1 Architectonic Quality with the Interplay of Volumes in School Buildings

The school buildings in Cyprus, in terms of volume, consisted of a cage or a skeleton frame and the use of modern construction techniques. In order to reduce the load-bearing structure of the building, reinforced concrete supports were used as verticals and horizontals to create space. As a consequence, a grille effect was given to the building as seen from a distance. In Cyprus school buildings, a reinforced concrete skeleton frame was used as the common structural system. In general, the building form and geometry consisted of rectangular prisms, apart from the Lefke Technical School building in which a cylindrical form was integrated between two rectangular building blocks (Figure 31).



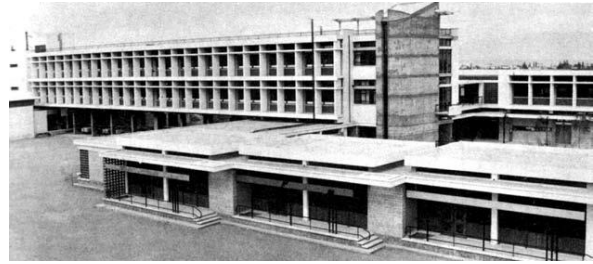
Lefkosa Turkish Lycee



Lefkosa Turkish Boarding School for Girls



Lefke Technical School



Kykkos High School



Lykavitos elementary school



Limassol Technical School

Figure 31: Image of Grille Effect by Using Concrete Skeleton Frame in Cyprus School Buildings

In Lefke Technical School, the sloped site is used advantageously to form the cantilevered system, levitating the volumes from the ground (Figure 32). Thereby, facades are extended outward from the supports, providing much more freedom in the spatial and formal configurations. As a result, interior spaces were not completely restricted by a cage construction system, and the whole design gained dynamism and formal aesthetic, providing much more flexibility than the traditional architecture.



Figure 32: Cantilevered System in Lefke Technical School

Vertical support elements projected towards the outside of the structure, to act as sun-shading devices, mostly on eastern and western facades, to protect the building's inner surfaces from excessive sun rays, in Lefkosa Turkish Lycee, Lefkosa Turkish Boarding School for Girls, Kykkos High School, Lykavitos Elementary School, Limassol Terra Santa School, and Lefke Technical School. Furthermore, most of the southerly facades of the buildings were supported by horizontal elements for protection against the sun as well, while providing a better visual connection to the outside. For instance, horizontal floor slabs were projected on each floor of the entire facade of the Lefkosa Turkish Lycee and Lykavitos Elementary School, while fixed horizontal shading elements were applied in both Famagusta and Limassol Terra Santa Schools and Lefkosa Ataturk Elementary School. Moreover, movable horizontal louvers were used in the Lefke Technical School, Lefkosa Turkish Boarding School for Girls and Limassol Technical Schools in the same manner. Even in Lykavitos Elementary School and Pallouriotissa Female Gymnasium, both verticals and horizontals were equally projected from the volume, a design known as an egg-crate sun breaker, which has high shading efficiency in hot and warm climates. Unlike other examples, these structural shading elements were not attached to the facades of Kykkos High School, leaving a gap between the two skins not only to protect the spaces from unwanted sunlight but also provide airflow to cool the building (Figure

33). Overall, due to the modular skeleton system of the buildings these elements, either structural or attached to the different directions of the facades, protected the spaces from climatic conditions and also created unity in the design.



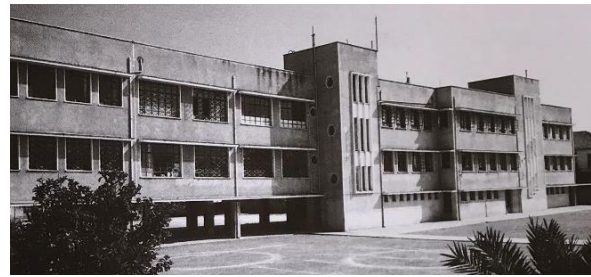
Figure 33: Vertical Shading Devices in Kykkos High School

Moreover, one of the main goals of the Style was achieved by using a lighter structural system instead of historically important load-bearing masonry elements. A skeleton frame was covered by either reinforced concrete or a glass screen to form and protect the internal spaces. In this manner, these simple planes were used to envelop an open box to create the volume, as also mentioned by Hitchcock and Johnson. Expression of the volume was felt as immaterial and weightless by a geometrically bounded space, compared to past architecture, represented by massive and bulky buildings such as the Gothic masonry structures of Cyprus. The volume of architecture not only created the lightness of the structure but also the building itself was sometimes physically lifted from the ground, resulting in a weightless effect; for instance, in Lefkosa Ataturk Elementary School, Limassol First Elementary School and Kykkos High School, the lower part of the building was emptied and the whole rectangular prism rested on the pillars (Figure 34). Thereby, a sense of lightness was imparted to the volume by this subtraction of the geometry, while creating a semi-open transitional space and

allowing cooling breezes to pass in-between two-sided courtyards. According to the functional organization, a weightless appearance was provided by semi-open transitional spaces, which are essential in a Mediterranean climate to help cool the buildings with natural air circulation and creates effective shading, between classrooms and courtyards. It was either lifted up to create a passage underneath, like Famagusta Terra Santa School or attached and surrounded by rectangular volumes, like Lefkosa Turkish Boarding School for Girls and Pallouriotissa Female Gymnasium. In the Famagusta Boarding Nursery, the whole building block was elevated from the ground, and even a transparent bridge, connecting two blocks to each other, was lifted up on the backside as if floating in the air (Figure 35).



Lefkosa Ataturk Elementary School



Limassol First Elementary School

Figure 34: Weightless Effect Created by Lifting Up the Volume from the Ground



Figure 35: Elevated Volume as if Floating in the Air, Famagusta Boarding Nursery

Furthermore, the lightness effect of the structure is provided by recessions and projections, usually representing different functions behind. Pure geometric volumes are emphasized by these movements of the facade as the interactions of solids and voids and by emphasizing the horizontality, especially in the Lefke Technical,

Famagusta Nursery, Famagusta and Limassol Terra Santa Schools. Moreover, the use of transparency gives the building an effect of lightness if it is used in the appropriate direction in Cyprus, where there is plenty of Mediterranean sun. In particular, glazing wall surfaces were used in the northern direction for Lefkosa Turkish Lycee to provide an abundance of natural light, whereas shading devices were used to control the penetrative sun rays coming from southern and western directions (Figure 36).



Figure 36: Northern Surface of Lefkosa Turkish Lycee

As for the roof, it should be substantially flat, though a single slope was acceptable in some situations, according to Johnson and Hitchcock. Since flat roofs were preferred, due to the Mediterranean style, they were widely used in Cyprus school buildings, with a slight fluctuation on the roofline in some examples. This up-and-down movement on the roofline created a dynamic view of the volumes, which were less massive and simple than the pitched roofs of the past. Unlike other schools, a slight single-pitch roof was applied in the Lefke Technical, Koskluciftlik Elementary and Lefkosa Technical Schools, without disturbing the geometry of the volumes (Figure 37). In the Famagusta Boarding Nursery, the inner transparent volume was covered by a reinforced concrete flat roof like a shell. This climate-responsive roof itself extended towards the southwest side and hung like an L-shape to complete space as a wall. Under the rectangular volume, sequences of rectilinear arcades were applied on both

the southeast and northwest directions, protecting the inner glazing facade of the building and allowing natural ventilation through the spaces.



Figure 37: Single-pitch Roof in Lefkosa Technical School

In terms of the surface of the volume, light-coloured plastered walls and metallic-framed glass planes composed smooth surfaces in most of the examples. However, some local materials, such as stone cladding, were also used, especially on the entrance facades of Lefke and Lefkosa Technical Schools, Famagusta Terra Santa School and Lykavitos Elementary School, while exposed concrete brick walls formed the outer shell of rectangular blocks in Lefkosa Turkish Boarding School for Girls. Although not smooth plastered surfaces, these textured and terracotta-coloured solid walls emphasized the flatness and the continuity of the volumes as a whole.

The layout of the windows was designed to make the best use of natural daylight on the facade. In some examples, due to climatic factors, large glazing surfaces were protected by vertical or horizontal shading devices, according to the direction. In addition, the use of decoration was avoided in the windows, and delicate metal frames were used instead. Although concrete or metal shading elements divided the glass surfaces, the windows seemed to be connected in an imaginary way so as to appear to have been a part of the wall surface. These continuous full-height glazing facades which protected by shading devices, help to get controlled sunlight into the spaces,

especially classrooms, and provide a visual connection to the outdoor spaces as well. Somewhat differently, one of the west-facing facades of Lefkosa Turkish Boarding School for Girls were positioned to create an angle according to the openings. Thus, this surface of school was shaped like a folded plaque and the windows were rotated with respect to the sun. Similarly, angularly arranged shading elements (angled baffles) were used on the glass surfaces to prevent unwanted sun rays in Limassol Terra Santa School and Lefke Technical School. These movements on the surfaces of the volumes, which arose from the climatic requirements, added a non-decorative richness to the plain facades. As a result, the interplay of light and shadow in the spaces, as well as transparency and opacity of the volume of surfaces, are provided by fenestration (Figure 38).



Lefke Technical School



Lefkosa Turkish Boarding School for Girls











Limassol Terra Santa School

Figure 38: Angular Arrangement of the Windows According to the Sun Direction

Overall; Modern Cyprus school buildings have transformed from a massive form to light-weight volumes, just like post-war school buildings worldwide. One of the main reasons for this was the spread of new construction methods and thus the application of the reinforced concrete skeleton system to school buildings. Thus, the rectangular prismatic volumes had a grille appearance with the vertical and horizontal elements forming the structure. In addition, the lightness of the volumes was ensured in a way that either with the use of the cantilever system or elevating up the entire volume from the ground. Therefore, the functional, flexible and dynamic appearance of post-war school buildings worldwide has also emerged in Modern Cyprus school buildings. The rectangular prismatic masses, which have undergone a subtractive transformation, have created solid and void interaction, creating shady transition areas between multiple courtyards. The walls were used as a secondary element and transparency was brought to the fore by considering the direction of the sun. Although the roofs were generally flat, in some cases a slight one-way slope was also used. The openings on the facades are protected with either vertical or horizontal shading elements according to the solar orientation of the mass, and even by using angled baffles to provide maximum protection (Table 6).

Table 6: Architectonic Quality with the Interplay of Volumes in School Buildings

<ul style="list-style-type: none"> *Reinforced concrete skeleton frames *Grille effect 	
<ul style="list-style-type: none"> *Vertical and horizontal elements *Rectangular prisms 	
<ul style="list-style-type: none"> *Cantilevered system *Dynamism *Flexibility 	
<ul style="list-style-type: none"> *Weightless appearance *Lightness of structure 	
<ul style="list-style-type: none"> *Subtraction of the geometry *Semi-open transitional spaces 	
<ul style="list-style-type: none"> *Interactions of solids and voids *Transparency 	
<ul style="list-style-type: none"> *Roof line *Flat or slight slope 	
<ul style="list-style-type: none"> *Openings on the surfaces *Angled baffles *Sun orientation 	

4.2 Battle of Regularity and Articulation against Axial Symmetry in School Buildings

Well-designed modern school buildings in Cyprus are usually associated with the orderliness of the structure, with evenly spaced columns rather than the axially of the classical architecture of the past. The similarity of parts led to the beauty of order, highlighted by basic regularity in a simplified construction. In addition, the use of standardized parts was more advantageous in terms of materials, time and finance. As Johnson and Hitchcock admitted, regularity could sometimes be monotonous. However, in Cyprus, the monotony of the school building is broken with different degrees of rhythmic repetition and various commitments. In general, the skeleton structural system enabled a regular repetition and rhythm on the facades of the buildings. For instance, the implementation of the regular grid system was visible on the surfaces of the volumes in most of the examples. According to direction and function, repetitive vertical elements were projected from the facades, acting both as a column and as a sun breaker. As it is mentioned before, unlike others, in Kykkos High School the grid surface was not strikingly attached to the inner surface and surprisingly created a gap between the two surfaces. In this way, natural ventilation and controlled daylighting provided in between this double-skin facade. These external support elements also represented the order of the structure as a whole, besides its climate-responsive use.

In order to avoid monotonous facades, vertical circulations were emphasized and raised above the horizontal roof lines with the use of different materials or textured surfaces. For example, in Kykkos High School, exposed concrete was used to differentiate the vertical circulation, while elevated stair towers created movement on

the horizontal facade of the Lefkosa Atatürk Elementary School and Limassol First Elementary School. Furthermore, in Lefkosa Turkish Boarding School for Girls, Pallouriotissa Female Gymnasium and Limassol Technical School, surface of stair areas were bounded by perforated concrete panels like honeycomb grillwork, called brise-soleil or sun breaker, created another type of visual richness and fascination. These elements are defined as one of the most influential architectural innovations in terms of environmental factors, like shading and natural ventilation (Figure 39).



Lefkosa Turkish Boarding School for Girls



Limassol Technical School



Pallouriotissa Female Gymnasium

Figure 39: Perforated Concrete Panels like Honeycomb Grillwork, Brise-Soleil in Vertical Circulations

Asymmetrical layouts were required in the modern school buildings of Cyprus, in order to achieve aesthetic order and flexibility. Rather than axial symmetry, an asymmetrical layout was preferred, both structurally and formally. Axial symmetry was an essential issue for the traditional Cyprus building, whereas horizontal lines dominated the facades with linear layout organizations of the building in Modern Architecture. Furthermore, well-designed modern school buildings communicate a

proportional system and layout, which is separate from the structural skeleton. Different types of elements, created by imaginary lines of geometrical form, were harmonized with each other and combined as a whole, both on the plan and facade composition. Considering the views of Johnson and Hitchcock, proportions were one of the most essential aesthetic features of modern school buildings in Cyprus, due to the functional necessities of education. Generally, pure geometric forms such as rectangular blocks were utilized, especially for classrooms repetitively located next to each other. The sizes and layouts of the classrooms were defined by optimum orientation towards the sun, wind direction, and interior arrangements.

In this proportional layout, the grid system of the structure led to having an equally divided surface to the volume on the facade of the school buildings. According to function and climatic aspects, each facade of the buildings was designed differently, but in harmony with each of the others. For example, on some surfaces, vertical elements were emphasized, while in other horizontal elements came forward such as in Lykavitos Elementary School (Figure 40). Egg-crate shading elements were applied, in which both verticals and horizontals were equally projected from the volume, in Pallouriotissa Female Gymnasium and Lykavitos Elementary School (Figure 41). Axial symmetry was avoided in the examples, so simple geometry and proportion dominated in the overall composition of the school buildings. As a result, the asymmetry was inevitable, either on the layout or elevations in school buildings.



Figure 40: Vertically Arranged Brise-Soleil from Main Entrance View in Lykavitos Elementary School



Lykavitos Elementary School



Pallouriotissa Female Gymnasium

Figure 41: Egg-Crate Shading System

Main entrance definitions and vertical circulation areas were located in proportion to the structure, but not in the centre. In Famagusta Boarding Nursery, Lefkosa Turkish Lycee and Kykkos High School, the main entrance occupied one-third of the facade. In some schools, these entrance definitions were extended outwards from the surface, like a canopy, to direct people in a more welcoming way. Also, stair towers on Lefkosa Turkish Boarding School for Girls, Lefkosa Ataturk Elementary School, Limassol First Elementary School, and Limassol Technical School were positioned at regular intervals to keep the balance of the volume, or sometimes they were located at one edge of the building, as in Lykavitos Elementary School.

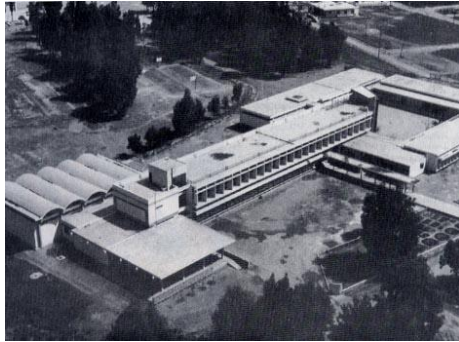
It is very widely seen in Cyprus schools that simplicity of form, the balance between masses and unity have emerged by the principle of regularity. Thus, the functional and aesthetic values of the school buildings have been raised by applying the simplification and unity principles of International Style, without being bound to the old styles. In order to draw more attention, non-rectangular forms were occasionally used as an aesthetic element. Contrary to the principle of regularity, different (non-rectangular) geometric shapes were used to create more eye-catching structures. In Lefke Technical School, the cylindrical volume is combined with other rectangular volumes, creating an opposition to the linear regularity of the building but bringing a movement to the whole school complex (Figure 42).



Figure 42: Cylindrical Volume in Lefke Technical School

Besides vertical elements, horizontal dominance was one of the most remarkable features of the modern school buildings in Cyprus, which were designed according to International Style principles based on functional necessities. Almost all Cyprus school complexes consisted of rectangular prisms horizontally developed by responding to the human scale. In particular, Lefkosa Ataturk Elementary School, Limassol First Elementary School, Koskluciftlik Elementary School, Kykkos High School, and Famagusta Nursery emerged with this expression (Figure 43). In Lefkosa Ataturk Elementary School and Limassol First Elementary School, verticality is added into the volume by stair towers, but it has not broken the horizontality of the

rectangular form. In short, horizontality is dominant in most structures as a principle of regularity, while vertical elements have played a secondary supportive role.



Kykkos High School



Koskluciftlik Elementary School

Figure 43: Emphasis of Horizontality in Cyprus School Buildings

Freedom of facades was provided by a skeleton frame, enabling them to cover the facade like thin plates or a skin. Consequently, the sizes and shapes of openings were specified by the necessities of light, ventilation, insulation and the function of internal space. Horizontal strip or ribbon windows were chosen to illuminate the interior spaces. In particular, continuous full-height ribbon windows were used on the outer walls of classrooms to get natural light and air, while on the corridor side clerestories or skylights were used to provide balanced bilateral light and cross ventilation into the spaces. In addition, ribbon windows were strengthened the emphasis on horizontality. For instance, in Lefkosa Turkish Boarding School for Girls, Lefkosa Turkish Lycee, Koskluciftlik Elementary School, Kykkos High School, and Famagusta Terra Santa School, the horizontality of the building block was divided by vertical elements with

large glazing surfaces; however, the horizontality of the volume was not disturbed by these secondary devices (Figure 44). In the other directions, the effect was more pronounced, with fewer openings or ribbon windows. As an essential of regularity, the order was emphasized by same-sized windows, creating a patterned effect on the facades.



Famagusta Terra Santa School



Lefkosa Turkish Boarding School for Girls



Kykkos High School







Kykkos High School

Figure 44: Horizontal Strip or Ribbon Windows in Schools

Overall, regularity in Modern Cyprus school buildings is ensured by the harmony, proportion, and order of masses. In particular, the integrity of the whole design is provided by the repetition and rhythmic movements of the external structural elements. Also, honeycomb grillwork brise-soleil were especially used in vertical circulation areas, added a visual richness and fascination to the surfaces. Due to the proportional grid system, the plays of light and shadow created a dynamism on the surfaces of simple rectangular prisms. In general, horizontality is dominant due to this rectangular geometry in volumes. In addition, this emphasis has become stronger with the use of

horizontal strip windows in Modern Cyprus school buildings which is similar to the beta-type openings used in post-war school buildings worldwide (Table 7).

Table 7: Battle of Regularity and Articulation against Axial Symmetry in School Buildings

<ul style="list-style-type: none"> *Beauty of Order *Proportion *Repetition *Rhythm 	
<ul style="list-style-type: none"> *Honeycomb grillwork *Brise-soleil *Visual richness & fascination 	
<ul style="list-style-type: none"> *Asymmetrical layout *Proportional grid system *Simplification 	
<ul style="list-style-type: none"> *Horizontal dominance *Ribbon windows 	

4.3 Avoidance of Applied Decoration as Aestheticized Climate Control Elements in School Buildings

The applied decoration was consciously avoided in Cyprus in order to get rid of all historic references and to establish a new image of Modern Cyprus. As Johnson and Hitchcock mentioned, simplicity was the important feature of the new era architecture; it was also an essential issue in the design of modern school buildings in Cyprus. In spite of the figurative decorations of the past, the new school buildings were embellished with the interplay of solids and voids through an abstract approach.

Despite this intangible approach, religious symbols were quite brilliantly stylized, such as sculptural cross figures in the Terra Santa Schools.

Roof overhangs were designed as a fractured shape to enrich the building's volume and create visual interest. Particularly, the folded plate roof on the front facade of the Lefkosa Turkish Boarding School for Girls was remarkable (Figure 45). As well, the trapezoidal entrance definition rose upward in Famagusta Terra Santa School. In both Terra Santa Schools, one of the most distinguishing characteristics was the use of parabolic eaves. These horizontal overhangs were used repetitively on certain facades of the buildings (Figure 46).



Figure 45: Folded Plate Roof in Lefkosa Turkish Boarding School for Girls



Limassol Terra Santa School



Famagusta Terra Santa School

Figure 46: Parabolic Forms in Terra Santa Schools

Another aesthetic detail was the geometric openings that look like a pattern or ornament on the surface of volumes but are functional. For example, in Lefkosa Turkish Lycee and Lefkosa Turkish Boarding School for Girls and Lefkosa Technical School diagonally arranged mini cubic windows were applied onto the surface, allowing natural light and air circulation to enter from the facade. Next, circular shape openings were used in the same manner in Lefkosa Atatürk Elementary School, and Famagusta Nursery, creating a pattern of light and shadow on the surfaces (Figure 47).



Lefke Technical School



Lefkosa Turkish Lycee



Lefkosa Atatürk Elementary School



Lefkosa Turkish Boarding School for Girls



Famagusta Boarding Nursery



Lefkosa Technical School

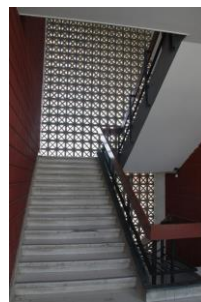
Figure 47: Decorative and Functional Openings on the Elevations

On the other hand, one of the most significant features was the use of brise-soleils, as perforated honeycomb grillwork, on the surfaces of vertical circulations. These filtered elements were specially adapted to hot climates because they prevented sun rays but allowed ventilation inside. In Lefkosa Turkish Boarding School for Girls, Pallouriotissa Female Gymnasium, Limassol Terra Santa School, and Limassol Technical School examples, these useful devices were used commonly in staircase areas of the building blocks. They might be located in the front facade of the building,

and have different types of patterns and textures. For example, in Lefkosa Turkish Boarding School for Girls and Pallouriotissa Female Gymnasium, stair zones were screened with vertically arranged perforated honeycomb grillwork, whereas external walkways were protected by horizontally located brise-soleils in Famagusta Terra Santa School and Limassol Technical School. Apart from its functionality, the aesthetic value of the volumes was enriched by these types of brise-soleils (Figure 48).



Limassol Technical School



Lefkosa Turkish
Boarding School for Girls



Famagusta Terra Santa School

Figure 48: Perforated Honeycomb Grillwork, Brise-soleil in Transitional Spaces

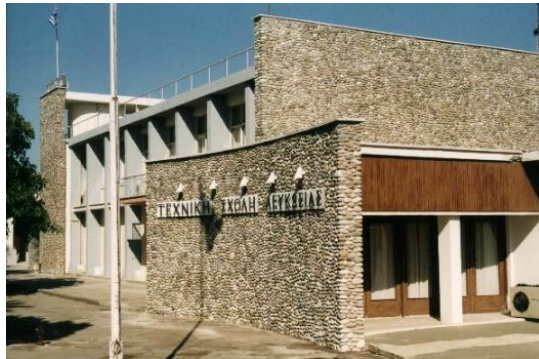
As stated by the creators of International Style, the material and detail of the windows were significant features identifying the Style, and they selected fixed metal windows as the first choice. It can be observed that fixed metal-framed windows were applied in almost all Cyprus school buildings. Also in some cases, metal or glass or concrete louvers were attached to these window frames, to protect the openings from intensive sunshine. In general, metal and glass horizontal louvers were adjustable, while concrete ones were fixed on the facades.

Local cladding materials, such as yellow sandstone, were used as surface texture in Famagusta Terra Santa School, Technical schools and Lykavitos Elementary School; in Lefke Technical School and Lefkosa Technical School, river cobbles were used on

the planar surfaces at the entrances of the complexes to show the elegance of texture and material (Figure 49).



Lefke Technical School



Lefkosa Technical School

Figure 49: Yellow Sandstone and River Cobbles as Local Cladding Materials on the Surfaces

In order to make a distinction between modern style and classical style, avoidance of decoration was as effective as regular horizontality. In Cyprus school buildings, perfect proportions, technical details of structural elements, surface texture, material, and color, to name just a few, could be used to create visual interest without the need for any decoration. Consequently, details of undecorated pure volumes created both functional aesthetics and simplified decoration in new architectural language.

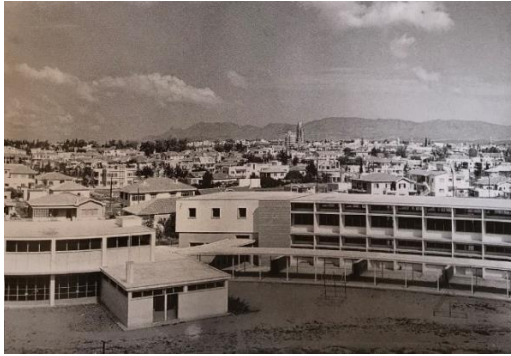
In modern Mediterranean architecture, the expression of climatic elements and the simplicity of details were represented by enrichment of the fenestration and the harmony of perfect proportions without the need for applied decoration. Therefore, the

elaborate details of Modern Architecture include both functional and aesthetic quality, which serve as ornaments. Apart from architectural details, sculptures have been used as secondary elements to decorate the modern buildings efficiently without any disruption. This is well illustrated by the symbol of the cross in Limassol Terra Santa School and a huge sculpture at the entrance courtyard of the Lefkosa Technical School (Figure 50).



Figure 50: Sculptural Symbolic Figures in Limassol Terra Santa School

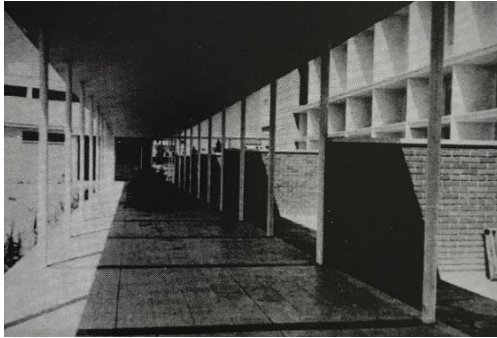
The landscape has also been used as a decorative element in modern design. Opposing values, such as natural environment and man-made buildings, were combined by architects. They tried to emphasize the contrast between nature and geometric volumes. With regard to International Style and natural surroundings, site selection and location of the building on the site were the first issues to be considered. The unique and natural beauty of the environment had to be protected to the utmost. Natural surroundings had to be maintained, not only for recreation in open spaces but also from the necessity to feel the original elegance of nature. It can be seen from the examples that connection with nature was provided by open courtyards, playgrounds or semi-open transitional spaces in Cyprus (Figure 51).



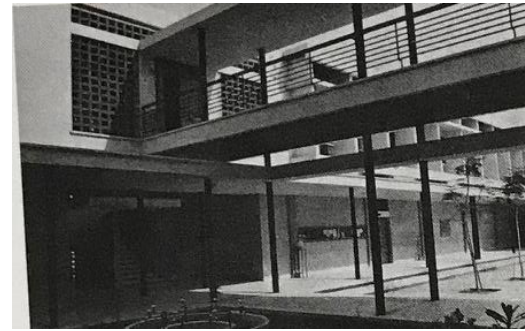
Lykavitos elementary school



Lefkosa Turkish Boarding School for Girls



Lykavitos elementary school



Kykkos High School

Figure 51: Semi-open Transitional Spaces and Connection with Nature

Due to the Mediterranean climate of the island, all buildings were designed to have shaded outdoor spaces. These relationships between indoor and outdoor spaces were suitable for different types of school activities. In particular, the sloping terrain of the Lefke Technical School has been preserved in a natural way, and the building was situated to make use of this slope without harm to the environment. In addition, the building itself was perceived as an art object, like a sculpture from afar, again due to this topography.

Overall, in Modern Cyprus school buildings, decoration and ornamentation were avoided, just as in post-war schools worldwide, and the elegance of technical details was emphasized. For example, the masses and surfaces where simplicity and clean lines are used, draw a visual interest with broken lines, folded plate and parabolic eaves. The overall design is enriched with both functional and aesthetic details, such

as fine proportions of masses and structural details, the alignment of the openings like a pattern, or the use of geometric mini holes on the surfaces. Especially the use of brise-soleil as perforated concrete screens in both horizontal and vertical circulation lines has made it stand out both in terms of climatic necessity and an aesthetic element. In addition, the use of local materials as a texture on surfaces has revealed the detail of the material, while sculpted symbols are also strikingly stylized in this overall simplicity. Apart from that, just as in post-war schools worldwide, a contrast was created between the artificial environment and the natural environment, ensuring the compatibility of the opposites (Table 8).

Table 8: Avoidance of Applied Decoration as Aestheticized Climate Control Elements in School Buildings

<ul style="list-style-type: none"> *Technical perfection *Folded plates *Parabolic eaves 	
<ul style="list-style-type: none"> *Fine proportions *Geometric openings 	
<ul style="list-style-type: none"> *Light and shadow *Mini cubic openings 	
<ul style="list-style-type: none"> *Filtered elements *Concrete screens *Texture 	
<ul style="list-style-type: none"> *Sun & Air Movement *Transitional spaces *Circulations 	
<ul style="list-style-type: none"> *Texture *Local materials *Yellow stone *River cobbles 	
<ul style="list-style-type: none"> *Functional and aesthetic quality *Stylized symbols 	
<ul style="list-style-type: none"> *Landscape *Natural beauty *Connection with environment 	

4.4 Design with Climate in the Context of Local, Regional and Global Thinking

After the examination of post-war Cyprus school buildings based on three main principles of the International Style, it is revealed as a fourth principle that, adaptation to climate and environment was one of the most influential design approach considering the Mediterranean school architecture. The modernist architects of the time, affected by the universal trends and within that spirit, they developed design strategies with respect to environmental factors and local climatic conditions of the island. Thus, they have created a unique school architecture, which blended with International Style and environmental design, without disturbing the integrity of the design. In addition, the primary materials of Modern Architecture, such as concrete, glass, and steel, were applied in school buildings together with local materials such as yellow sandstone and river cobbles, resulting in a rich texture on the facades. But most of all, one of the most essential design strategies was to control the intense Mediterranean sun. Having a direct impact on the space and at the basis of modernism, play of light and shadow were provided and enriched by both functional and aesthetic design approaches; such as proper use of fenestration, semi-open shaded transitional areas, orientation of layout and mass, different types of shading devices on the surfaces according to the sun direction, appreciation of the landscape and so forth. Subsequently, the link between International Style and Mediterranean architecture was developed in more human-scale school buildings without the need for applied decoration, ornamentation or symbols (Figure 52).



Kykkos High School



Famagusta Boarding Nursery

Figure 52: Functional and Aesthetic Details on the Mass and Surfaces

As a Modern heritage, these school buildings mostly represents success in the sense of design with climate as well as responsiveness to the physical environment. For example, the abundant use of glass surfaces, as a feature of International Style during the interwar period, was no longer bare, it was protected by structural shading devices during the post-war era. Since the beauty, space and lighting provided by the glass are not suitable under the conditions of the Mediterranean climate, gracefully designed *brise-soleil* in accordance with the direction of the sun adds to the Cyprus school architecture both functional and aesthetic value. The widespread use of these sun-breakers is designed differently on each elevation, depending on the rotation of the sun in the sky and existing environmental data. In this way, controlled light penetrated through the *brise-soleil*, accordingly ensured comfortably illuminated spaces, especially in classrooms. Considering the environmental design strategies, layout and orientation of school building masses was another significant approach in respect to the sun. In Modern Cyprus school complexes, the layout of the masses was developed both in parallel with the new understanding of education and on the basis of climatic design. As for design with the climate in school buildings, some layout features came forward as a convenient connection between indoor and outdoor areas, creation of shaded courtyards and playgrounds for the active outdoor use, distribution of functions

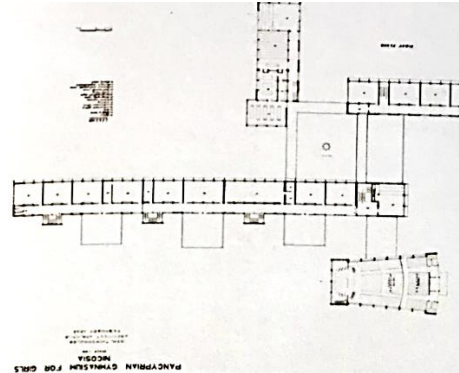
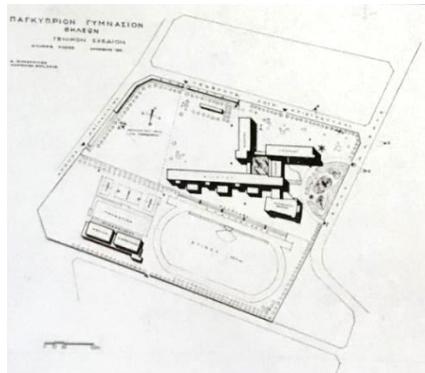
on the site depending on the sun path, use of passive solar energy in the most effective way, and to name a few (Figure 53).



Lefkosa Turkish Boarding School for Girls



Lefke Technical School


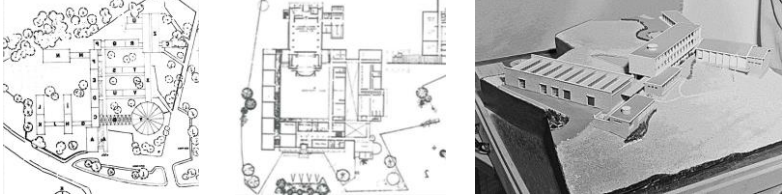



Pallouriotissa Female Gymnasium
Figure 53: Orientation and Layout of Building Mass

Overall, the climate was the most powerful and influential element for shaping the post-war school architecture in the Mediterranean region. Although the International style was not defined as regional in essence, localization was inevitable under the climatic conditions of the Mediterranean. Instead of forms reflecting pure machine aesthetics of the interwar period; a climate-responsive has emerged in accordance with changing times and conditions of the post-war time. The modernist architects have created a new school architecture that meets the needs of the climate and region, considering the scientific understanding and aesthetic appreciation. Undoubtedly, the ideology of the International Style architecture was interpreted regionally, and so post-

war school buildings of Cyprus were designed locally, all in sympathy with the Mediterranean climate (Table 9).

Table 9: Design with Climate in the Context of Local, Regional and Global Thinking

<p>*Localized Modern *Climate-sensitive volumes & surfaces</p>			
<p>*Asymmetrical layout organization *Human-scale Height</p>			
<p>*Indoor-outdoor relationship *Orientation towards sun</p>			

In light of this, it is very important for architects to develop environment-based design strategies in accordance with local climate within the scope of environmentally friendly design in complex structures like schools. In this context, in the post-war period when environmental design and Modern Architecture fused, Modern Cyprus school buildings were examined in the next part of the thesis, in respect to the Mediterranean climate and, accordingly, the most influential design factor: the sun!

Chapter 5

MEDITERRANEANIZATION OF INTERNATIONAL STYLE IN POST-WAR CYPRUS SCHOOL BUILDINGS

When post-war Cyprus school buildings are examined in line with the main principles of International Style, the result was the ‘Mediterraneanization’ of the Style, as reinterpreted and adapted to the specific local and regional requirements. In today's architecture, the importance of passive and regional design strategies that have been applied in the post-war period has significantly increased due to global warming issues. Thus, passive and climate-responsive design methods have increasingly started to be applied throughout the world. Undoubtedly, the task of architects and designers is to think locally and act globally, in terms of environmentally friendly design. Particularly in hot and warm countries like Cyprus, experiencing the Mediterranean climate, the sun is a major source of the passive design approach. Therefore, finding sun responsive design solutions while providing shading for a comfortable building environment, should be one of the most inevitable design criteria of the architects in the region. As it can be seen in the previous chapter that environmentally sensitive design solutions that are used to both take advantage of the sun and control the sun, are commonly applied in post-war Cyprus school buildings as a new conception of function and aesthetic in the Mediterranean region. Referring to these Modern school buildings, the most prominent climate sensitive design strategy were the use of *brise-soleil* on the surfaces and orientation and layout of the masses relative to the sun. In this context, this modern era tradition is of paramount importance to sustaining to

produce lower energy buildings. In light of this, as the finding of the previous chapter which illustrated how International Style principles adapted to the Mediterranean climate; in this part of the study, as representatives of the Mediterranean modern, post-war Cyprus school buildings and their surfaces and masses were analysed relative to the sun, in order to understand whether they are environmentally friendly buildings.

5.1 Orientation and Layout of School Building Masses

It should be emphasized that instead of an introverted central layout organization as in the traditional; layout of Modern Cyprus schools were shaped as extroverted and linear arrangements, particularly adopting the finger-type organization which was the most common school layout of the 1950s worldwide. Typically, this layout is well suited for passive design strategies, such as maximizing daylight, and also for providing shaded areas in connections between indoor and outdoor spaces. By and large, in most Cyprus School buildings, the layout organization was established as a combination of finger-type and courtyard-type.

The attention was paid to the use of outdoor spaces as an extension of the interior spaces, not as independently separated areas from indoors. This connection between in and out is already known as one of the main features that are at the root of Mediterranean architecture. Thus, a direct connection was established between physical activities and classrooms and allowed them to be seen from the administrative department block of the schools. Contrary to the compactness of traditional school buildings and the independent arrangement of functions, this more open and transparent finger-type layout offers a more active learning environment for students, apart from its climatic and physical characteristics. Because, inward-off education that occurs in an environment where silence is dominated in the past was replaced with a

more open, experiential, social and interactive education understanding in the new age (mid-century period). Thus, the functions are arranged in such a way that they are easily interacting with each other; it has created areas where more communication can be established between the teacher and the student and at the same time allow socialization and group work among the students. This is known as one of the most effective methods of transition to modern life, education, and shaping of school architecture of the mid-century modern era.

The layout **Lefkosa Turkish Boarding School for Girls** was sequenced according to the typical finger-type layout of the 1950s and the masses were integrated with each other with multiple intermediate gardens and semi-open circulation paths. It has much more complexity rather than other school structures, including additional functions in it such as dormitories, apart from classrooms, administration, sports, and music activities. The three-story classrooms and dormitory block extend in the north-south direction which all classrooms and dormitory rooms take the eastern sun in the morning lecture hours, while the longitudinal side of the labs and special class masses are arranged in an east-west direction, but on a single floor to receive the northern light. Therefore, while the multi-story classrooms stand out with their narrow and deaf-kept façades, perpendicular to the road and the historic city walls on the opposite side, it is observed that the single stories are not emphasized much. It can be seen that multi-story classrooms expressively connected as pairs vertically through the stairs and floor halls, instead of horizontally arranged along the corridor. Because of this arrangement, long blocks are formed by adding these small blocks to each other. Moreover, multi-staircase and corridor-free layout allow the mutual opening of windows to get benefit from the cross ventilation in classrooms. Even though the long sides of the classes are

not preferred to face the east and west directions in such hot climates, the climatic problems that would arise from this are largely eliminated by skilfully designed precautions in this school, such as vertical sunshades in the east, horizontal strip windows in the west and the multiple shaded open areas due to proximity of masses, to name but few. In addition, covered walkways were not only provided the transition between open, semi-open and closed spaces but also brought life to these spaces. Thus, in the school complex, a design example can be shown both in terms of responding to Modern Architecture as well as taking important measures against the climate (Figure 54).

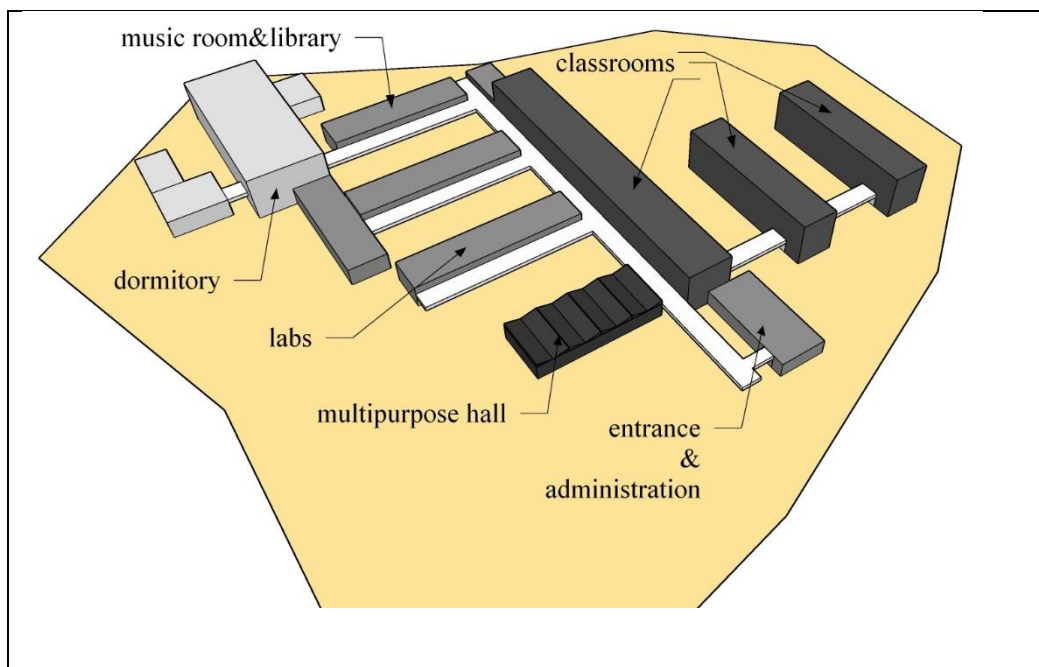


Figure 54: Lefkosa Turkish Boarding School for Girls, Drawn by Sevil Aydinlik

The **Pallouriotissa Female Gymnasium** is arranged according to a typical finger-plan layout and the functions are arranged on an east-west axis in a centrifugal linear organization. The school complex consists of four main parts: classrooms, multipurpose hall, management area and theatre hall. The masses have consisted of pure rectangular prisms and all have connected to each other by semi-open circulation

pathways. The longitudinal faces of the three-story and two-story class-blocks face south and north directions, and access is provided from the north through single-loaded corridors to the classes. The spaces between the masses are used as public and semi-public courtyards. A common inner courtyard has been created between the administration and the classes and is surrounded by semi-open circulation lines. In general school complex, this courtyard functions as a common area that connects all masses together with an asymmetrical balance. Sport and gymnastics rooms located to the north of the complex lead to both the inner gardens connected to the classrooms as well as the outdoor playgrounds and the running track behind. The theatre hall is located in the west wing of the school and it is remarkable with its form, size, and massiveness. It is also positioned in a place at the school complex to have easy access both from classes and the main entrance and management building. The stair towers attached to the masses give the appearance of vertical prisms fitted to horizontal rectangular prisms. In general, airflow and solar control are effectively provided by the advantage of having a finger-type arrangement in the school complex. Thus, either through the horizontal semi-open circulation lines or through the perforated concrete screen of the stair towers attached to the volumes, the air circulation flows into the whole complex. On the other hand, these elements such as perforated concrete screens and covered walkways, not only provide airflow, they also control the sun's rays. In addition, the egg-crate system used on long south-facing surfaces of the classes is one of the most effective sun shading elements. As a result, it can be said that the whole school complex has a climate-sensitive design and layout (Figure 55).

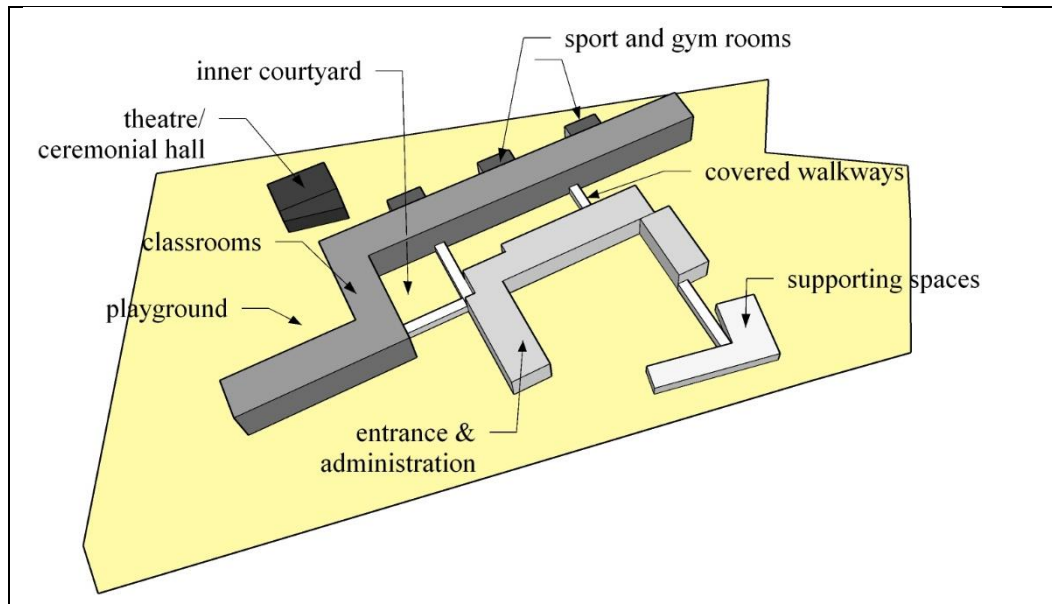


Figure 55: Pallouriotissa Female Gymnasium, Drawn by Sevil Aydinlik

Within its urban neighbourhood context, **Kykkos High School** is divided into two separate buildings for Girls and Boys on its plot. When the general scheme of the school is examined, it consists of three parts in a linear organization on the east-west axis. The school layout generally corresponds to the ‘main linear cluster’ type, while the western wing is shaped according to the ‘courtyard’ type. The tallest three-story building, with its longitudinal side facing south and north, consists of main classrooms and is directly connected to other functions such as multipurpose hall and administration unit integrated at both ends. This dominant mass of classrooms was raised on concrete pillars and a semi-open area was created underneath, thus allowing access to the school's south and north gardens easily. The main entrance, administration building and other studio-type classrooms in the east wing are arranged around a central inner courtyard. This centralized courtyard is used as an area where social activities, ceremonies, and events take place, connecting the public and semi-public spaces with its proximity to the administration and main entrance block. In the west wing, there is a multipurpose hall, where sports and gym activities take place,

which draws attention with its concrete barrel vault form among other masses. In particular, a direct connection is provided from this hall to the open backyard and is used as a private open space reserved for students. The volumes in the west wing are more massive, solid and have minimum openings because of the low angle of the sun exposure. Moreover, the eastern blocks are arranged around the central inner courtyard, and the ones in the south are single-story and the ones in the north are two-story. Particularly with the use of semi-open areas, the use of deep sun shading elements used on the south-facing facades, determining which functions of the masses will receive sunlight from which direction on the land and placing them accordingly, resulted with climate-compatible school design. In this way, by providing light, shadow, and natural airflow to the volumes effectively, was created quality and comfort through the spaces (Figure 56).

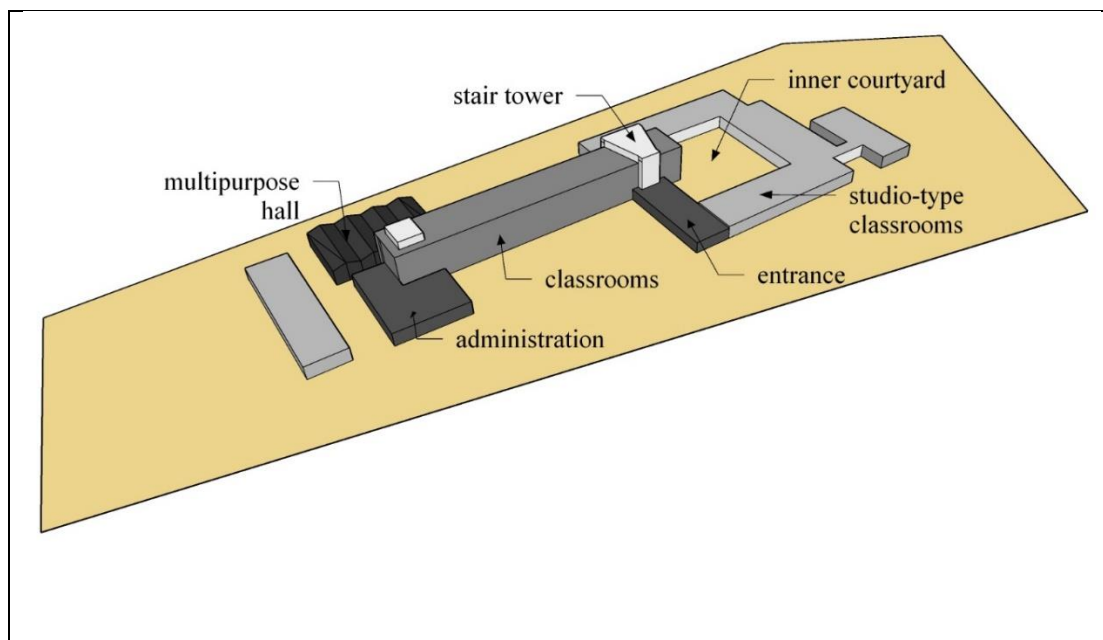


Figure 56: Kykkos High School, Drawn by Sevil Aydinlik

Lefkosa Turkish Lycee, compared to other schools, has a smaller complexity, consisted of three main integrated blocks with classrooms, administration and multipurpose hall and also other supporting facilities. The school layout shows the characteristics of linear finger type layout composition. The longest three-story block with the main entrance and classrooms of the building, positioned directly to face the south (front side looking to the parking area and main road) and north (backside looking the courtyard) directions. In this case, shorter sides of the masses directly face the east and west direction. The masses settled on a flat site, constituted of administration, multi-purpose hall, laboratory and some parts of the classrooms on the ground floor, while upper floors function as classrooms. Apart from the internal circulation at the main entrance, the main classroom's block, which is longitudinal, is also accessed by external stairs from the inner courtyard at the back. In particular with this backyard where outdoor activities take place, multi-purpose halls and classes are easily accessible, which demonstrates the importance of indoor and outdoor connections in post-war modern schools. The class block is designed in a single-loaded layout and is accessible through semi-open corridors facing the courtyard to the north. In this case, to protect the glass surfaces of the classroom windows on the south facade, sun-shading elements applied both horizontally and vertically, as an egg-crate system. In addition, mutual air circulation is distributed to the interiors through the clerestory windows on the corridor side. In order to direct the people to the main entrance, a perforated concrete overhead plane was extended from the rectangular prism masses of the school. In addition, the vertical circulation towers are articulated to the main masses. School masses increased shaded areas due to the orientation of the sun, resulting in a climate-compatible school design (Figure 57).

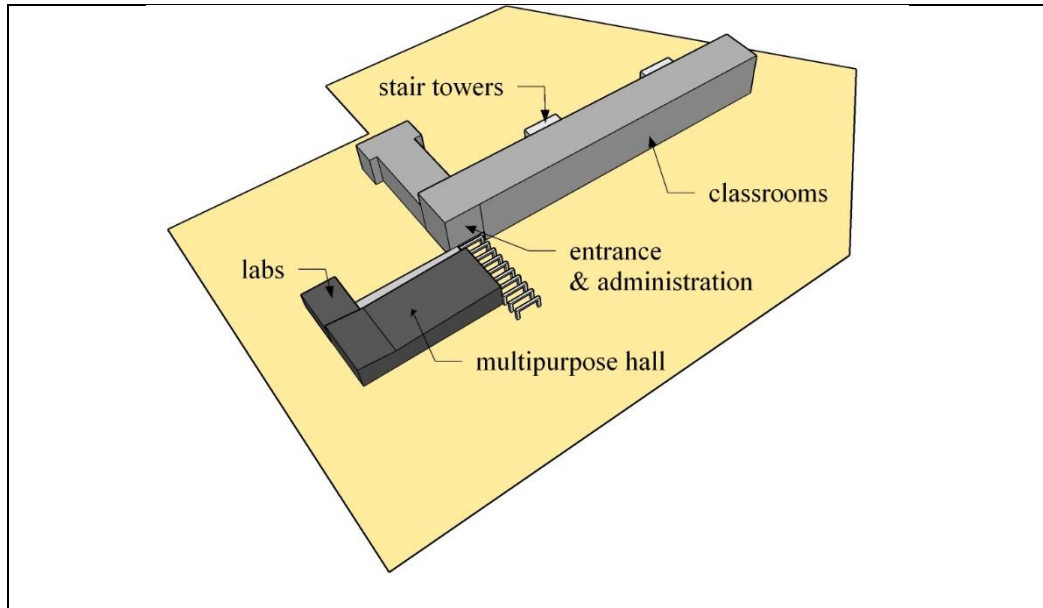


Figure 57: Lefkosa Turkish Lycee, Drawn by Sevil Aydinlik

Unlike other schools, which are generally located in the city centres and on flat sites, **Lefke Technical School** has located on a sloping terrain just outskirts of the city centre. The school layout shows the characteristics of the cluster-type together with multiple courtyards organization. The school complex is totally divided into four wings and all are integrated well into the sloping terrain; as two of them were placed in the minus level while the other two were located on the ground level. The two-story-high longitudinal block in the main entrance courtyard, which is accessed from the southeast, contains classrooms on the west wing and entrance and administration parts on the diagonally rotated east wing. In addition, workshops block is separated on the left side (west) of this mass, which are positioned longitudinally towards the north-west and south-east lines, and directly connected to the southeast facing the front garden. This classroom block, perceived as two floors from the front side (south-east), but actually functions as three floors in the backside (north-west) by using the different levels of the topography. The external staircase in between the classroom block and workshop masses leads to a lower level from the entrance courtyard and is connected to the minus level classrooms and workshops through the inner courtyard at the back

(north). In particular, the circulation axis between the masses on this sloping layout is provided by open and semi-open pathways with split levels and ramps. Some of the workshop spaces are located in the north-east direction of the sharp sloping terrain, overlooking the green area. And the connection between the workshops and outdoor spaces is provided by balconies that seem to hang in the air due to the cantilever structural system. Using the advantage of the topography, the distinction between public and semi-public spaces has been significantly made. Depending on the orientation of the school on the plot, and considering the incoming sun angles, shading elements were applied differently on each surface of the masses according to needs. Moreover, semi-open walkways and shaded passages, which are formed by the proximity of buildings, provides cool airflow between the masses while responding to a climate-appropriate design approach. The challenges caused by the sloping site actually allowed a dynamic modern school complex to emerge at the end (Figure 58).

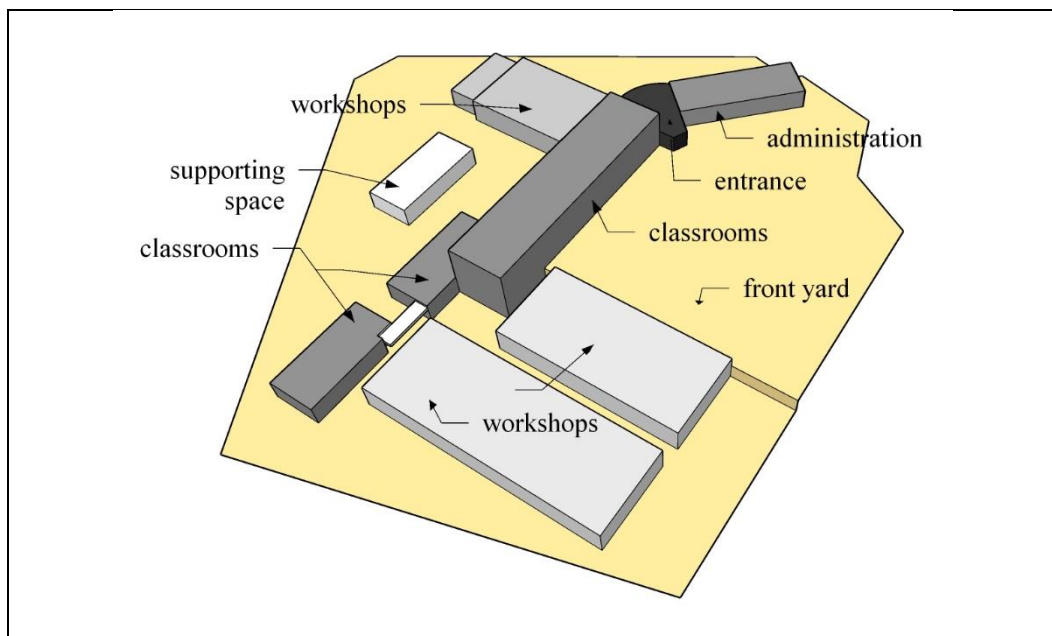


Figure 58: Lefke Technical School, Drawn by Sevil Aydinlik

The **Limassol Technical School** is located in an urban neighbourhood site, which extends in the north-west and south-east direction consisted of a combination of finger-type and courtyard type school layout. The two-story school building has open-ended inner courtyards between the wings of the classrooms and workshops to the north of the site, and also have a central inward courtyard surrounded by administration block on the south side. In this case, different functions are divided into certain sections as public and semi-public, resulting in an easy and understandable circulation for both students and visitors of the school. In contrast to the masses of rectangular prisms, circular external staircases were used to provide access to single-loaded semi-open corridors of the classrooms. Among the other masses, the assembly hall and library building was remarkable, which designed as the most prominent and dominant element of the school complex. At the ground level, there is an entrance area surrounded by transparent glass surfaces and an empty frame consisting of a series of sculptural concrete legs around it. The upper floor consists of a bulky solid rectangular box placed on these legs. Thus, aesthetic appearance and harmony were achieved with the contrast between the solid and void architectonic values of the design. At the same time, rectangular closed prisms boxes have undergone a subtractive transformation both in the class blocks and in the assembly hall, not only ensured to lighten the structure but also adapted to the climate. As a result of this, taking into account the direction of the sun and the wind, semi-open areas, and circulation lines have been created which provide both easy airflow and effective horizontal shading to the spaces (Figure 59).

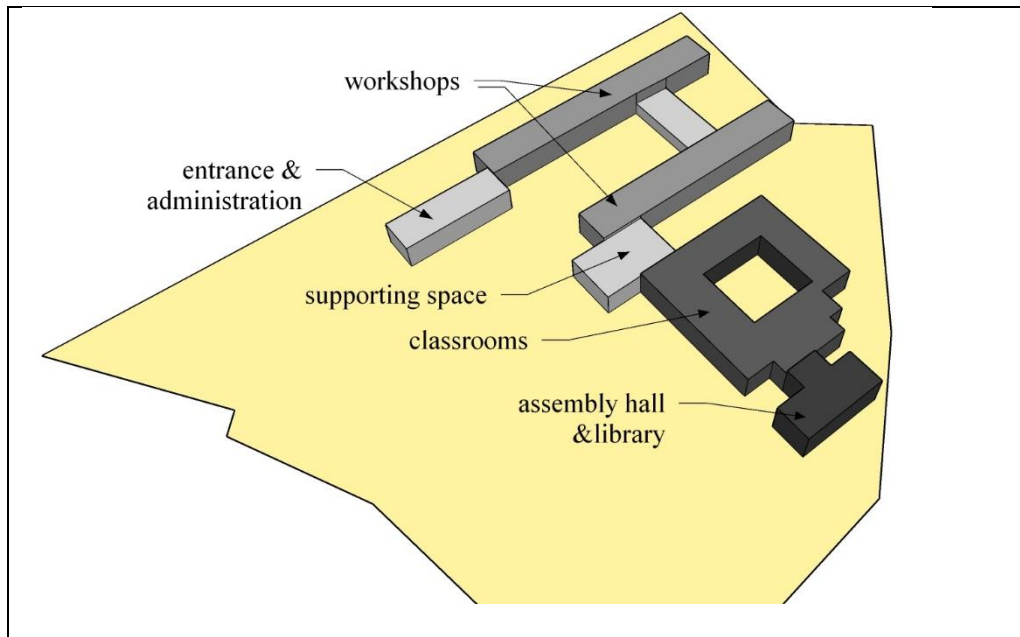


Figure 59: Limassol Technical School, Drawn by Sevil Aydinlik

The **Lefkosa Technical School** is positioned in a region that is directly connected to the city and the main street opposite the Hilton Hotel on the one side; while on the other, it is located adjacent to the green forest area to the east. The school layout type represents the characteristics of the cluster and campus-style arrangements and it is oriented on the north-south axis direction. The workshops and classrooms, which offer training opportunities for many branches, rises from one-story to three-story depending on their functions. Although there is no physical connection between the main functions due to the school layout, visual connection and direction are provided with semi-open extensions between the blocks. In the general school layout, there is the main entrance and administration building on the west part, and just behind it, classrooms are located as divided into three wings. In terms of the orientation of the classes, the three-story long block is positioned in the north-south direction, while the two-story two blocks are oriented in the east-west direction and finally the three wings are integrated to each other as a completed whole. The single-story multi-purpose halls installed at both ends of the north-south directed longitudinal class block, clearly

attract attention with their formal language, either its massive solid form or high vaulted roof and even triangular geometric shape on the layout organization. There are open inner courtyards between the classroom blocks and the colonnaded covered walkways of the classes open directly to these inner gardens. In addition, these inner courtyards between the administration building and the classes are used as gathering and activity areas, while connecting both different functions as well. Overlooking the main road, the administration building serves as a buffer, providing a controlled entrance to the school. Because it receives western sun, the administration block has a solid property, apart from the privacy issues. Therefore, openings were less used in these surfaces, and stone textured planar elements were used to emphasize the main entrance while at the same time controlling and blocking the unwanted sun rays. Due to the further compactness of the masses in the eastern block, they were served for workshops and laboratories to provide practical training in a more intimate area of the school. In general, the masses are joined to each other by an additive method. Even though there are semi-open circulation areas in each mass, the shaded semi-open spaces connecting these different volumes do not exist in the general school layout (Figure 60).

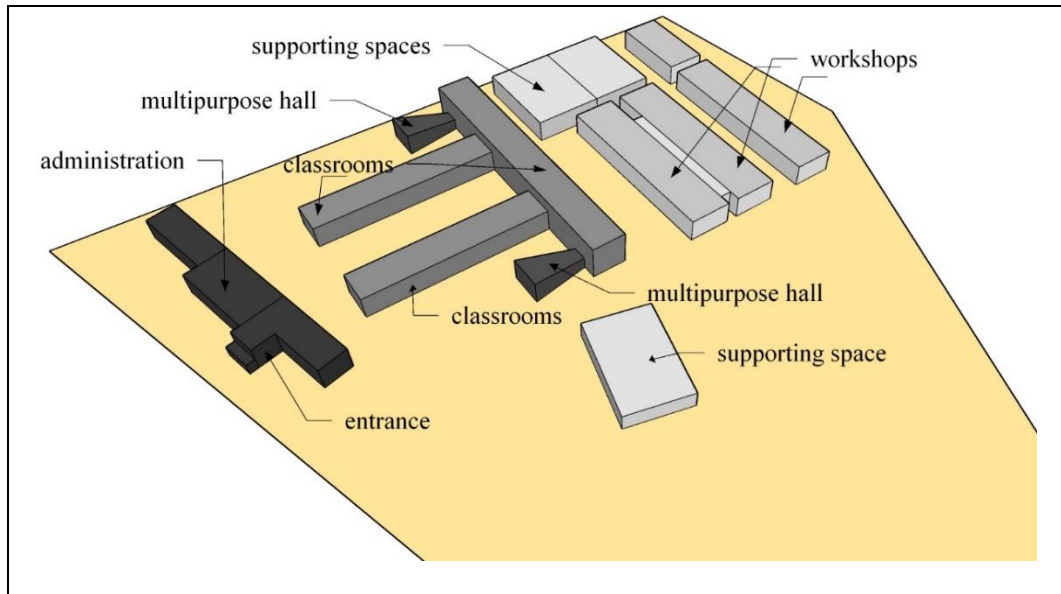


Figure 60: Lefkosa Technical School, Drawn by Sevil Aydinlik

The **Famagusta Terra Santa School** building in the developing region of the modern period has a compact structure due to its less complexity than other schools. Two-story masses consisting of three parts are positioned in a zigzag linear school organization. The long direction of the school has slightly rotated from the north axis to the northwest axis, and a school layout with two courtyards has been established as the southward and northward. The south courtyard is used as public due to its proximity to the administration building and the main road, while the north courtyard is used as a semi-public courtyard where student activities take place. On the ground floor, there is the administration and entrance hall, on the top there are general classrooms, on the east and west side there are training studios for practice and a multi-purpose hall. At the overlapping point of the pure rectangular prismatic masses, two-story volumes have had a subtractive transformation to create semi-open transition areas, so that easy access between the main building and studios in the east wing provided. In this way, it is also connected the two courtyards to each other and thus provided a circulation from south to north of the complex. This void (semi-open transition space) appears to

be an imaginary rectangular prism that is opened horizontally. No external staircase was used for access from the courtyards to the upper floors, only controlled vertical circulation through the entrance hall on the ground floor. The compatibility of proportional solids and voids in the masses is remarkable. This simplicity in the masses becomes dynamic by making additions to the surfaces and subtracting them from the volume, while at the same time ensuring effective environmental control. These are illustrated as curvilinear horizontal sun-shading elements attached to surfaces on the top of glazing, remarkable parabolic canopy defining the entrance, vertical, patterned and perforated concrete panels used to shade the semi-open transition space facing the south. There are also other climate-responsive features such as shading by subtracting the circumference of the underlying masses to about 60 cm or overflowing the upper volume to provide shadow to the lower codes. As a result, all these architectonic values come into prominence in the school complex consists of a combination of climate-sensitive design and modern Mediterranean architecture (Figure 61).

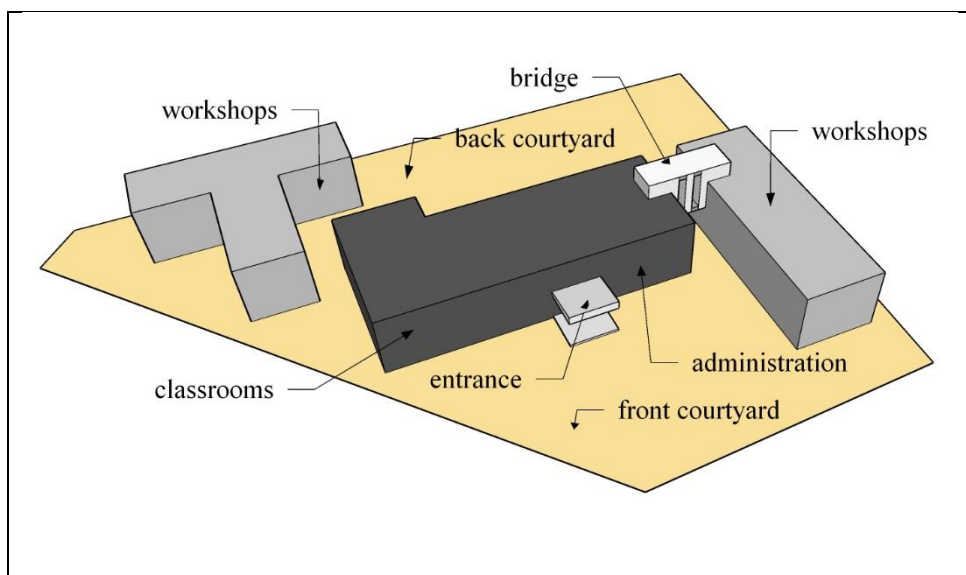


Figure 61: Famagusta Terra Santa School, Drawn by Sevil Aydinlik

The **Limassol Terra Santa School** building, located on the north-west and south-east axis, is arranged according to the multiple courtyard type layout to form a private inner garden and an open courtyard for semi-public use. The school generally has an inward centralized organization, and the enclosed courtyard in the middle, where all functions are surrounded by, is the focal point of the school layout. The volumes of the masses become thinner and thicker according to their function, and they are connected to each other by semi-open covered corridors and all of them have direct access to the inner courtyard. In the three-story school building, there are classes in the north-east wing, main entrance, and administration in the southeast, supporting spaces, multi-purpose halls, and accommodation in the south-west wing and an auditorium in the north-west axis. Unlike other schools here, the most striking volume with its form and function is the chapel used as a place of worship in the south-east wing. Although the school complex is inward-facing, the open courtyard to the east of the auditorium allows for further expansion of the school as needed. The school masses, which consist of linear rectangular forms, give a very conservative and rigid appearance from the outside, particularly from street-side due to privacy issues. It can be said that religious understanding of the school affected the architectural expression of the school, which more importance was given to the privacy. But when these closed boxes are carefully examined, just like the Famagusta Terra Santa School, its solid image has also been softened with the fine details of Modern Architecture and climatic necessity. These masses have been transformed by the use of curvilinear lines either on the surfaces or as a form; such as a half-cylindrical concrete which framing sculptural cross symbol and emphasizing it vertically, indented protruding carvings on the surfaces to create shading, and linear vertical louvers rotated relative to the sun angle attached to the surfaces. Accordingly, although it seems to be an enclosed, rigid and conservative

complex, it was actually enriched by these architectonic qualities. As a result, it has had a permeable structure in which the massiveness of the volumes has been mitigated by the plays of light and shadow reflected on the facades and spaces and even with the use of perforated textured concrete planar elements on vertical circulation zones (Figure 62).

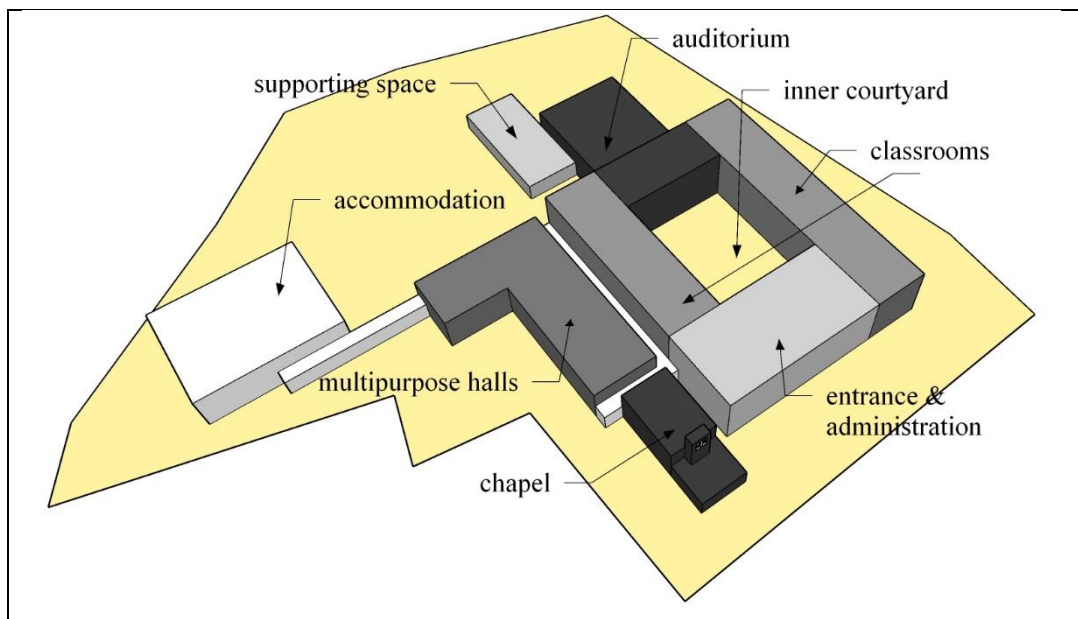


Figure 62: Limassol Terra Santa School, Drawn by Sevil Aydinlik

The two elementary schools, **Lefkosa Ataturk Elementary School** and **Limassol First Elementary School** are almost identical to each other and both of them located in the urban cores of Limassol and Lefkosa city. Consisting of a single compact mass, the elementary school buildings are situated on the site with a linear type of layout. The schools are harmoniously located to fit into their context, so that the school in Lefkosa lies on the east-west axis with the long direction facing south and north, while the school in Limassol lies in the north-east and south-west axis with the long direction facing north-west and south-east. The school building consisted of three shifted rectangular prisms on a horizontal axis while two stair tower masses mounted

vertically on it. The lower part of the three-floor compact volume underwent a subtractive transformation and some part of it was evacuated to create a passage in between the open playgrounds and also to reach the vertical circulations. Thus, this void under the solid mass supplied a semi-open area on the concrete pillars as well as lightened the mass in general. On the ground floor, there are administration and support spaces (such as kitchens, toilets, etc.), while the upper floors are reserved for the teacher room and main classrooms. In both school buildings, which have a simple and pure geometric form, it is remarkable that the masses that make up the stair towers to break the monotony are exaggerated and transformed into a more dynamic form by using linear and circular openings on their surfaces. In order to ensure the security for elementary school level students, open playgrounds and courtyards towards the northern and southern directions were positioned to be easily followed from the administration part. In both schools, classes are accessed through double-loaded corridors and therefore cross-ventilation are not sufficiently provided in between the spaces. There is no direct connection from the classes to the outdoors. In addition, the long sides of the classes facing south and south-east are exposed to sunlight. Even though small horizontal eaves are applied to the windows to control the sun, they are not sufficiently effective solutions. Although the school design shows the characteristics of the modern period with its simplicity and clean lines and pure geometric forms, it is not adequately designed for the Mediterranean climate (Figure 63).

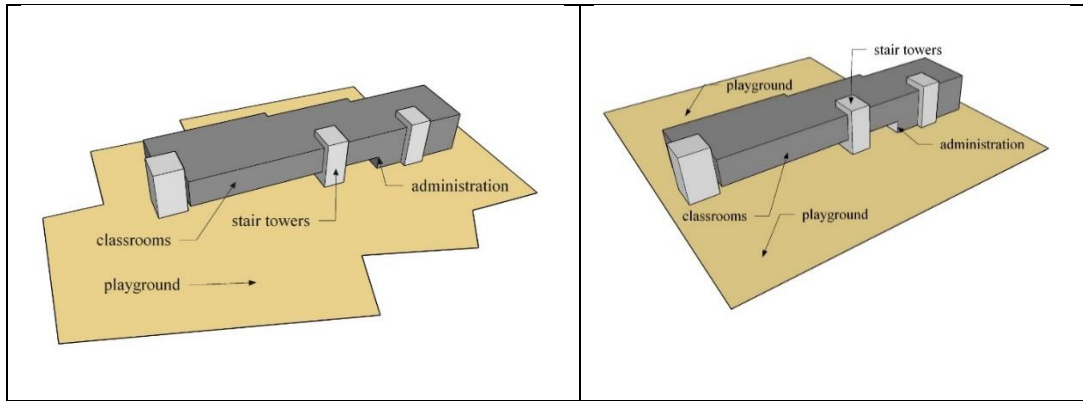


Figure 63: Lefkosa Ataturk Elementary School and Limassol First Elementary School, Drawn by Sevil Aydinlik

The **Lykavitos Elementary School** complex is divided into two linear wings and showing the characteristics of both cluster and finger type school layouts with a free composition on the site. In the north-east wing of the two-story school building, there are a total of eight classes (four on the upper floor and four on the ground floor) and four outdoor classes in the south, while the western section has an entrance hall and administration. The second wing, located in the south-west direction, extends diagonally to the first wing in the north and houses an assembly hall and supporting spaces. Depending on the function, the assembly hall and supporting spaces are particularly located in the south-west wing because of they do not need too many glass surfaces; so that these spaces both act as a buffer for the school complex and also can control annoying sun rays with minimum window openings. Both wings are connected to each other by semi-open circulation and spaces; which were one of the most remarkable features of the complex to make use of outdoor areas more actively. Thus, the hierarchical balance between spaces and masses represents a successful example of the powerful relationship between closed, semi-open and open spaces. As in other schools, the masses consisting of rectangular prisms were both lightened and shaded by subtracting certain parts of the volumes according to the sun's direction. The classroom block was slightly rotated from the north to the northwest in the layout and

accessibility to classes is provided through single-loaded semi-open corridors. There is no exit to the courtyard from the classes facing south to south-east, access to the inner gardens is provided from the transition area where two wings intersect. Classrooms facing the north have almost no glass surfaces or openings, only entrance doors and a small overhead window provided. The natural airflow to the classes is provided by windows opening from the south, and the deep egg-crate system shading element is used to break the sun's rays, especially on this long facade. Architectonic qualities such as school layout and shaping of the masses according to the orientation of the sun, the details used on the surfaces and the efficient use of semi-open areas clearly show that this school has a climate-sensitive design (Figure 64).

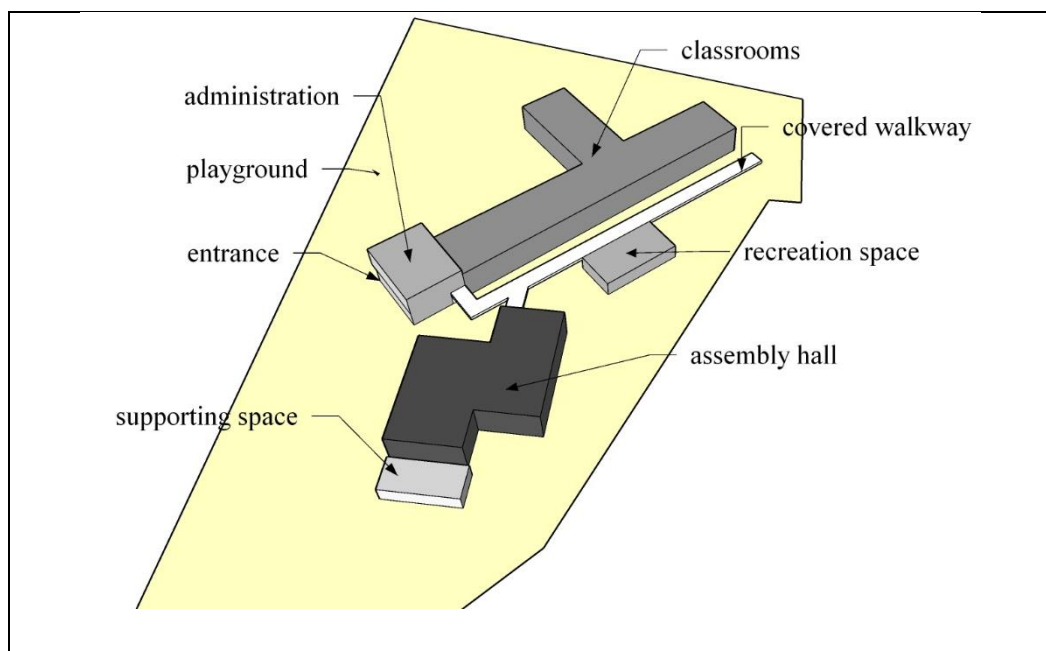


Figure 64: Lykavitos Elementary School, Drawn by Sevil Aydinlik

Consisted of a two-story rectangular mass, **Koskluciftlik Elementary School** building has a linear school layout. It has an organization extending in the line of east-west axis with its longitudinal parts facing south and north. The school has a smaller complexity than other schools, consisted of south-facing main classrooms, an administration part

attached to the main block in the north wing, and an assembly hall and supporting spaces in the west. All lecture rooms are lined up on the linear single-loaded corridor facing the southern front yard. This semi-open circulation line exiting from the north part of the building and provides direct access to the outdoor playground at the backyard. The clerestory windows were used in the direction facing the northern facade of the classes, thus providing mutual airflow to the interiors. In addition, as in other primary schools, open courtyards where the activities take place can be observed from the administration building. The school building, which consists of a clean and pure geometric form of Modern Architecture, stands out with its slightly sloped roof, unlike other Modern Cyprus schools. Surprisingly, the glazing surfaces on the southern facades are exposed to the sun, as in Atatürk and Limassol elementary schools, and there were no structural solar control elements are used to prevent the unwanted sun rays. Because of this, overheating and glare problems are inevitable in classrooms, which only internal curtains were used to block the sun. Although shaded circulation axes and open spaces created in the north, and also cross-ventilation is ensured in the classrooms, insufficient precautions against the sun have caused the school design to be inadequate in the climatic context (Figure 65).

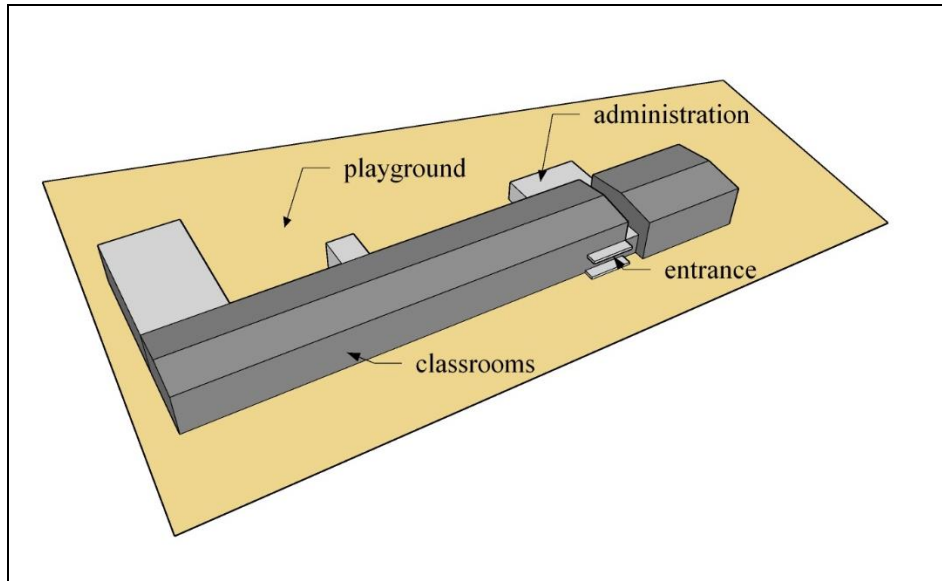


Figure 65: Koskluciftlik Elementary School, Drawn by Sevil Aydinlik

Unlike all other schools, **Famagusta Nursery School** is designed as a single-story building that suits the size of its users. It has got a linear school layout, consisting of two wings. The rectangular prismatic masses as separated into two wings are connected to each other by a closed bridge which acts as a transparent tube. Volumes consisted of very simple and pure geometric forms, such as using planar and volumetric elements, are effectively enriched with very fine details. The school includes a small administration, classes, playing and sleeping areas and other supporting spaces. The long sides of the masses parallel to each other lie in the direction of north-east and south-west on the school layout, facing north-west and south-east. Located near the seaside of the developing city, the school retreated from the main street to the southwest and created a large playground for students. This outdoor playground also allows public use of other children. The rest of the school perimeter is used as a completely green area. The most striking feature of this school building is that the rectangular volumes have a light and weightless appearance as if it stands in the air. In the whole school, the proportional solid-void relationship, the creation of light-shadow patterns from the small holes drilled on the surfaces and the

provision of natural air circulation from these openings show the harmony of the school design with the climate. In addition, the plain roof slab which is applied as a planar element wrapped the glass volume within it like a shell, resulted in an example of a successful school building with both modern architectural language and climatic design adaptation (Figure 66).

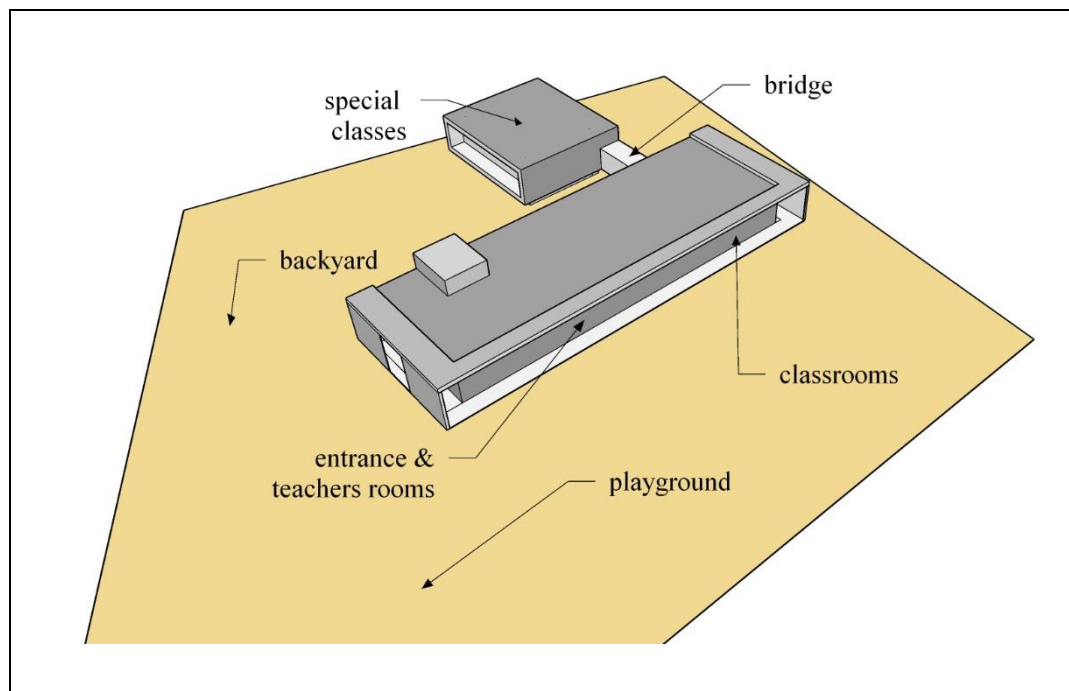


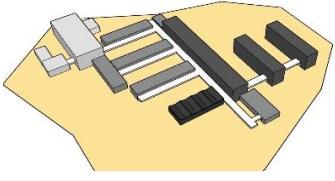
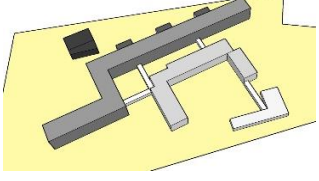
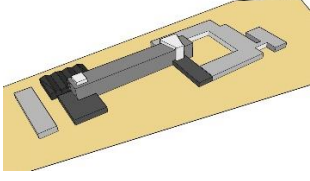
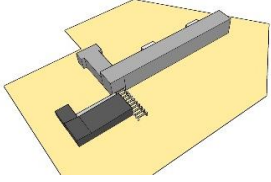
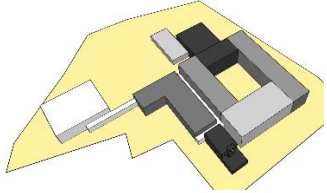
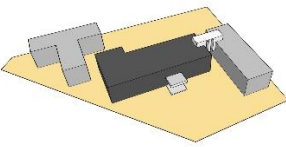
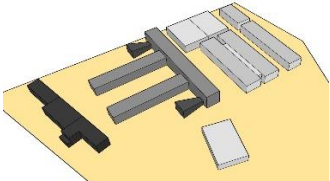
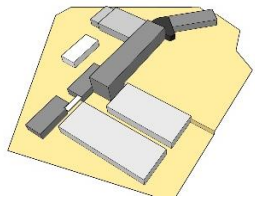
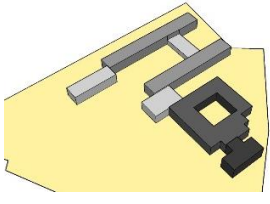
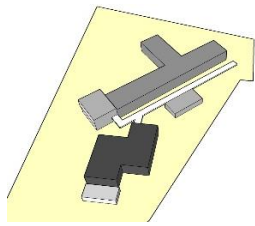
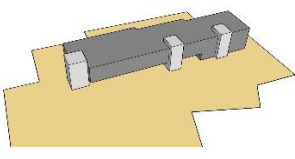
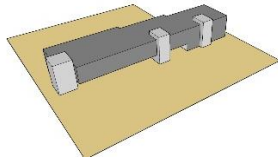
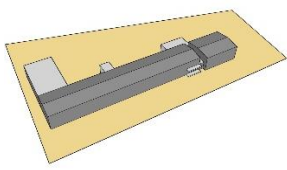
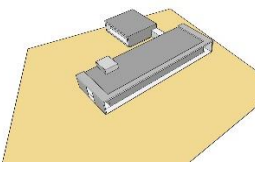
Figure 66: Famagusta Nursery School, Drawn by Sevil Aydinlik

Overall, masses of modern schools have been transformed into thin, linear, rectangular prismatic volumes with one-sided semi-open corridors or passages compatible with the climate, instead of thick, heavy and compact masses with double-sided airless and dark corridors of the past. In this way, Cyprus school architecture was created which is shaped by the spacious spaces and thin masses directly connected to the outside and landscape, in which natural ventilation and daylight are more effectively used. Moreover, order, mass, and orientation in architecture are parts of an integral whole. In this context, the masses of Cyprus schools varied according to the education level of the school in terms of height and size, but in any case, it is seen that they are formed

in human-scale dimensions (from one story to three floors high) which was a feature brought by both International Style and Mediterranean Modern Architecture. Consequently, monumental masses of school buildings and formal education were replaced with human-scale school buildings and activity-oriented education.

On the other hand, passive design strategies were also considered in the massing phase of school design, such as building height and building width, surface areas exposed to sunlight at different times of the day. Accordingly, passive comfort is provided with adapting to current climatic conditions, apart from ensuring the flexible use of educational spaces. The orientation of the building indicates the direction in which the surfaces will take the sun. Considering the orientation of mass and asymmetrical layout organization of the Cyprus schools towards the sun; it was necessary to create shaded areas such as courtyards, playgrounds, transition spaces and also surfaces in order to optimally benefit from the sun and to avoid overheating problems. Hierarchy of spaces; the arrangement of different functions on the layout such as administrative, education, sports, socialization, and so on, are all massively integrated with each other with transition spaces even though they are segregated functionally. In this part of the study; the Cyprus school buildings, which have been designed with an architectural language that reflects the basic principles of International Style and adopted the understanding of modern education system, examined to understand how the mass and layout configurations of the schools were formed by considering the orientation relative to the sun (Table 10).

Table 10: Orientation and Layout of School Building Masses

		
Lefkosa Turkish Boarding School for Girls	Pallouriotissa Female Gymnasium	Kykkos High School
		
Lefkosa Turkish Lycee	Limassol Terra Santa School	Famagusta Terra Santa School
		
Lefkosa Technical School	Lefke Technical School	Limassol Technical School
		
Lykavitos Elementary School	Lefkosa Ataturk Elementary School	Limassol First Elementary School
		
Koskluciftlik Elementary School	Famagusta Nursery School	

5.2 Shades and Shadows of School Building Masses

In this part of the study, the solar analysis was conducted for each Modern Cyprus school in order to understand how direct sunlight affects the school complexes and their site location, considering the layout of massing and orientation (Table 11). In order to determine the overall shadow conditions within the immediate surrounding area of the school buildings, computer-generated three-dimensional sun path diagrams are utilized. For this purpose, in the site plans of the schools, the route of the sun passing through the dome of the sky was examined to show a visual representation of the shade and shadows cast by school buildings for three benchmark dates as summer solstice (21 June; the longest day of the year, when the sun is at the highest point in the sky), winter solstice (21 December; the shortest day of the year, when the sun is at the lowest point in the sky), and spring equinox (21 March; when day and night equal as 12 hours and the position of the sun is just over the equator). The autumn equinox (21 September) is taken into account here, as it has almost the same solar path as the spring equinox. The diagrams display how shadows disperse and penetrate the surfaces of buildings and the area in which they are located, in different hours for the three extreme dates of the solar calendar. In this way, it can be read from the graphs that how school buildings address the sun at these different dates. Accordingly, the daily hour framework for the study has been established as standard or daylight savings time as 9 in the morning, 12 in the noon and 3 in the afternoon according to the local Cyprus time (GMT+2). The evening hours (around 6 p.m.) with the longest shadows were not taken into account, as this coincided with a time when schools were inactive. Cyprus weather data, including solar declination angle, and the position of the sun in the sky according to the time of day, has been imported to the computer software program 'Autodesk Ecotect Analysis' to simulate the shadow impact analysis derived from the

direct rays of the sun. The shadows cast by the school buildings are represented in grey colour in the diagrams. It should be noted that shadow dispersion shown in computer-generated simulations are based on clear and cloudless weather forecast conditions. Because, the overcast sky, which mostly occurs in autumn and winter days, only reduces the effect and perception of the shadow gain.

Table 11: Orientation of Modern Cyprus School Layouts towards North

Horizontal Axis (East –West)	Vertical Axis (North- South)	Diagonal Axis	
		Northeast- Southwest	Northwest- Southeast
Lefkosa Ataturk Elementary School	Lefkosa Turkish Boarding School for Girls	Lefke Technical School	Kykkos High School
Lefkosa Turkish Lycee	Lefkosa Technical School	Famagusta Terra Santa School	Limassol Terra Santa School
Koskluciftlik Elementary School		Famagusta Nursery School	
Pallouriotissa Female Gymnasium		Limassol Technical School	
Lykavitos Elementary School		Limassol First Elementary School	

Equinox (21 March) Results:

Twice a year, the first days of spring and autumn (March 21 - September 21) are the times when the sun shines on the equator following the same arc in the sky and the day and night are approximately equal. In these times when the sun rises from the east and sets in the west, theoretically, all shadows extend indefinitely when the sun intersects with the horizon line. Taking into account the impact of adjacent or separated school building masses, shadows first appear from around 8 am and begin to disappear at about 6 pm, as daylight savings times. Accordingly, Table A (see Appendix A) illustrates the shadow analysis of the selected school buildings for the equinox. Since

the values of March and September are almost equal to each other, shadow studies in this study were made on the basis of March 21. Firstly, at 9 o'clock in the morning, shadows fall directly onto the west side of the building blocks in vertically arranged (north-south axis) classrooms of Lefkosa Turkish Boarding School for Girls and Lefkosa Technical School, so that mostly longitudinal west surfaces of the classrooms are totally shaded. Also, a large portion of open courtyards that links all adjacent building masses to each other was shadowed by the linear arrangement of the classrooms in both schools. Compared to other schools, it is seen that the length of shadows is longer in these school complexes due to the north-south axis arrangement of the linear masses and its general layout. However, in Lefkosa Turkish Lycee, Lefkosa Ataturk Elementary School and Koskluciftlik Elementary School, the classroom blocks, which is the most dominant mass in the complexes, extends completely on the east-west axis, while in Pallouriotissa Female Gymnasium and Lykavitos Elementary School extends slightly tilted to the northeast-southwest axis. Therefore, the morning shadow gradually covers the entire back courtyards in the north due to the orientation of the classrooms in these schools. In addition, the secondary courtyard to the north of the multipurpose hall in Lefkosa Turkish Lycee is also overshadowed all the time by the longitudinal direction of the hall and its close proximity to the classroom. Somewhat differently, in Lefke Technical School, shadow effect differs by a number of factors, such as the levelled topography, close proximity of buildings, and northwest-southeast axis orientation and layout arrangement of the school complex. Following this, during the noontime at 12:00 pm, while the southern surfaces of the buildings are in the shade, the shadows slightly scatter the north of the open courtyard areas in Cyprus schools. Furthermore, there is almost no shadow impact on the intermediate courtyards between classes and reasonably little on the east-

west surfaces of adjacent buildings in Lefkosa Turkish Boarding School for Girls and Lefkosa Technical School. Nevertheless, it is seen that shadow cast was more effective in the open spaces in schools with diagonal layout (in line with northwest-southeast and northeast-southwest axis). However, during the noontime, open courtyards of Lefkosa Turkish Boarding School for Girls and Lefkosa Technical School are moderately shaded due to the north-south axis layout of the schools. Subsequently, by 3:00 pm, the shadow of the masses penetrated instantly on north-east portions of the sites for all school buildings. As can be seen from the diagrams, the afternoon shadow impact is slightly less effective in horizontally arranged (east-west axis) school's courtyards. Expressly, apart from the low angle of the sun at this time of day, a large amount of shadow is penetrated in the intermediate courtyards between the classes at the Lefkosa Turkish Boarding School for Girls, Kykkos High School, Limassol Terra Santa School and Lefkosa Technical School due to the orientation, layout, and density of the masses.

Summer Solstice (21 June) Results:

During the summer solstice, as the sun rises in the northeast and sets in the northwest directions, the sun is in the sky more than any day of the year, and the shadow directions and lengths vary considerably. In this time of the year, when the sun angle comes from the sky steepest, shadows falling from east to west are the longest in the early morning and late evening times. But, especially in the noontime, around 12:00 pm, the sun reaches its peak in the sky, so shadows occur as the shortest of the year and provide the brightest ambient light levels. Table B (see Appendix A) illustrates this in the same manner that there is no significant shadow impact on and around the sites for all selected school buildings throughout the day from sunrise till sunset. Due

to their horizontal layout and orientation on the site, Lefkosa Turkish Lycee, Lykavitos Elementary School, Lefkosa Atatürk Elementary School and Koskluciftlik Elementary School receive the least amount of shade on the ground, while shadow noticeably more effective in vertically arranged layout of Lefkosa Turkish Boarding School for Girls and Lefkosa Technical School, especially around 9.00 am and 15.00 pm. In addition, during the morning hours, shadow lengths are longer in school layout of Pallouriotissa Female Gymnasium, Famagusta Terra Santa School, Lefke Technical School, and Famagusta Nursery School, caused by south-east facing longitudinal masses. Conversely, shadow cast is longer during the evening times in Kykkos High School and Limassol Terra Santa School, due to their long masses facing south-west. Particularly, in school layouts with finger-type and multiple courtyards, outdoor areas between classes are more suitable for active use in the summer period. Given the low angle of the sun at these times of the day and close proximity of the buildings to one another, the shadow penetration is still minimal level in the courtyards of classrooms and mainly restricted to the west surfaces (in the morning) and east surfaces (in the afternoon) of the school buildings. However, it is clearly seen that sites of the schools which have more complexities, multiple courtyards, and higher stories, more shaded areas occurred than the schools with one or two masses, such as primary schools. Furthermore, during the noontime (at 12.00 pm), when the sun reaches its highest point in the sky, there is almost no shadow falling on the courtyards and sites of the schools. Nevertheless, owing to its horizontal orientation of the classroom's block at the Lefkosa Turkish Lycee, Lykavitos Elementary School, Lefkosa Atatürk Elementary School, and Koskluciftlik Elementary School, the northern part of the site (the backyard) receives a slight shadow even around 12.00 in the afternoon. By and large, when the sun reaches its peak, the shaded area for all schools decreases and in the

afternoon it begins to lengthen again. It should be noted that, in the summertime, the use of shaded spaces is crucial in the Mediterranean climate, especially in the transition spaces between buildings and the use of semi-open areas should be carefully designed to be efficient and comfortable.

Winter Solstice (21 December) Results:

Starting from the 22nd of September till the 21st of December, the position of the sun in the sky changes considerably towards the southern direction. Thus, every passing day to the winter solstice, while the sun rises from the eastern horizon to the south, it sets from the western horizon to the south. It should be noted that the opposite process begins after 21 December till 21 March. In winter solstice, the duration of the shadow effect is significantly shortened in parallel with the decrease in daylight time, whereas shadow length is the longest time of the year. As Table C (see Appendix A) demonstrates, there is a considerably effective shadow cast on the surfaces of school buildings, playgrounds, and courtyards from early in the morning until late afternoon in the winter solstice. Due to the low solar angles and length of shadows at this time of the year, shadow penetration is dramatically dispersed during morning and afternoon hours. Thus, large portions of the open spaces and facades of school buildings according to their proximity to each other, are completely covered with shade. Accordingly, at 9:00 in the morning, the shadows fall from school buildings to the northwest direction, while at 15.00 in the afternoon its pattern disperses in the northeast direction. Therefore, especially in the morning hours, in Lefke Technical School, Famagusta Terra Santa School, Limassol Technical School, Limassol First Elementary School, Famagusta Nursery School, which longitudinal direction of the class blocks are located on the northeast and southwest axis; the south-east courtyards

of these schools receive full sun, while the north-west courtyards are completely under shade. Compared to others, in Lefkosa Turkish Boarding School for Girls and Lefkosa Technical School, shadow impact is much more intense and efficient in the intermediate courtyards of the schools, because of the orientation of the buildings through the north-south axis direction and longitudinal linear layout organization. In addition, inner courtyards between the dense masses of Pallouriotissa Female Gymnasium, Kykkos High School, Limassol Terra Santa School, are largely shaded in the afternoon. Yet during the noontime, intermediate courtyards between classrooms in Lefkosa Turkish Boarding School for Girls and Lefkosa Technical School receive no shadow cast while in other courtyards located on the northern side are overshadowed. In the schools extending along the east-west axis (mostly in elementary schools and Lefkosa Turkish Lycee), open courtyards in the south direction make maximum use of sunlight during the winter, while the northern gardens are shadowed all day. Above all, beginning from 3:00 pm till sunset time, the shadow is extremely dispersed and intense in its impact, which can be seen from diagrams that the whole school buildings' sites was nearly overshadowed. In addition, because the ambient light levels are low during the last hours of the sunset, the shadow effects are almost invisible to the human eye. It should be taken consideration that, it is essential to benefit from the sun in the wintertime as opposed to summer months in architecture, especially in school buildings, to be able to use outdoor spaces for many activities for the students. In general, it is observed that the southern sides are suitable for taking advantage of the sun during the winter months. In all the schools, the front gardens on the southerly directions are suitable for outdoor use and winter activities.

Overall, in all shadow simulations, it is clearly demonstrated that in the morning and afternoon hours the shadow cast is more effective and intense, as the sun rays reach the earth at a low angle for all benchmark dates. Therefore, the shadows are the longest during these periods and offer comfortable outdoor spaces for students, especially in the summer months. However, in the winter solstice, the southern parts of the school buildings are designed to be usable in order to make the most of the limited daylight and provides free heat during cooler months. Only in the noontime, shadows from the existing structures are the shortest or even has no effect, because of the sun's highest position in the sky. Undoubtedly, shadow lengths also change according to the height and size of the building masses and its orientation to the sun. Mainly in the summer solstice, it is nearly not possible to use open areas due to excessive solar radiation. Hence, in a school environment with such climate, it is inevitable to use suitable shading elements on the facades of buildings, as well as to create shaded transition areas and semi-open spaces. Equinox (in which day and night are equal) was observed as the period in which the relationship between indoor and outdoor spaces was best achieved. Because solar rays are not very sharp and the weather is warm during this period while allowing a comfortable environment in school buildings. Consequently, on the basis of the orientation and layout of the buildings, attention should be paid to how the solar factor affects the environments of school buildings at different times of the day or year, and necessary precautions should be taken accordingly. In schools, it is very important to provide a comfortably cooled (by shading in summer) as well as warmed (by sunlight in winter) spaces, such as working, gathering and resting activities, where students and teachers spend a great deal of time. Therefore, sun responsive approach, particularly shading is not only one of the most essential design strategies for the Mediterranean climate but also a critical environmental issue to be

analysed for certain functions, users' comfort, and so on. Thus, the desired passive solar design will be provided which is a significant environmental solution for sustainable school architecture.

5.3 Design and Use of Brise-soleil in the School Building Surfaces

In Modern Cyprus school buildings, the design and use of *brise-soleil* have been shaped according to the specific orientation towards the sun. Substantially, various methods of shading elements were integrated to the school buildings depending on the direction and angle of the sun; either attached on the surfaces to protect the glazing behind, or as a shelf over the openings, or extending roof and overhangs, sometimes as a perforated planar element, on the circulation pathways, to name but few. Adaptation to the Mediterranean climate was based on these shading methods with the use of semi-open areas, the application of *brise-soleil* (whether vertical or horizontal or a combination of both, fixed or movable types, concrete or metal material) and even with the use of horizontal strip windows to minimize the excessive sun rays. With regard to exposure to the sun, the main challenge is to provide adequate shading, while providing the appropriate quantity and quality of daylight through spaces according to their function behind. Particularly in classrooms where students spend a long time, controlled and high-quality daylight distribution should be ensured while providing the shaded and cooled indoor environment for Cyprus schools. In light of this, shading methods and elements in such a hot climate were investigated through the surfaces of Modern Cyprus school buildings to understand their sensitivity to the sun and Mediterranean climate. Accordingly, in order to examine the design and use of *brise-soleil* in Cyprus school buildings, they are categorized under three main headings as vertical shading devices, horizontal shading devices, and egg-crate shading devices.

Vertical Shading Devices:

Modern Cyprus school buildings were generally designed as longitudinal rectangular prism masses which external, fixed and structural *brise-soleil* were applied on the facades according to the orientation of the sun. As for vertical shading devices, fixed, structural and mostly concrete planes projected towards the outside of the linear masses, mostly on eastern and western facades. For instance, vertical planes are projected from classroom blocks, facing eastern direction, which conceived as a continuous element of the structure in Lefkosa Turkish Boarding School for Girls. Because the orientation of volumes was slightly rotated towards southern and northern directions, vertical projection planes were applied less frequently and combined with horizontal elements either using concrete shelves or metallic louvers in Pallouriotissa Gymnasium for Girls, Lefke Technical School, and Lefksosa Technical School. Due to the linear arrangement of the classes, longitudinal facades exposed to solar radiation during morning and evening times. Using properly spaced vertically projected planes in between recessed classroom windows allow view for students while protecting the building's inner surfaces from excessive sun rays to overcome problems of glare and overheating. It should be emphasized that openings and windows, especially ones facing east and west, are problematic due to the low-angle of the morning and afternoon sun. The most effective answer to this problem is to use fewer windows in these directions, especially in the western direction. However, if this is not possible due to design, vertical shading devices should be used in a proper way, otherwise, if they are very frequently and intensely used they will severely restrict the vision. Just as in the successful implementation of Lefkosa Turkish Boarding School for Girls, the openings and transparency were minimized by using horizontal strip windows in the west, while controlled sunlight is penetrating into the classes among the vertical

elements arranged at frequent intervals in the east and the view is not restricted much (Figure 67). On the contrary, longitudinal sides of classroom blocks are arranged facing the south-east direction in Lefke Technical School, in which vertical elements were arranged infrequently and supported by horizontal projections with glass louvers to enhance shading. Unlike the others, the classroom mass of Pallouriotissa Gymnasium for Girls, which was originally protected by the egg-crate system and rotated slightly to the south-east, the laterally mounted vertical concrete legs were arranged rhythmically and created an extra shadow effect. Furthermore, fixed vertical louvers, which act as complete external venetian blinds, were mounted on the large glass surface in Lykavitos Elementary School and on the sides of the upper bridge connecting the two masses in Famagusta Terra Santa School. These devices are formed from vertically arranged tiny louvers, either thin cast concrete slabs or aluminium sheets. In Lykavitos, it is applied frequently spaced to form a screen in front of the glazing surface in the north-west. However, in Famagusta, it was applied to provide security in the crossing of the bridge, and at the same time, it was arranged at a slightly tilted angle to create a visual connection with the outside. To sum up, apart from having a rational approach to control the sunlight and provide fewer maintenance problems, these vertical projected planes and louvers were also stylistic elements of the modern school design, enriching the plasticity of the building's external surfaces.

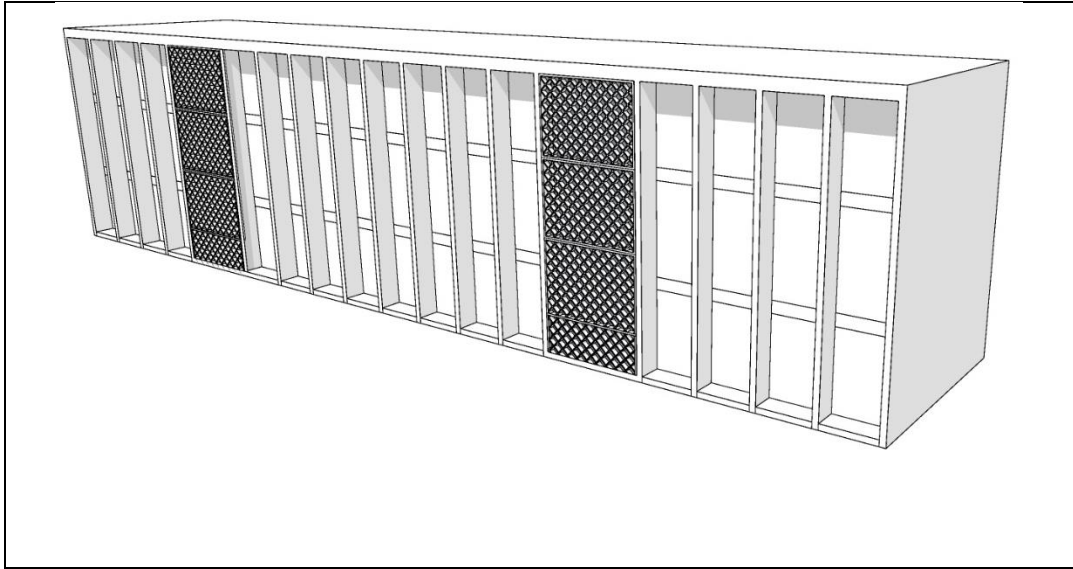


Figure 67: Vertical Shading Devices in East Elevation of Lefkosa Boarding School for Girls, Drawn by Sevil Aydınlık

Horizontal Shading Devices:

In Cyprus school buildings, especially in classroom blocks, vertical elements are used to prevent horizontal sun rays from the east and west, while horizontal shading elements are used to prevent vertical sun rays from the south. One of the best advantages of these horizontal elements rather than shading is that it provides a better visual connection to the outside. It should be noted that the highest priority is given to the view in most windows and openings. Therefore, cutting the view to keep a window in the shade is not an efficient design conception. Although horizontal overhangs might prevent slightly the appearance of high skies, most importantly they do not obstruct the horizontal view, especially at eye level. In summer particularly, the sun is higher in the sky, so the horizontal elements on the south-facing windows are quite effective. However, these horizontal elements also provide a supportive shade when used in the east, southeast, southwest and west directions, though not as effective as in the south. In order to shade south-facing surfaces, projected horizontal shelves and attached louvers can be one of the primary methods. They must be wider than the

windows and fixed into the structure of the building to provide many benefits taking account of the movement of the sun from east to west. In general, these horizontal shelves are installed directly above the window level. If the glass surfaces are spaced at close intervals, the shelves are typically mounted along the full width of the south facade. In addition, smaller shelves and louvers can also be placed on high glazing windows at different levels. However, if fixed louvers are installed in the line of sight, they can block the view, but may not obstruct it completely. For example, the sequential vertical alignment of the horizontal blinds in front of a window might block the view when looking upwards and horizontally, but it does not block it completely while looking down and provides visibility. Typically, horizontal projections are applied along the sun-facing facades of buildings. This is mainly used to prevent overheating during the summer period in the southern facades, which consists of large amounts of glazing. By and large, louvers are used to prevent high-angle summer sun falling on the surface of the building and provide shadow, while at the same time allowing the low-angle winter sun to provide passive solar heating through interior spaces. In Cyprus school buildings; it is seen that a variety of horizontal shading methods were used mostly in southern directions. For instance, fixed metallic horizontal shelves were applied on every three floors in Lefkosa Turkish Lycee, whereas movable horizontal louvers used in Lefke and Limassol Technical Schools and Lefkosa Turkish Boarding School for Girls (Figure 68). Unlike fixed ones, these movable glasses or metal louvers do not block the view depend on being adjustable and thickness or transparency of the material. In order to provide shading by blocking the sun from certain angles, in fact, the use of several small elements (like shelves and louvers) and the use of several large elements could have the same effect. Although these devices almost as transparent as an insect's wings are rather effective to prevent

solar radiation. In addition, horizontal concrete shelves were applied on the windows to create shadows, with curvilinear forms in Famagusta Terra Santa School; and similarly, slight protrusions were applied in Atatürk and Limassol Elementary Schools, although the effectiveness of the second samples was questioned. Furthermore, long rectangular prism blocks of the selected school buildings were enriched by recessions and projections, additions and subtractions from the main structure to give proper shading. Pure geometric volumes are emphasized by these movements of the facade as the interactions of solids and voids and by emphasizing the horizontality. For example, in Lefke Technical school, the windows on the southwest facade at the lowest level serve as horizontal shading, with a niche like subtraction of the volume about 50-60cm. Similarly, by recessions and projections of the volumes, horizontal type of shading was also created in Famagusta Terra Santa School example. Moreover, roof eaves and overhangs were designed to provide effective shading just under the floor levels, besides enriching the building's volume and creating a visual interest such as overflowing roof plate of Famagusta Nursery School. Particularly, the folded plate roof on the south facade of the Lefkosa Turkish Boarding School for Girls was remarkable, which shows the characteristics of mid-century Modern Architecture and also has a strong consideration as a horizontal shading device. Foremost, semi-open transitional spaces, which are essential in the Mediterranean climate to help cool the buildings with natural air circulation and create effective shading, were used in almost all selected school buildings. According to the functional organization, it was used as an inviting entrance definition in Lefkosa Turkish Lycee extending in front of the south facade, whereas it was used as semi-open passages in front of the classroom blocks on the northern side. Besides, there are semi-open corridors in front of the single-loaded class blocks to the north of Lefkosa

Technical School and Koskluciftlik Elementary School. Specifically, in Lefke Technical School and Kykkos High School, semi-open transitional corridors and also balconies were formed by subtraction of the rectangular prism blocks of the classrooms in north-west elevation. In addition, semi-open transitions are widely used throughout the circulation axis and allowing cooling breezes to pass in-between two-sided courtyards and classrooms in Lefkosa Turkish Boarding School for Girls, Pallouriotissa Gymnasium for Girls and Lykavitos Elementary School.

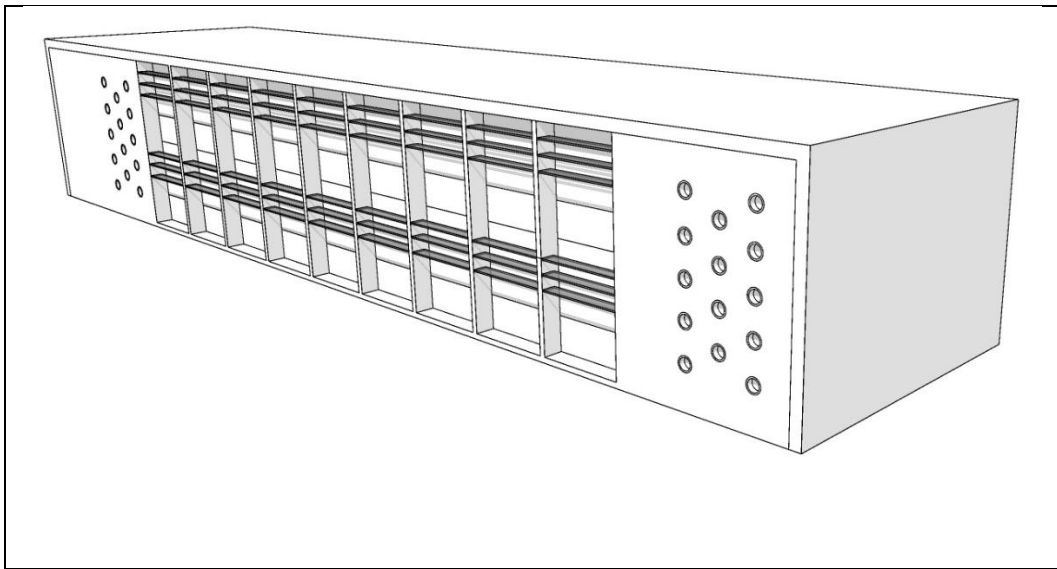


Figure 68: Horizontal Shading Devices in South-East Elevation of Lefke Technical School, Drawn by Sevil Aydınlık

Egg-Crate Shading Devices:

When vertical and horizontal shading elements are combined, the most effective sun breaker is emerged as egg-crate. These devices are more suitable in hot and arid climates to block the unwanted sun rays, especially on the south-east and south-west facades and sometimes on east and west. Egg-crate shading devices are efficiently used in Lefkosa Turkish Lycee (south), Kykkos High School (south-west), Lykavitos Elementary School (south-east) and Pallouriotissa Gymnasium for Girls (south-east), in response to recommended sun directions which give the best all-around shading

(Figure 69). It was projected from the rectangular volumes as wrapping around the windows like a lattice to ensure high shading efficiency. Thus, actually, the entire surface was acted as a shading element around the openings to prevent the extreme sun rays and overheating. Furthermore, on some special facades angled baffles are used to block direct sunlight and obscure glazing surfaces behind, while slightly allowed daylight floats into the building. Therefore, according to the angles of the sun at different times of day, angled baffles were rotated towards the south-west in Lefke Technical School and south-east in Limassol Terra Santa School, acted like deep inset windows, to reduce the impact of harsh sunlight and intense heat. Somewhat differently, without using any projections or baffles, angular arrangements of windows were designed on the surface of the dormitory part of Lefkosa Turkish Boarding School for Girls, which longer elevation facing the west and accordingly openings rotated to the south side. Thusly, these movements on the surfaces of the volumes, which arose from the climatic requirements, added a non-decorative richness to the plain facades. On the other hand, perforated concrete panels, which known as the most effective shading and cooling method by both providing natural airflow as well as controlling the sun, can fall into this category due to use both horizontally and vertically. These filtered screens are inspired from traditional mashrabiya by Le Corbusier after visiting African countries, and called as 'sun-shielding perforated concrete panels' or 'honeycomb grillwork'. In particular, it used in vertical circulation zones in Lefkosa Turkish Boarding School for Girls and Pallouriotissa Gymnasium for Girls, just like a textured permeable wall. In addition, it is used on the horizontal circulation zones as a semi-permeable screen wall to protect the transition spaces from the sun and cooling the environment by natural air movement. Apart from increasing the plastic value of the volumes such as creating a visual richness and fascination on

surfaces, these elements are defined as one of the most influential architectural innovations in terms of environmental factors, as shading and natural ventilation. Similarly, another version of these elements is the tiny holes drilled into the surfaces which they also filter sun rays but allow air circulation to the internal spaces. Looking like a pattern, these small-sized geometric holes on the surfaces can control the sunlight. For instance, mini cubic windows were used in Lefkosa Technical School and Lefkosa Turkish Lycee, while circular shape openings were applied in Lefke Technical School and Famagusta Nursery School, onto the surfaces. This aesthetically pleasing appearance of small apertures or openings are specially adapted to hot and warm climates, which filter the excessive sun rays, allows natural daylight, and air circulation into the spaces while creating a pattern of light and shadow on the surfaces.

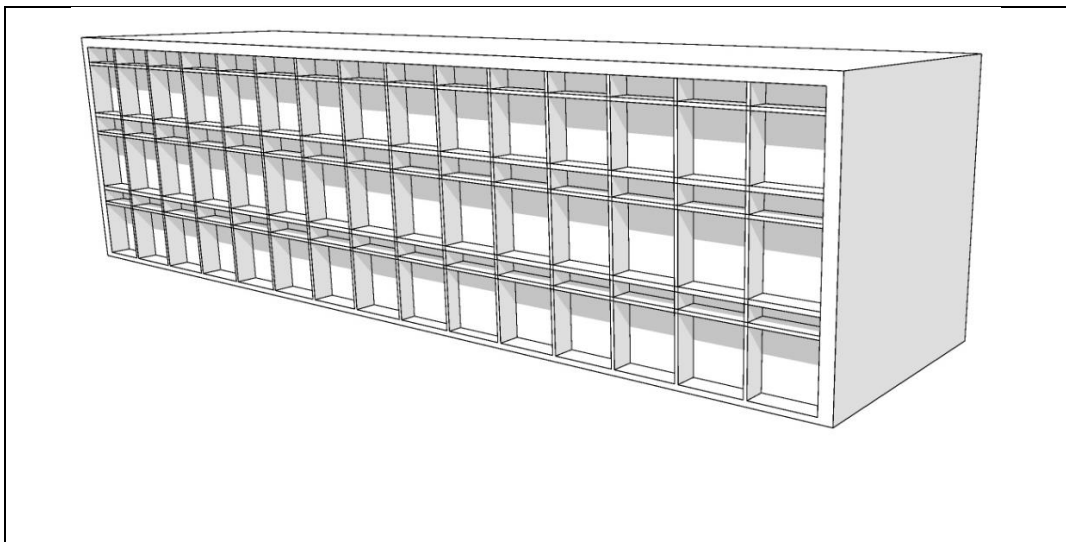
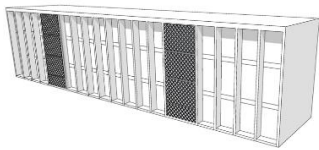
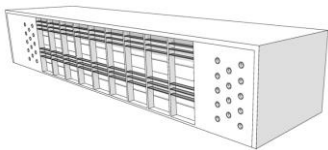
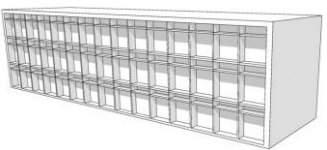


Figure 69: Egg-Crate Shading Devices in South Elevation of Pallouriotissa Female Gymnasium, Drawn by Sevil Aydınlık

Overall, *brise-soleil* was the most powerful and influential element in modern school design in this Mediterranean region. Abundance uses of glass surfaces and volumes, which are used extensively in Modern Architecture, were controlled with different types of shading devices on the exterior facades of the school buildings. The controlled

light penetrated through the sun breakers accordingly ensured comfortably illuminated interior spaces. In some cases, even air circulation is provided with perforated screen elements to cool the buildings. In addition, the interplay of light and shadow in the spaces, as well as transparency and opacity of the volume of surfaces, are provided by fenestration. Also, due to the modular skeleton system of the buildings these elements, either structural or attached to the different directions of the facades, protected the spaces from climatic conditions and also created unity in the design. Consequently, these devices designed in sympathy with the Mediterranean climate, thus providing a functional and aesthetic effect (Table 12).

Table 12: Vertical, Horizontal and Egg-crate Types of Brise-soleil in Modern Cyprus School Buildings

		
Vertical Brise-Soleil	Horizontal Brise-Soleil	Egg-crate Brise-Soleil

Chapter 6

CONCLUSION AND DISCUSSION

International Style in architecture rapidly rose and progressed towards establishing a common universal identity for all nations, wherein people aimed to forget the past and began to embrace a new, Modern lifestyle, following the period of world wars that had left devastating wounds on the communities. However, the International Style has often been criticized for its ignorance of climate, context, place, culture and the power of pluralism. Although some of these criticisms seem to be justified, it is because the ‘global economy’ was endangered by ‘multinationalism’ in the 1960s and at the same time saw it as a force that ‘levelling cultures and indigenous development’. Modernism, which began with ‘high ideals’ and enthusiasm, promised to create a new world with its ‘internationalist stance’, but this trend was attacked at the end of the 1960s, and subsequently, the main slogan of Modern Architecture ‘less is more’ replaced with ‘less is bore’ as a new belief of postmodernism. The rational styles of – isms in the 20th century suffered serious blows, along with new trends that represented purely commercial packaging and advertising, such as Pop Art. Khan (1998) asserted that ‘The International Style, and more particularly modernist architecture, never really died; it did not even fade away, but transformed itself under several guises in different countries’. He continued to express that ‘while modernism was never a single style, nor even a single attitude, it was nevertheless characterized by an international outlook.’

In Cyprus, despite the growing ethno-nationalist conflict, architecture had its golden age from about the mid-1950s to the early 1970s in the quest for modernism. It was striking to see that post-war school architecture managed to avoid references to historical, ethnic and religious identities when there was an intentional exacerbation of hostility between two ethnic communities. Post-war Cyprus school buildings predominantly followed principles of the International Style (architecture as volume, regularity of features, and avoidance of applied decoration) together with environment-based design strategies, while both Greek and Turkish-Cypriot education systems were instrumental in strengthening local nationalisms and even ethnic tensions. Dissemination of the International Style and its relevance for school buildings played an important role in creating learning environments, which were not promoting or preparing for war, but encouraging a different sort of battle: a cultural rivalry between the two communities. Unlike the architecture of most earlier school buildings, post-war school buildings exploited Modern building materials and techniques, climate and environmentally sensitive Modern design ideas and approaches, Modern ways of life and thought as well as Modern methods of education.

As cultural symbols post-war school buildings in Cyprus represented the national character of the community on the island, embracing and supporting modernity for survival and existence. This argument is echoed in the discourse and praxis of passionate, modernist Cypriot architects and in the state policy of the Modern republic. Policies of the bi-communal state contributed to the development of the economy, the increase in living standards and the adoption of a Modern way of life, with great emphasis on educating the Cypriot communities. At the same time, modernist architects brought a contemporary spirit, universal trends and developments in

architecture to the island. These avant-garde architects contributed to the contemporary image of the built environment with the new style, which was both adequate for technological developments and served the Modern way of life. In this context, modernist architects were achievement-oriented, precise and perfectionist professionals who served their communities as architects without political prejudices or connections. Therefore, with the ideals of establishing a new republic aimed at separation from colonial and authoritarian rule, post-war school buildings, as representing the state, were completely purified from its monumental, resplendent and nationalist image of the past. It is undeniable that the new understanding of education, which was transformed with the socio-political developments of the post-war era, reshaped school architecture in Cyprus.

School buildings were renewed, reshaped and reformed by modernist architectural ideas that both reflected local traditions and the Mediterranean climate and considered rational planning and scientific reasoning. Accordingly, they were not only formed in accordance with International Style principles, such as using simple geometric forms, clean lines and functionality in architecture but also well integrated with climate responsive design approaches. In this context, universal principles of International Style, which were initiated by Johnson and Hitchcock, were localized and created its own unique architectural characteristics in post-war school buildings, especially by responding to the environmental conditions of Cyprus. In general, the elegance of technical details, beauty of simplicity, proportion, pure geometric volumes, and relationship with the natural environment was emphasized without the need of any decoration and ornamentation in the school buildings. Moreover, visual interest, fascination, and dynamism were provided by solid-void relationship, brise-soleil, the

use of local materials, broken lines, folded plate roofs and parabolic eaves on the masses and surfaces. In terms of Mediterranean climate, particularly the orientation and layout of the building mass, and surface treatments of the building were one of the most essential design strategies according to the sun. Therefore, this is revealed as a fourth principle that design with climate in the context of local and regional thinking was one of the most influential design approach considering the Mediterranean school architecture.

The climate was the most powerful and influential element for shaping the post-war school architecture in this Mediterranean region. Although these buildings represent the common features of mid-century architectural trends, they were blended with regional and local sensibilities considering Mediterranean climate and architecture. The modernist architects developed a design strategy with respect to environmental factors and local climatic conditions, so created a unique architecture for post-war school buildings without disturbing the integrity of design and an aesthetic of simplicity. One of the most essential design strategies was to control the intense Mediterranean sun. Having a direct impact on the space and at the basis of modernism, play of light and shadow were provided and enriched by both functional and aesthetic design approaches, such as proper use of brise-soleil and fenestration on the surfaces, shaded semi-open transitional areas, orientation of layout and mass according to the daily and annual patterns of the sun, appreciation of the landscape and so forth. In addition, the primary materials of Modern Architecture, such as concrete, glass, and steel, were applied in school buildings together with local materials such as yellow sandstone and river cobbles, resulting in a rich texture on the facades. Thus, the link between International Style and Mediterranean architecture was developed in more

human-scale school buildings without the need for applied decoration, ornamentation or symbols. As a new conception of function and aesthetic in the region, there was a ‘Mediterraneanization’ of International Style in post-war Cyprus school buildings, which was reinterpreted and adapted to the specific local requirements. Consequently, in line with the principles of International Style and depending on existing environmental data, similar Modern and climate-sensitive design approaches were seen in the school architecture and educational buildings of both communities. Modern Architecture, which started its journey in the Mediterranean region, actually expressed itself better and stronger in its origin and essence when it started to spread all over the world and be applied in the Mediterranean region with International Style principles. In this context, post-war school buildings in Cyprus can be shown as successful examples of Mediterranean modernism which articulates a reconciliation between the local and Modern. As a Modern heritage, these school buildings mostly represents success in the sense of ‘design with climate’ as well as responsiveness to the physical environment. As Frampton (2002) claimed that adopting the ‘universal’ principles of ‘modernism’ together with the ‘geographical context’ of a building, such as climate, topography, light and local architectonic form, was in fact ‘critical regionalism’.

However, this ‘regionalized’ Style and most importantly environmentally friendly design approach disappeared over a short period, started from the mid-1970s till today. As a result, classical revival style is seen in school buildings from that time till now, in which local environmental values and the functionality of International Style are largely ignored. Also, today when the maintenance works of these buildings are carried out, interventions and renovations that do not conform to the original character and authenticity of these Modern school buildings are observed. This Modern heritage is

open to any kind of threat because they have not been registered, so any uncontrolled intervention in these school buildings may be subject to degradation or permanent destruction. Therefore, it is important to apply 'do as little as possible' and 'reversibility' rule in order to preserve this Modern heritage. Furthermore, adaptation to climate is one of the most effective design solutions in these buildings in order to address the global warming issues nowadays within the scope of sustainability issues. Indeed, today's architects should learn a lesson from the enthusiasm of post-war architects to create an environmentally friendly design, which is all about thinking locally and acting globally. It should be noted that the main philosophy of the Modern Movement has always been to build a better world. Because our legacy is our future, we should learn how to appreciate and advocate for the preservation of our Modern legacy.

In conclusion, this study shows that post-war school buildings are the 'situated modernism' in Cyprus, conveyed appreciation and aestheticization of climate-sensitive design strategies. Particularly, sun control is highlighted as an important value to determine a new conception of space, function, aesthetics, and design. It rooted in the Mediterranean region and personalized as other tradition by Turkish and Greek Cypriots, yet all of them is to share the internationalist outlook. Accordingly, this study documents and sheds light on Modern Cyprus school buildings of which design strategies could be considered for the design of new school buildings in the age of global warming problems. It should not be forgotten that today, there is still much to be learned and acquired than scientific understanding and aesthetic appreciation of Mediterranean Modern architecture. The lessons to be taken from post-war school buildings are the Modern system of thought, vision, and education that reflects the

enthusiasm and spirit of the period, as well as, the architectonic qualities with environmentally friendly, climate-sensitive, and contemporary design strategies.

As the documented and analysed precedents of Modern Architecture in Cyprus, post-war school buildings represent an important period in the recent history of the island. They enable understanding of how International Style was localized on the island while the spirit of time, social, cultural and political aspects of the period are traced. In this respect, though education is supposed to unite people, segregated schooling in Cyprus became one force that contributed to the destruction of bi-communal republican ideals. Eventually, internationalism was defeated by nationalism, and the two ethnic communities became totally separated from each other with the division of the island in 1974. However, a common understanding of peace-making and trust-building communicated through education could have been a way to heal from the conflict. Therefore, school buildings as homes of such understandings could be a tool for and symbol of peace in Cyprus. As Abraham Lincoln stated, ‘the philosophy of the schoolroom in one generation will be the philosophy of government in the next’ (Boyle & Burns, 2011:17), which illustrates the potential for school buildings in Cyprus to influence the ideologies of states and people’s beliefs in peace.

REFERENCES

- Agarez, R. (2018). *Algarve Building: Modernism, Regionalism and Architecture in the South of Portugal, 1925-1965*. Abingdon: Taylor and Francis
- Alpagut, L. (2005). *The educational buildings in Ankara in the early Republication Period* (dissertation). Hacettepe University, Ankara.
- Aydınlık, S., & Pulhan, H. (2019). Education in Conflict: Postwar School Buildings of Cyprus. *Open House International*, 44(2), 68–76.
- Aydınlık, S., Pulhan, H., & Uraz, T. U. (2016). Adaptive Reuse of Modern School Building in Post-Colonial Cyprus. *DOCOMOMO 14th International Conference, Adaptive Reuse: The Modern Movement towards the Future*, Calouste Gulbenkian Foundation, Lisbon, Portugal, 607–613.
- Baker, L., & National Clearinghouse for Educational Facilities. (2012). *A History of School Design and Its Indoor Environmental Standards, 1900 to Today*. National Clearinghouse for Educational Facilities, Washington, DC.
- Banham, R. (2002). *Theory and design in the first machine age*. Oxford: Butterworth Architecture.
- Barber, D. (2012). Le Corbusier, The Brise-Soleil, and the Socio-Climatic Project of Modern Architecture, 1929-1963. *Thresholds*, 40, 21–32.

- Barr, A. H., Hitchcock, H.-R., Johnson, P., Mumford, L., & Museum of Modern Art (New York, N.Y.). (1932). *Modern Architecture: International exhibition, New York, Feb. 10 to March 23, 1932, Museum of Modern Art*. New York: Museum of Modern Art.
- Benevolo, L. (1971). *History of Modern Architecture: Vol. 1*. Cambridge: M.I.T. Press.
- Bilsel N. & Dinçyürek Ö. (2017). Education under the Shadow of Politics: School Buildings in Cyprus during the British Colonial Period. *Paedagogica Historica*, 53(4), 394-410.
- Boyle, P., & Burns, D. (2012). *Preserving the public in public schools: Visions, values, conflicts, and choices*. Lanham: Rowman & Littlefield Education.
- Bozdogan, S. (2001). *Modernism and Nation Building: Turkish Architectural Culture in the Early Republic*. Seattle: University of Washington Press, USA.
- Bozdogan, S., & Akcan, E. (2012). *Turkey: Modern Architectures in History*. Reaktion Books, Limited.
- Bryant, R. (2001). An Aesthetics of Self: Moral Remaking and Cypriot Education. *Comparative Studies in Society and History*, 43(3), 583-614.
- Bryant, R. (2004). *Imagining the Modern: The Cultures of Nationalism in Cyprus*. Taurus & Co., NY.

Building-massing-orientation (n.d.), Retrieved from:
<https://knowledge.autodesk.com/support/revit-products/getting-started/caas/simplecontent/content/building-massing-orientation.html>

Burke, C. & Grosvenor, I. (2008). *School*. Reaktion Books, London.

Burke, C. (2015). Hidden Internationalisms: Tradition and Modernism in Post-war Primary School Design, 1948-1972. In Breward, C., Fisher, F. and Wood, G. (Ed.), *British Design. Tradition and Modernity after 1948*. London. Bloomsbury Academic.

Caldas, J. V. (2011), Design with Climate in Africa. The World of Galleries, Brise-Soleil and Beta Windows, *DOCOMOMO Journal, Modern and Sustainable*, 44, 16-23.

Canizaro, V. B. (2007). *Architectural regionalism: Collected writings on place, identity, modernity, and tradition*. New York: Princeton Architectural Press.

Cohen, J.-L. (2007). *Mies van der Rohe*. Basel: Birkhäuser.

Collier R.W. (1975). *Contemporary Cathedrals - Large scale developments in Canadian cities*, Montreal: Harvest House.

Colquhoun, A. (2002). *Modern Architecture*. Oxford: Oxford University Press.

- Conrads, U. (1991). *Programs and manifestoes on 20th-century architecture*. Cambridge, Mass.
- Cunningham, A. (1998). *Modern Movement heritage: A challenge to manage*. New York: E & FN Spon.
- Curtis, W. J. R., & Phaidon Press. (2013). *Modern Architecture since 1900*. London: Phaidon Press.
- Dodd, C. H. (1993). Cyprus: A Historical Introduction. In Dodd, C. H. (Ed.), *The political, social, and economic development of Northern Cyprus*. Huntingdon, England: Eothen Press.
- Doratli, N. (2002). Nicosia - the Last Divided City of Europe, *Open House International*, 27(4), 57-70.
- Dudek, M. (2000). *Architecture of schools and the new learning environment*. Oxford: Architectural.
- Encyclopaedia Britannica. (2008). *Brise-soleil*. Retrieved from: <https://global.britannica.com/technology/brise-soleil>.
- Energy and Resources Institute., Institut Catalá d'Energia., & Asia Urbs Programme. (2004). *Sustainable building design manual*. New Delhi: Energy and Resources Institute.

- Evans, C., & Brooks, R. (2005). *Architecture Of The Modern Movement In Tucson 1945-1975, Context Study*. Jeffery Preservation Studies Program, University of Arizona.
- Fereos, S. & Phokaides, P. (2006). Architecture in Cyprus between the 1930s and 1970s. *DOCOMOMO Journal*, 35, 15-19.
- Feridun, H. (2001). *Kıbrıs Türk eğitiminin tarihçesi: (1571-1974)*. İstanbul: Boğaziçi Yayınları.
- Ferreira, Z. (2013). Local and Global Modern Thinking. Designing with Climate in Mozambique: School Buildings Production, *DOCOMOMO Journal*, 48, 83-87.
- Ferro, L. (2004). Karantinòs Greek Rationalist. *Domus 874*, Milano: Editoriale Domus.
- Frampton, K. (2002). Towards a critical regionalism: Six points for an architecture of resistance. *Labour, Work and Architecture / Frampton, Kenneth*, 77-89.
- Frampton, K. (2011). *Modern Architecture: A critical history*. London: Thames & Hudson.
- Gamarra J. (2018). Building Citizens for Tomorrow: Postwar School Design in Ontario. *RENDER: The Carleton Graduate Journal of Art & Culture*, 6, Ottawa, ON: Carleton University.

- Gelfand, L., & Freed, W. E. C. (2010). *Sustainable School Architecture: Design for Elementary and Secondary School*. John Wiley & Sons.
- Georghiou C. (2018). *The Architecture of the Cypriots during British Rule 1878 – 1960*. En Tipis Publications, Nicosia.
- Georghiou, C. (2013). *British colonial architecture in Cyprus: The architecture of the British Colonial Administration, 1878-1960*. Nicosia: En Tipis Publications.
- Georgiou, S. (2012). *Living With the “Other”: Greek Cypriot Education after 1960* (dissertation), Istanbul Bilgi University, Turkey.
- Giedion, S. (1982). *Space, time and architecture*. Cambridge Mass: Harvard University Press.
- Given, M. (1997). Star of the Parthenon, Cypriot Melange: Education and Representation in Colonial Cyprus. *Journal of Mediterranean Studies*, 7(1), 59-82.
- Given, M. (2005). Architectural styles and ethnic identity in medieval to Modern Cyprus. In J. Clarke (Ed.), *Archaeological perspectives on the transmission and transformation of culture in the Eastern Mediterranean*. Oxbow Books, 207-213.
- Goad, P. (2017). The classroom is another place? Ernest J. Kump’s “ideal” learning environments for Californian schools 1937–1962. In K.K. Darian-Smith & J.

Willis. (Ed.), *Designing schools: Space, place and pedagogy*. London: Routledge, 39-54.

Goldfinger, M. (1993). *Villages in the sun: Mediterranean community architecture*. New York: Rizzoli International Publications, Inc.

Grewe, C., & German Historical Institute (Washington, D.C.). (2005). *From Manhattan to Mainhattan: Architecture and style as transatlantic dialogue, 1920-1970*. Washington, D.C.: German Historical Institute.

Groot, H. (2007). *When Less Powers More: An Analysis of Energy Conservation in Modern Architecture*, University of Auckland, New Zealand.

Gropius, W., & Shand, P. M. (1998). *The new architecture and the Bauhaus*. Cambridge, Mass: M.I.T. Press.

Hajisoteriou, C., & Angelides, P. (2013) The politics of intercultural education in Cyprus. *Education Inquiry*, 4(1), 103-123.

Hille, T. (2012). *Modern Schools: A Century of Design for Education*. New York, NY: John Wiley & Sons.

Hitchcock, H.-R., & Johnson, P. (1995). *The international style*. New York: W.W. Norton.

- Hohfeld, M., Lindlar, G., & Bundesinstitut für Bau-, Stadt- und Raumforschung.
(2015). *Tel Aviv white city: Modernist buildings in Israel and Germany*. Bonn:
Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR) im Bundesamt für
Bauwesen und Raumordnung (BBR).
- Jackson, A. (2008). *Reconstructing architecture for the twenty-first century: An
inquiry into the architect's world*. Toronto: University of Toronto Press.
- Johnson, W. M. (1969). Book Review: The International Style. *Art Education*, 22(1),
40-41.
- Jordy, W. H. (1965). The international style in the 1930s. *Journal of the Society of
Architectural Historians / Society of Architectural Historians*, 24(1),10-14.
- Joseph, J. -S. (1997). *Cyprus: Ethnic conflict and international politics ; from
independence to the threshold of the European Union*. New York, NY, USA:
Palgrave Macmillan.
- Karakus, G. (2013). Myths of the Mediterranean. *NATURA*, 90-101.
- Keshishian, K. K. (1972). *Romantic Cyprus: Everybody's guide*. Nicosia, Cyprus:
Kevork K. Keshishian.
- Khan, H.-U. (1998). *International style: Modernist architecture from 1925 to 1965*.
Köln, Germany: Taschen.

- Knapp, E., Noschis, K., Colloquia sàrl, & Architecture & Behaviour Colloquium. (2010). *Architectural quality in planning and design of schools: Current issues with focus on developing countries*, Lausanne: Comportments.
- Koch-Nielsen, H. (2002). *Stay cool: A design guide for the built environment in hot climates*. London: James & James Science.
- Lange, M. (2009). *An Education in Violence: British Colonialism and Ethnic Conflict in Cyprus and Sri Lanka*. Department of Sociology, McGill University.
- Latif, D. (2014). Religion and Ethical Education in Divided Societies: The Case of Cyprus. In Seligman, A. B. (Ed.), *Religious education and the challenge of pluralism*. New York: Oxford University Press.
- Le, C. (2009). *Towards a new architecture*. Mineola, NY: Dover.
- Lechner, N. (2001). *Heating, cooling, lighting: Design methods for architects*. New York: J. Wiley.
- Lejeune, J.-F., & Sabatino, M. (2010). *Modern Architecture and the Mediterranean: Vernacular dialogues and contested identities*. London: Routledge.
- Lescaze, W. (October 01, 1937). The Meaning of Modern Architecture. *The North American Review*, 244(1), 110-120.

- Levine, R. (2018). Modern Architecture & Ideology: Modernism as a Political Tool in Sweden and the Soviet Union. *Momentum*, 5(1), Art. 6.
- Mackenzie, C. (1993). Le Corbusier in the Sun. *Architectural Review*, CXCII (1152), 71-74.
- Mallgrave, H. F. (2009). *Modern architectural theory: A historical survey, 1673-1968*. Cambridge: Cambridge University Press.
- Michael, A. & Fereos, S. & Konstantinou, C. (2009). *Learning from the Heritage of the Modern*. Cyprus Architects Association, Republic of Cyprus, Nicosia.
- Mollon E. (2013), Mid-Century Modern Schools in Manhattan, *DOCOMOMO_US*, Newsletter, Retrieved from: <http://www.docomomo-us.org/news/mid-century-modern-schools-in-manhattan>.
- MOMA. (1932), School Buildings in New International Style of Architecture in Modern Architectural Exhibit, *New York Times*, Museum Of Modern Art press release archives, New York.
- Moussa, M. (2012). Xenia Hotels Project, 1950-1967. Reapproaching the Role of Post-War Modern Architecture in Greece. *1st International Conference on Architecture and Urban Design*, Epoca University.
- Nallo, M. (2013). Die Schule als offenes Haus: school building and leisure in Switzerland in 1950s and 1960s. *The Journal of Architecture*, 18(5), 647–671.

- Nelson, B. (2014). School design through the decades. *Mosaic Newsletter*. Retrieved from: <https://mosaicscience.com/story/school-design-through-decades/>
- Nevzat, A. (2005). *Nationalism amongst the Turks of Cyprus: The first wave*. Oulu: Oulu Univ. Press.
- O'Donnell, K. (2018), *What do building massing and orientation have to do with sustainability?* Retrieved from: <https://www.metabuild.io/what-do-building-massing-and-orientation-have-to-do-with-sustainability/>
- Ogata A. F. (2008). Building for Learning in Postwar American Elementary Schools, *Journal of the Society of Architectural Historians*, University of California Press, 67(4), 562-591.
- Olgyay, A., & Olgyay, V. (1957). *Solar control & shading devices*. Princeton: Princeton University Press.
- Olin, M. N. (2011). *Through the Eyes of Greek Cypriots and Turkish Cypriots: The Perception of Cyprus* (dissertation). Portland State University.
- Orr, C. W. -J. (1918). *Cyprus under the British Rule*. Roxburghe House, London.
- Ossipoff, V., Sakamoto, D., & Britton, K. M. C. (2015). *Hawaiian modern: The architecture of Vladimir Ossipoff*. New Haven, Connecticut: Yale University.

- Özay, N. (2005). A Comparative Study of Climatically Responsive House Design at Various Periods of Northern Cyprus Architecture. *Building and Environment*, 40(6), 841-852.
- Özgüven, B. (2004). From the Ottoman Province to the Colony: Late Ottoman Educational Buildings in Nicosia. *Middle East Technical University Journal of the Faculty of Architecture*, 21(1-2), 33–66.
- Özkul, A. E., Akcansoy, Y. & Ülvey, G. F. (2018). Viktorya İslâm İnas Sanayi Mektebi ve Kıbrıs Türk Kadınının Yaşamdaki Rolü, *CTAD*, 27, 71-96.
- Özmatyatlı, I. O. & Özkul, A. E. (2013). 20th Century British Colonialism in Cyprus through Education. *Eğitim Araştırmaları-Eurasian Journal of Educational Research*, 50, 1-20.
- Pallouriotissa School Archives (2018). Retrieved from: <http://lyk-palouriotissalef.schools.ac.cy/index.php?id=istoria>
- Pancyprian Archieves (2016). Retrieved from: <http://lyk-pagkyprionlef.schools.ac.cy/index.php/el/sxoleio/istoriko-scholeiou>
- Papadakis, Y. (2007). *Divided Cyprus: Modernity, History, and an Island in Conflict*. Bloomington: Indiana Univ. Press., USA.
- Peel, L., Powell, P., & Garrett, A. (1998). *An introduction to 20th-century architecture*. London: Grange Books.

- Persianis, Panayiotis and G. Polyviou. *History of Education in Cyprus*. Nicosia, Cyprus: The Pedagogical Institute, 1992.
- Pyle, P. & Phokaides, P. (2009). *Architecture and Modernity in Cyprus*. *EAHN Newsletter*, 36-49.
- Ragon, M., & Erginöz, M. A. (2010). *Modern mimarlık ve şehircilik tarihi*. İstanbul: Kabalcı Yayınevi.
- Ramsey, C. G., Sleeper, H. R., & Hoke, J. R. (2000). *Ramsey/Sleeper architectural graphic standards*. New York: John Wiley & Sons. Pg.801
- Rappas, A. (2014). *Cyprus in the 1930s: British colonial rule and the roots of the Cyprus conflict*. London: Tauris.
- Rhea, A. (2013). *Educating DeKalb: Midcentury Elementary Schools in DeKalb County*, Atlanta: Georgia State University.
- Rigolon, A. (2010). *European Design Types for 21st Century Schools: An Overview*. CELE Exchange, Centre for Effective Learning Environments, No. 2010/03, OECD Publishing, Paris.
- Rogerson, B. (1994). *Cyprus*. Old Saybrook, CT: Globe Pequot Press.
- Samuel, F. (2007). *Le Corbusier in detail*. Amsterdam: Elsevier/Architectural Press.

- Sennott, R. S. (2004). *Encyclopedia of 20th century architecture*. New York: Fitzroy Dearborn.
- Siandou, E. (2018). Heritage values as a tool for promoting peace: the case of the modern architectural heritage in Cyprus. *In: ICOMOS 19th General Assembly and Scientific Symposium "Heritage and Democracy"*, New Delhi, India.
- Skousboll, K. (2006). *Greek Architecture Now*. Studio Art Bookshop, Athens.
- Sobin, H. (1994). The Role of Regional Vernacular Traditions in the Genesis of Le Corbusier's Brise-Soleil Sun-Shading Techniques. *Traditional Dwellings and Settlements Review*, 6(1), 80.
- Sobin, H. (1994). Veils and Shadows: Le Corbusier in North Africa, 1928-1936. *Proceedings of the Meeting of the French Colonial Historical Society*, 19, 187-199.
- Solsten, E. (1993). *Cyprus: A Country Study*. Washington (D.C.): Federal Research Division, Library of Congress, USA.
- Sözgün, Z. (2015). Kıbrıs'ta Osmanlı Dönemindeki Eğitim Sistemine Genel Bir Bakış, *Journal of the Near East University Islamic Research Center*, 1(2), 207-217.
- Stock, F. (2008), Threatened: Mid-Century Modern Public School. Regional Modernism: the New Orleans Archives, *DOCOMOMO/NOLA*, Retrieved

from: http://ferlita.com/workshops/2008nola/images/nola_threatened_mid-century_modern_schools.pdf

Tabibi, B. (2005). *Exhibitions as the Medium of Architectural Reproduction - Modern Architecture: International Exhibition* (dissertation). Middle East Technical University.

Tanner, C. K., & Lackney, J. A. (2005). *Educational Facilities Planning: Leadership, architecture, and management*. Boston: Pearson Allyn and Bacon.

Tietz, J. (1999). *The story of architecture of the 20th century*. Cologne: Könemann.

Tournikiotis, P. (2001). *The Historiography of Modern Architecture*. Cambridge: MIT Press.

Uduku, O. (2006). Modernist architecture and 'the tropical' in West Africa: The tropical architecture movement in West Africa, 1948-1970. *Habitat International*, 30(3), 396-411.

UNESCO (2009). *Advisory Body Evaluation: Tel Aviv (Israel)*. No 1096, Retrieved from: <https://whc.unesco.org/en/list/1096/documents/>

Uraz, T. -U., Pulhan, H. & Ulucay, P. (2004). Locality of Modernism: The Case of Nicosia Turkish Girl Lycee. *DOCOMOMO Symposium on Locality of Modernism in the Architecture of Turkey*, METU, Ankara.

- Uraz, T. -U., Pulhan, H. & Ulucay, P. (2010). Ahmet Vural Behaeddin Mimarlığı: Bir Modernist'in Yerel Açılımlar, *V. Kıbrıs'ta İz Bırakmış Kıbrıslı Türkler Sempozyumu*, Eastern Mediterranean Publications.
- Varnava, A. (2010). The State of Cypriot Minorities: Cultural Diversity, Internal-Exclusion and the Cyprus 'Problem'. *Cyprus Review Nicosia Intercollege*, 22,(2), 205-218.
- Varnava, A., & Michael, M. S. (2013). *The Archbishops of Cyprus in the modern age: The changing role of the Archbishop-Ethnarch, their identities and politics*. Newcastle upon Tyne: Cambridge Scholars Publishing.
- Yıldız, N. (2007). Reflections of national identities in the architecture of the public spaces of Cyprus. In M. Davie (Ed.), *Fonctions, pratiques et figures des espaces publics au Liban. Perspectives comparatives dans l'aire Méditerranéenne*, Sous la direction de Beirut: Academie Libanaise des Beaux-Arts, 203.
- Yıldız, N. (2009). The Vakf Institution in Ottoman Cyprus. In P. Golden & M. Kappler et.al. (Ed.), *Ottoman Cyprus , A Collection of Studies on History and Culture*, Harrassowitz Publishing House, Wiesbaden: Germany, 117-159.
- Yıldız, N. (2011). The Cultural Evolution and National Identities Reflected in the Architecture of Cyprus during the Westernisation Period and the Eclectic Architecture of the Colonial Period. In G. Renda & S. Bağcı et.al. (Ed.),

Tradition, Identity & Synthesis: Cultural Crossings and Art, Ankara: Hacettepe Üniversitesi, 265-272.

Yıldız, N. (2015). Charity Undertakings for the Formation of Educational and Cultural Institutions in Ottoman Cyprus. In Giuliana G. (Ed.), *Religioni e Filantropia nel Mediterraneo: Tradizioni, Simboli e Iconografie, Legacy of MISP*, Baskerville, Bologna, 229-278.

APPENDICES

Appendix A: Shades and Shadows of School Building Masses

Passive Solar Design

Since the sun significantly affects climate in all respects, it makes sense to take advantage of this factor in architecture and create a 'solar design' by adopting various techniques. The most fundamental response for this is called 'passive solar design'. In this context, buildings should be designed to get the full benefit of solar energy, without any artificial processing. Smith (2006) noted that there are a number of conditions for accessing solar rays: 'the sun's position relative to the principal facades of the building (solar altitude and azimuth), site orientation and slope, existing obstructions on the site, the potential for overshadowing from obstructions outside the site boundary'.¹ Furthermore, the positioning of a building according to the seasonal changes in the sun path as well as the prevailing wind direction is considerably important strategies in terms of orientation.² Thus, taking full advantage of passive solar design also means maximizing energy efficiency and controlling comfort levels in buildings. Accordingly, in order to analyse the effect of the sun in buildings, its location in the specific site, orientation, massing, layout, spatial arrangement, and fenestration can be determined. When examining a site with respect to the sun, the projection of sunlight on the site at different hours of the day should be considered and also the determination and analysis of the sun paths at different times of the year. Obviously, the topography and orientation of the land are the main characteristics that affect solar access; as well as trees, adjacent buildings and features of the terrain has an impact on the site and design decisions.³

The importance of analysing sun path diagrams in architecture is stated as that these are the convenient way of representing the annual changes of the sun's path across the sky on a 2D flat surface. It also allows architects and designers to develop sun responsive design strategies by considering the shading requirements of the building

¹ Smith, Peter F.. *Architecture in a Climate of Change*, Routledge, 2006. pg.106

² Reardon, C., & Australian Greenhouse Office. (2013). *Your home: Australia's guide to environmentally sustainable homes*. Canberra: Dept. of Climate Change and Energy Efficiency.

³ Tell, E. (2011). *How Do We Sustain Regional Architecture In The Face Of Modern Models Of Universal Internationalist Architecture*, M. Arch Thesis, Unitec Institute of Technology, New Zealand. Pg.41

and its surroundings.⁴ Furthermore, sun path diagrams provide a broader overview of the sun on a site and simply allow to find out the position of it on the sky for any time or day of the year. The position of the sun varies according to different latitudes (northern or southern) but is used to analyse the effect of shadows cast generated by buildings, landscapes or topographic features within and around the site.⁵ Particularly, considering different climatic zones on the earth, Fathy (1995) emphasized that the main source of heat is the 'sun' in hot and warm climates in terms of the passive design approach in architecture. Therefore, during the hot seasons in order to plan any site, the position of the sun should be analysed for all hours of the day in all seasons and the prevailing wind direction should also be considered. In this way, knowing the declination and altitude angles for the summer and winter solstice (June 21 and December 21 respectively) and equinox solstice (September 21 and March 21 respectively) for both fall and spring, is sufficient to find out the direct rays of the sun. Thus, the position of the sun at any time of day or at any intermediate date can be calculated. Fathy (2005) especially emphasized that 'these dates, rather than averages, represent the extreme cases which the architect must consider'.⁶ Under those circumstances, besides its close relationship with a specific climate and influences by regional practices, knowledge of solar geometry is essentially needed when it comes to orientation.^{7 8}

Earth and Sun relationship (Solar geometry)

The plane passing through the Earth's elliptical orbit is called the Ecliptic plane and the plane passing through the Equator is called the Equator plane. These two planes do not overlap, because of the Earth's axis is not exactly perpendicular to the ecliptic plane. In other words, there is an angle of $66^{\circ}33'$ between the Earth axis and the ecliptic

⁴ J.Y. Lee, Roger et-al, Group 66, Heavenly Mathematics GEK 1506, Sun and Architecture, National University of Singapore, Department of Mathematics, 2004.

⁵ Koch-Nielsen, Holger. Stay Cool: A Design Guide for the Built Environment in Hot Climates, Routledge, 2002. Pg.146

⁶ Fathy, H., Shearer, W., & Sultan, A.-R. A. (1995). Natural energy and vernacular architecture: Principles and examples with reference to hot arid climates. Chicago: Published for the United Nations University by the University of Chicago Press.pg.42

⁷ Bay, J.-H., & Ong, B.-L. (2006). Tropical sustainable architecture: Social and environmental dimensions. Oxford: Architectural Press. Pg.32

⁸ Szokolay, S. V. (1980). Environmental science handbook for Architects and Builders. Lancaster: The Construction Press.

plane, and $23^{\circ}27'$ between the Equator plane and the ecliptic plane. The Earth completes its annual movement in an elliptical orbit around the sun in 365 days and 6 hours. This period is called one year and this movement is called annual movement. The sun's rays reach the Earth at certain angles. When these rays come perpendicular and straight, we live in the summer, and when the lights come further away, we experience the winter.^{9 10} Therefore, the main reason for the seasons' change is the tilted axis of the planet from the north-south angle and its rotation around the Sun, known as the annual path. If the axis inclination of the earth was 0° (not tilted), day and night would be equal, the angle of the sunlight falling to the ground would not change and there would be no temperature change, so the seasons would not occur at the end. In both hemispheres, the seasons are reversed. While the Northern hemisphere lives in summer, the Southern hemisphere lives in winter, and in the same way, one is in the autumn and the other in the spring. Depending on the tilt of the Earth axis and its annual movement, four important days emerge, marking the sequence of the sun's path, as solstices (21 June and 21 December) and equinoxes (21 March and 21 September).¹¹ The difference of the sun's paths in the northern and southern hemispheres is as follows: 21 June is the date of the extreme position north of the sun, from 21 March to 21 September in the northern hemisphere; while 21 December is the date of the extreme position south of the sun, from 21 September to 21 March in the southern hemisphere.¹² Solstices are the dates during which daytime periods begin to prolong or shorten, whereas equinox dates are those which the sun's rays fall perpendicular to the equator and the time of day and night is equal throughout the world. 'Solstices' are the times when the 'sun's path in the sky is farthest north and south of the equator'; thus, the winter solstice (21 December) is the shortest day of the year while the summer solstice (21 June) is the longest day of the year. Due to the Earth's position on orbit and the axis tilt; in 21st June (start of the summer), the Northern Hemisphere faces the sun and the sun's rays are perpendicular to the 'Tropic of Cancer' above the Equator, whereas in 21st December (start of the winter), Southern Hemisphere get close to the sun and its rays are directly overhead at the 'Tropic of Capricorn' below the Equator. In the meantime, the opposite happens in the Southern

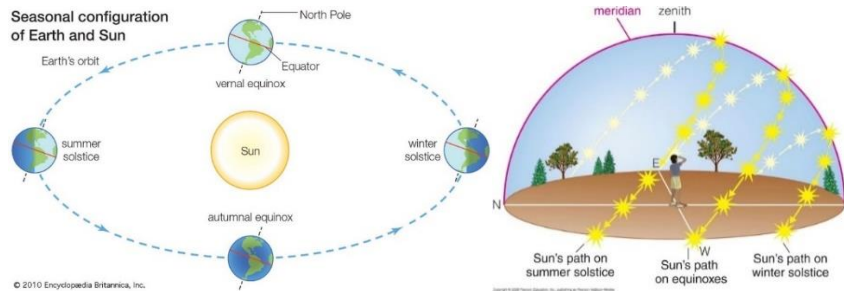
⁹ Lydolph, P. E. (1989). *The climate of the earth*. Totowa, NJ: Rowman & Littlefield. Pg.24-29

¹⁰ Clark, S. (1993). *The earth, sun and moon: Photopack*. London: Folens Limited. Pg.10-11

¹¹ Lang, K. R. (2006). *Sun, earth, and sky*. New York: Springer. Pg.199

¹² Koch-Nielsen, Holger. *Stay Cool: A Design Guide for the Built Environment in Hot Climates*, Routledge, 2002. Pg.146

Hemisphere. ‘Equinoxes’ are times when the angle of the sun rays reach the Equator perpendicularly, where night and day are equal all over the world. It happens twice a year as spring (21 March) and autumn (21 September) equinoxes in the Northern hemisphere (vice versa in Southern hemisphere).¹³



Sun Path, Shadow and Shading

Regarding the sun’s daily path, as the Earth revolves around the sun, the position of the sun changes in the sky, and the shadows move accordingly. Every day of the year, the sun constantly shifts from sunrise (east) to sunset (west), but the areas affected by the shadows differ in relation to the time of year. Although the solar path changes throughout the year, it continuously follows the same sequence each year. For example, every single day the basic patterns of the shadow of a building will be as follows: during morning hours, the shadows cast in the western direction away from the building; in midday, shadows cast close beneath to the building; and in afternoon hours, shadows cast in an eastern direction away from the building.¹⁴

The main purpose of shade planning in architecture is to provide a shadow according to the most appropriate time, day and year; although the location of the buildings, trees, and other external factors may create a different shadow pattern than expected.¹⁵ Knowing where the shadow of a building or even a tree will cast in the site or its close

¹³ Szokolay, S. V. (1996). Solar geometry. Brisbane, Qld, PLEA, Passive and Low Energy Architecture International in association with Dept. of Architecture, University of Queensland.

¹⁴ Koenigsberger OH and Ingersol TG. Manual of tropical housing and building – Part 1 Climatic design. New York: Longman Inc, 1974.

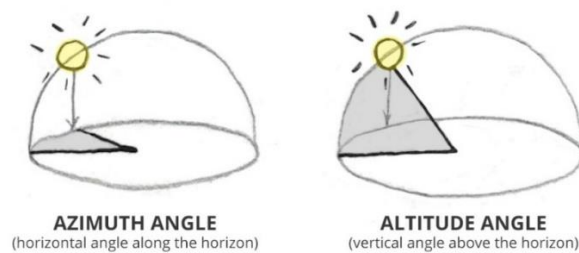
¹⁵ Oakman H. Tropical and subtropical gardening. Milton: The Jacaranda Press, 1981.

surroundings and how it will make an impact, depends entirely on the understanding of the sun's path. Thus, this knowledge and understanding are taken as the basis for effective shadow planning in architecture. Regarding a site, three important factors are needed to accurately assess the impact of the sun's path; latitude, longitude and north direction, respectively. Once these are known, the position of the sun can be found at any time, day and year, by using solar diagrams or computer programs. Furthermore, the position of the sun in the sky can be identified by two angles known as 'solar altitude angle' and 'solar azimuth angle', to analyse the shadow impact by buildings or any object. Solar altitude angle (length of shadow) of the sun in the sky. In order to find this angle, the distance between 'an imaginary line drawn between the observer and the sun' and 'the horizontal plane on which the observer stands' must be measured according to the latitude. Thus, the length of the shadow to be cast by any object on the ground is determined which varies depending on seasons or time of the day. On the other hand, the solar azimuth angle (direction of shadow) shows the angular distance between the 'north' direction and 'the projection of the line of sight from the sun' on a horizontal plane, which its value varies between 0° and 360°. Thus, the direction of the shadow to be cast on the ground is determined. In order to measure the length and direction of the shadow, solar angles for solstices (summer and winter) and equinoxes (spring and autumn) should be analysed which represents the extreme conditions of shadow patterns for architects throughout the year, as it is mentioned before. Annually, shadows cast are the shortest in the summer solstice, the longest in the winter solstice, and intermediate in the equinoxes. It can be determined between the hours 6:00 am and 18:00 pm. Both of these solar angles can easily be found on any day of the year and at any time of the day from solar diagrams or computer programs, and eventually, show what kind of shadow impact and geometry it gives us from any shading element or building orientation.¹⁶

Holger (2002) explains the indicators of solar diagrams as follows: while 'outer circle' (with you in the centre) illustrates 'the horizon', 'concentric circles' shows 'the angle of the sun above the horizon' and its height in the sky dome. In addition, the 'radial lines' show the sun's angle to the south, while the 'elliptical curves' represent paths of the sun on the 21st day of each month, and the 'vertical lines' illustrates different times

¹⁶ Koch-Nielsen, Holger. *Stay Cool: A Design Guide for the Built Environment in Hot Climates*, Routledge, 2002. Pg.146

of the day. Also, morning and afternoon times represented as east on the right and west on the left, respectively. In order to keep the validity of the solar diagrams, the hour lines are not designated with the time as displayed on a clock, so as a rule, local time does not overlap with actual local solar time. The difference between the standard time of a country and the local solar time should be determined for a suitable indication of the hour line. According to the season and location, actual 'local solar midday is the moment when the sun reaches its highest altitude, and the azimuth is at exactly 180° or 0° .' In order to generate solar charts, different computer programs can be used such as Sunpath, Ecotect and so on, apart from typical manual charts.¹⁷ Thus, in the conceptual design phase of a project, if such computer tools are used, the effects of the sun will be determined correctly and affect the overall design decisions such as site planning, orientation, mass configuration, just to name a few.



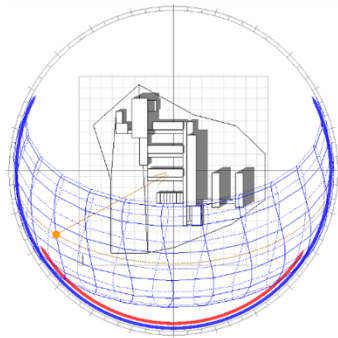
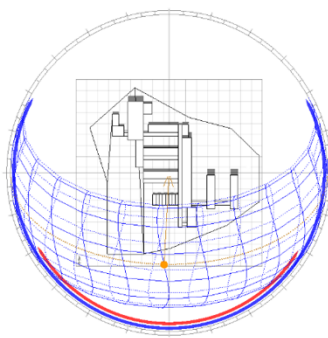
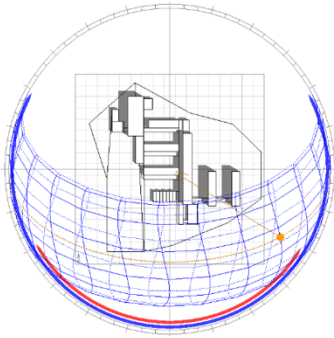
¹⁷ Koch-Nielsen, Holger. Stay Cool: A Design Guide for the Built Environment in Hot Climates, Routledge, 2002. Pg.146

TABLE A: EQUINOX

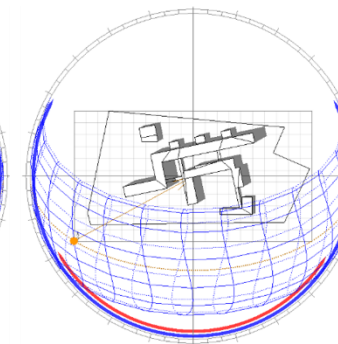
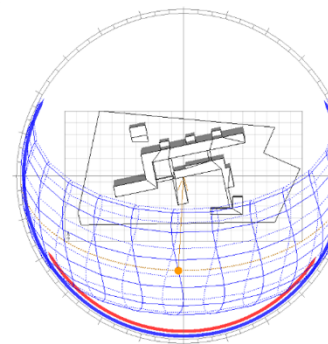
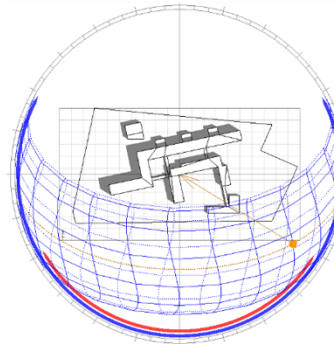
21st March, 09.00 hrs

21st March, 12.00 hrs

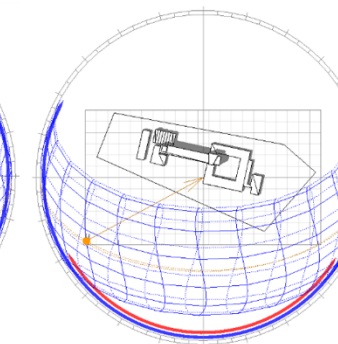
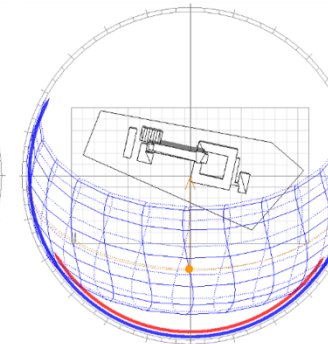
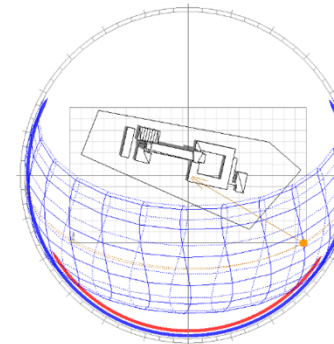
21st March, 15.00 hrs



Lefkosa Turkish Boarding School for Girls



Pallouriotissa Female Gymnasium



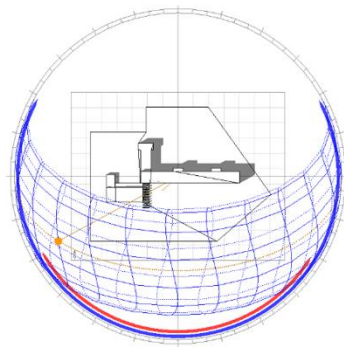
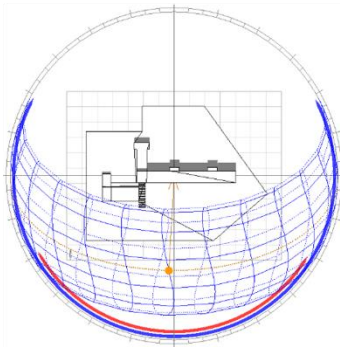
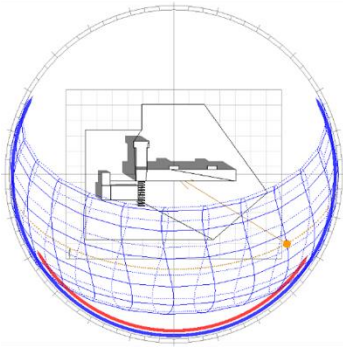
Kykkos High School

TABLE A: EQUINOX

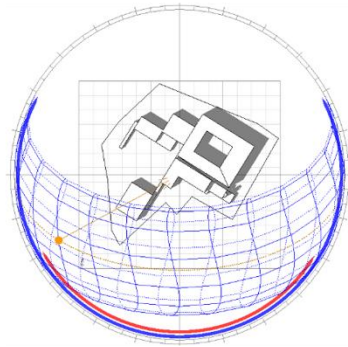
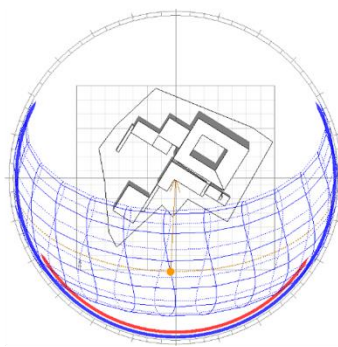
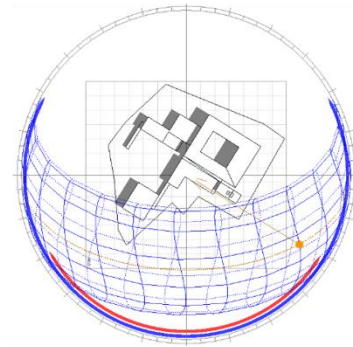
21st March, 09.00 hrs

21st March, 12.00 hrs

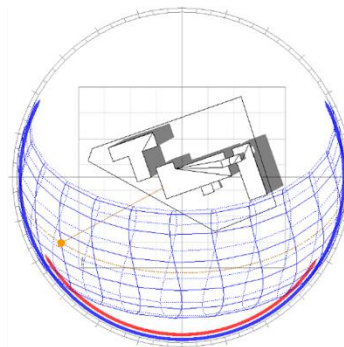
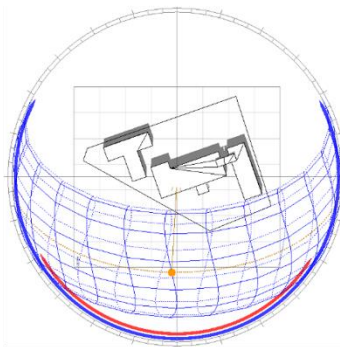
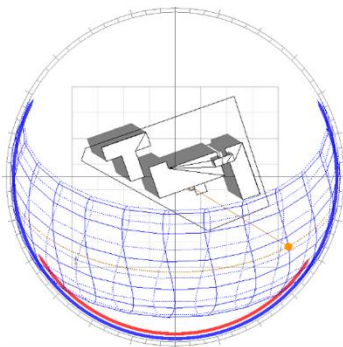
21st March, 15.00 hrs



Lefkosa Turkish Lycee



Limassol Terra Santa School



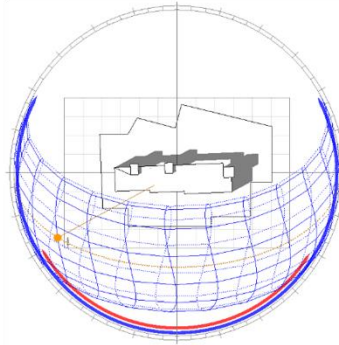
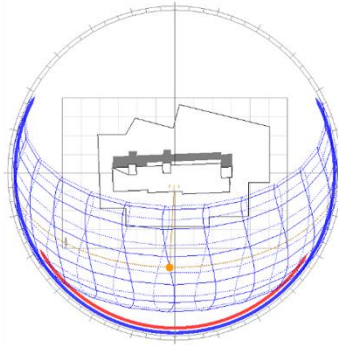
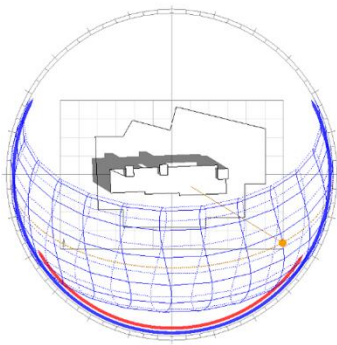
Famagusta Terra Santa School

TABLE A: EQUINOX

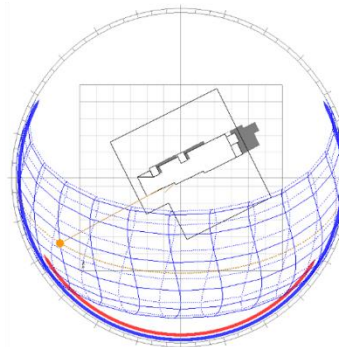
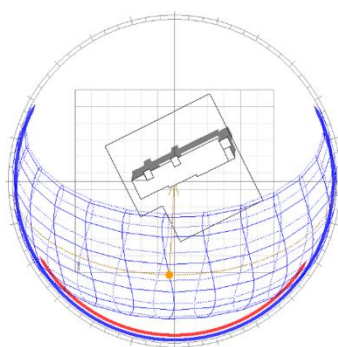
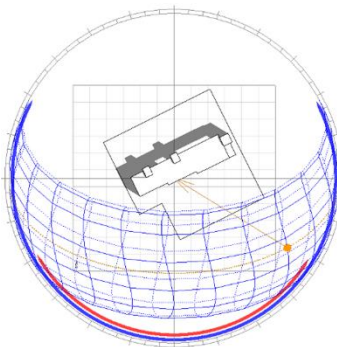
21st March, 09.00 hrs

21st March, 12.00 hrs

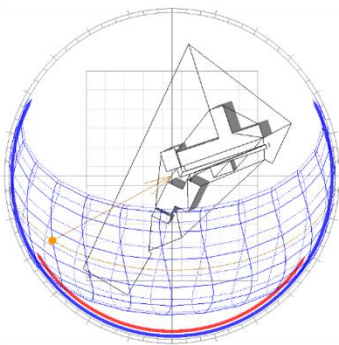
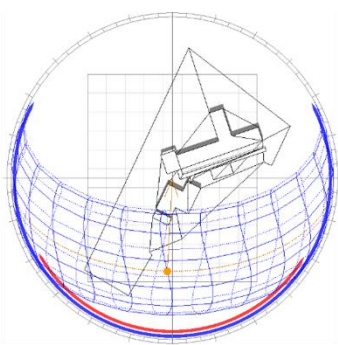
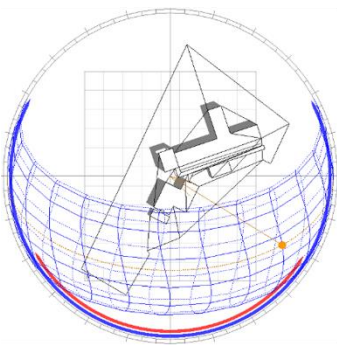
21st March, 15.00 hrs



Ataturk Elementary School



Limassol First Elementary School



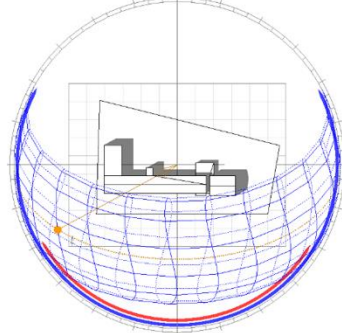
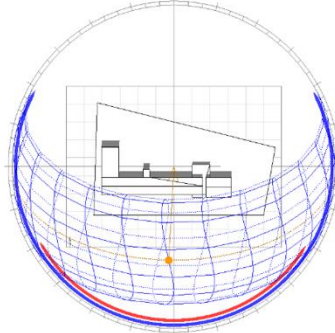
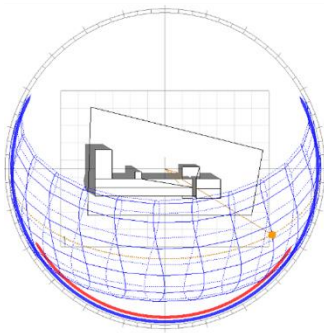
Lykavitos Elementary School

TABLE A: EQUINOX

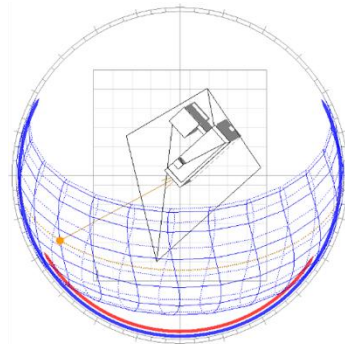
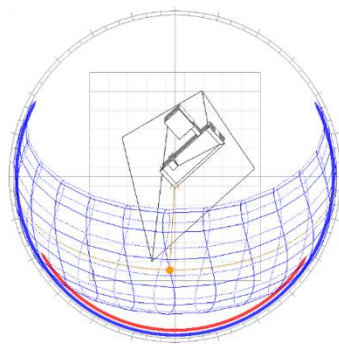
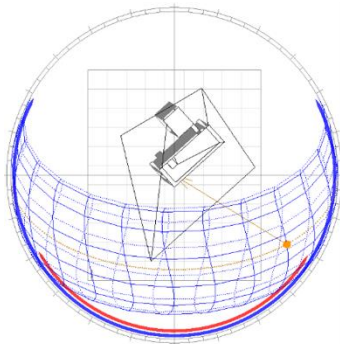
21st March, 09.00 hrs

21st March, 12.00 hrs

21st March, 15.00 hrs



Koskluciflik Elementary School



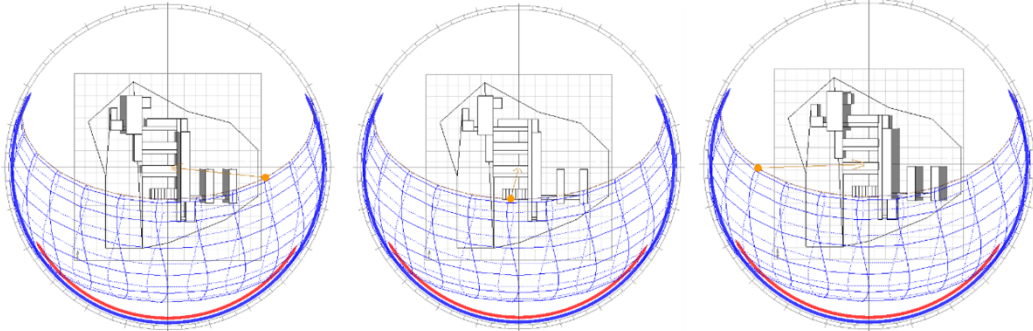
Famagusta Nursery School

TABLE B: SUMMER SOLSTICE

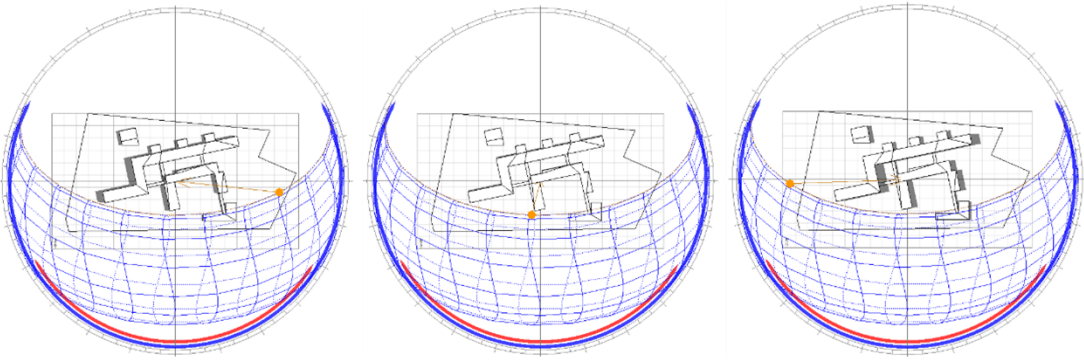
21st June, 09.00 hrs

21st June, 12.00 hrs

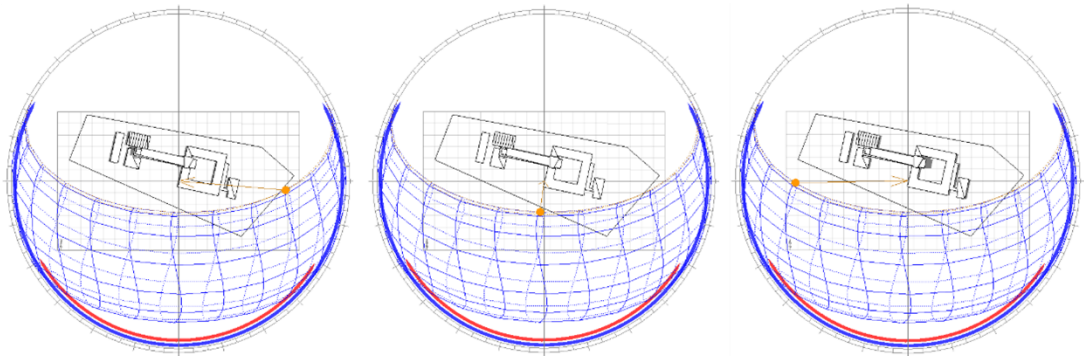
21st June, 15.00 hrs



Lefkosa Turkish Boarding School for Girls

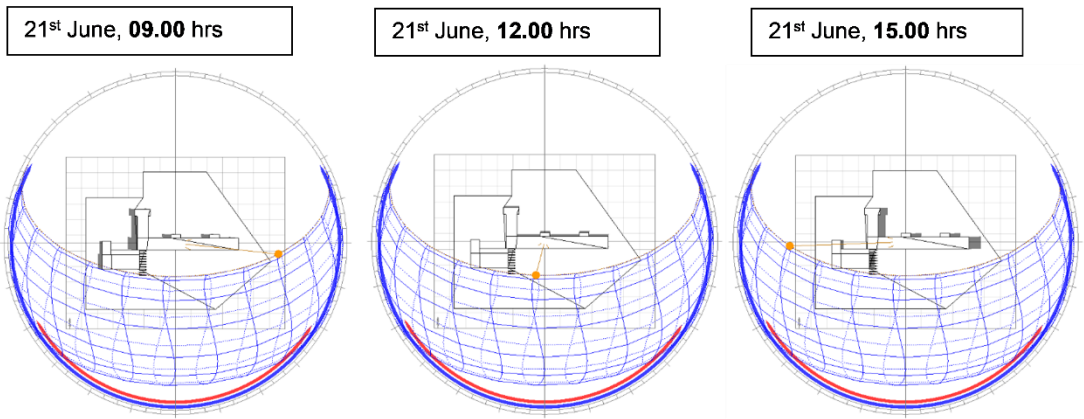


Pallouriotissa Female Gymnasium

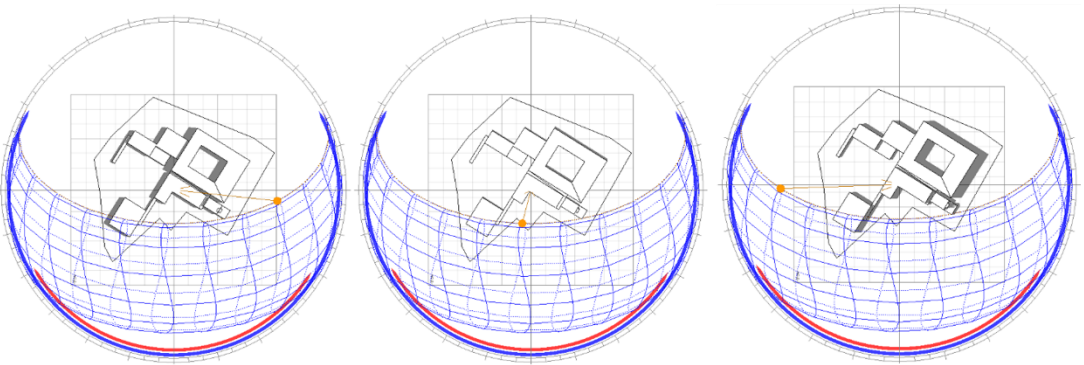


Kykkos High School

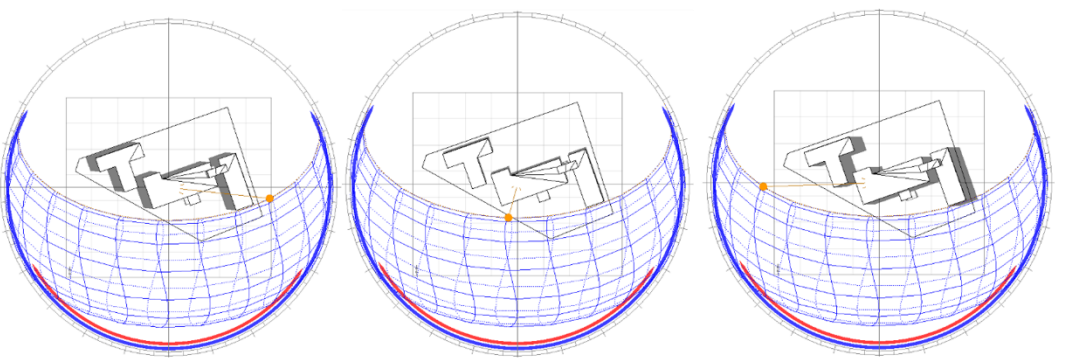
TABLE B: SUMMER SOLSTICE



Lefkosa Turkish Lycee



Limassol Terra Santa School



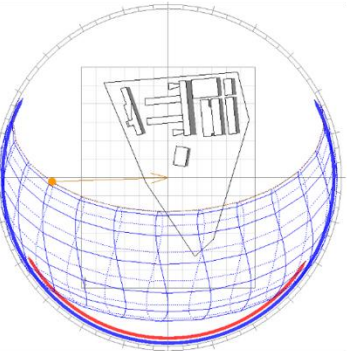
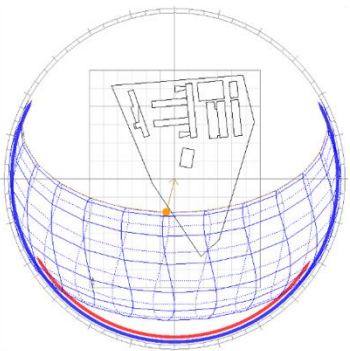
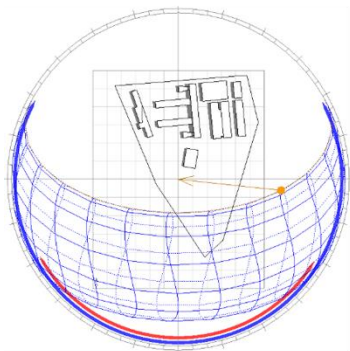
Famagusta Terra Santa School

TABLE B: SUMMER SOLSTICE

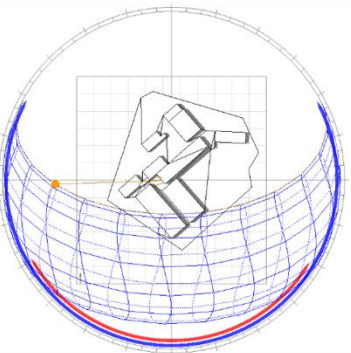
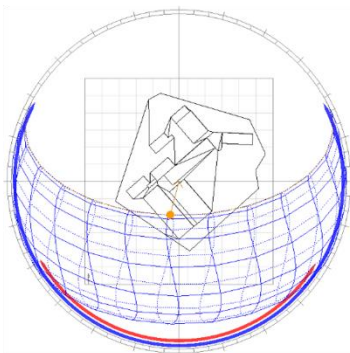
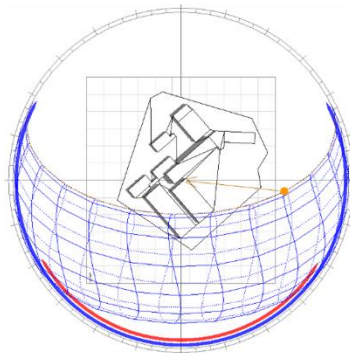
21st June, 09.00 hrs

21st June, 12.00 hrs

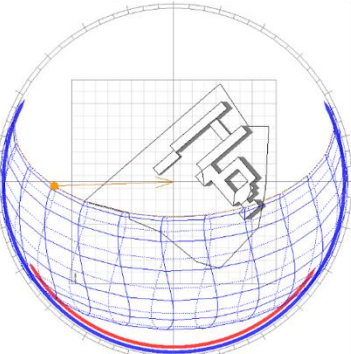
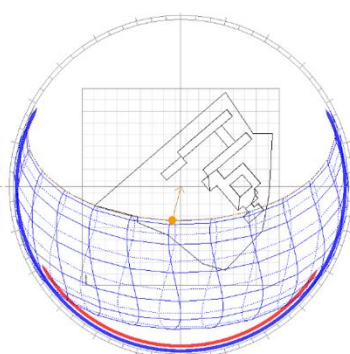
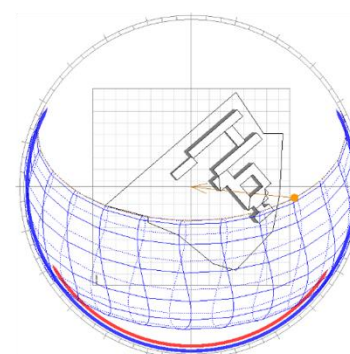
21st June, 15.00 hrs



Lefkosa Technical School



Lefke Technical School



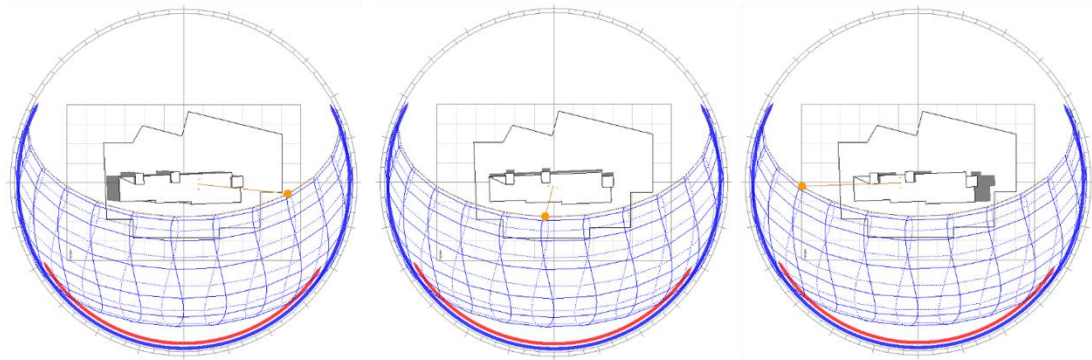
Limassol Technical School

TABLE B: SUMMER SOLSTICE

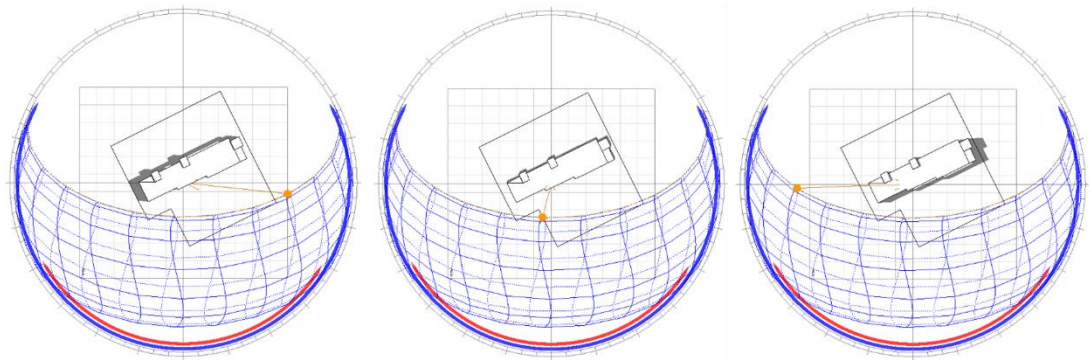
21st June, 09.00 hrs

21st June, 12.00 hrs

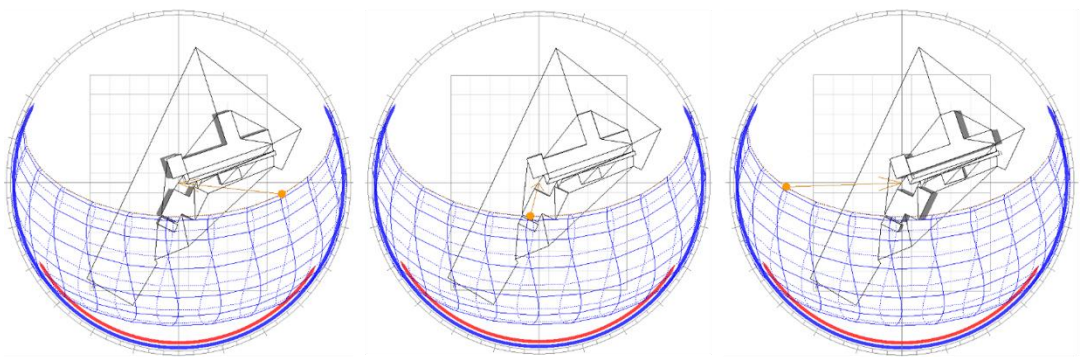
21st June, 15.00 hrs



Ataturk Elementary School



Limassol First Elementary School



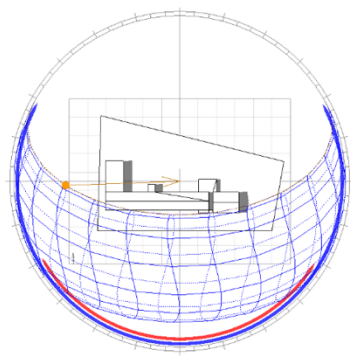
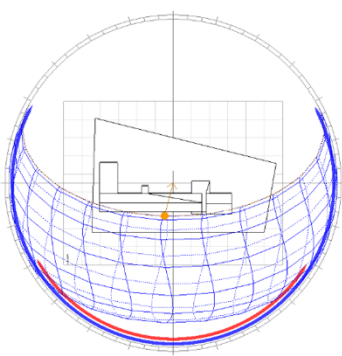
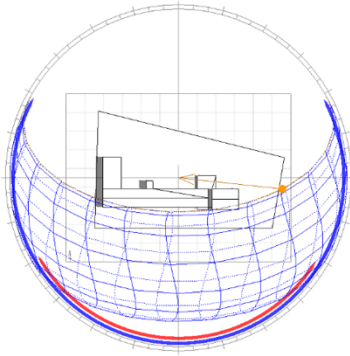
Lykavitos Elementary School

TABLE B: SUMMER SOLSTICE

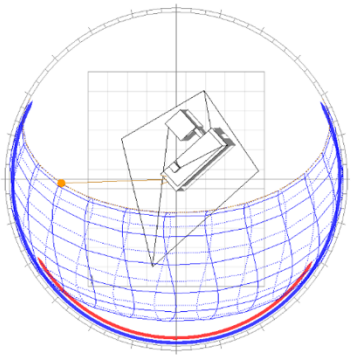
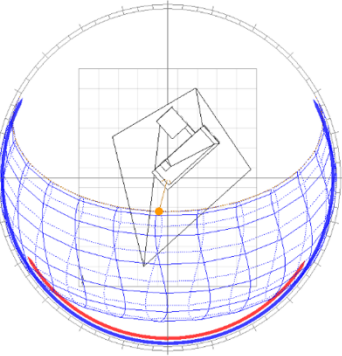
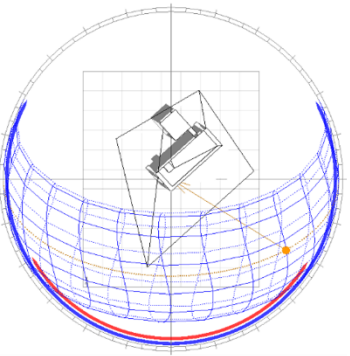
21st June, 09.00 hrs

21st June, 12.00 hrs

21st June, 15.00 hrs



Koskluciftlik Elementary School



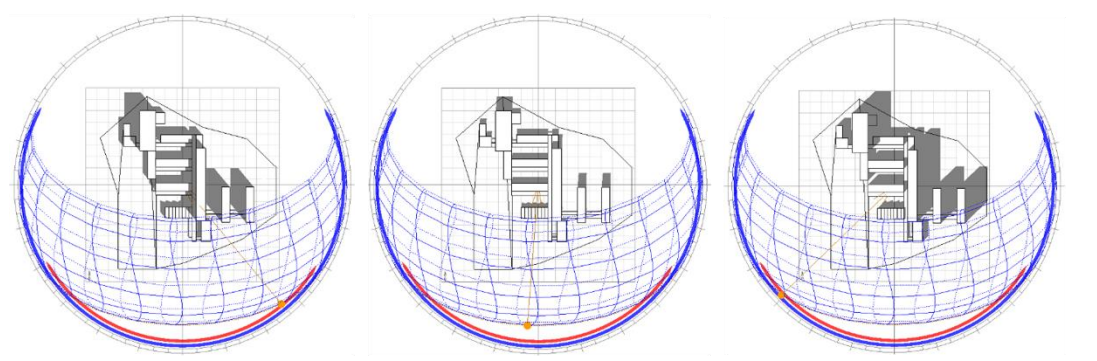
Famagusta Nursery School

TABLE C: WINTER SOLSTICE

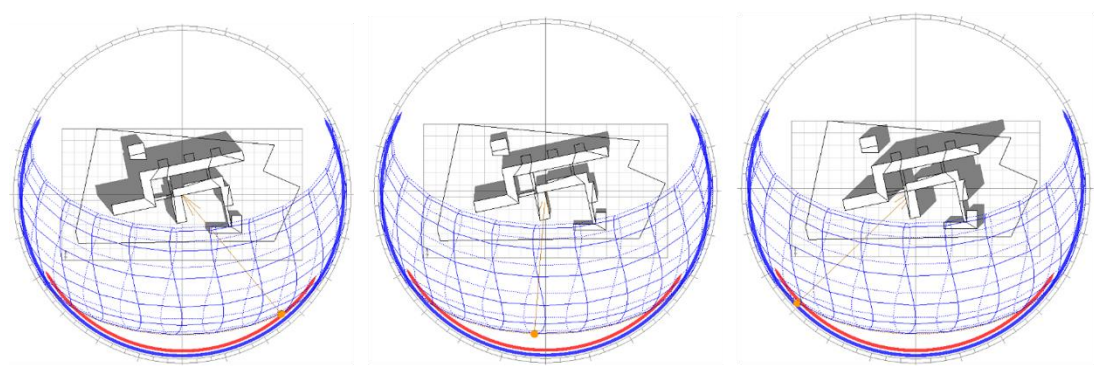
21st December, 09.00 hrs

21st December, 12.00 hrs

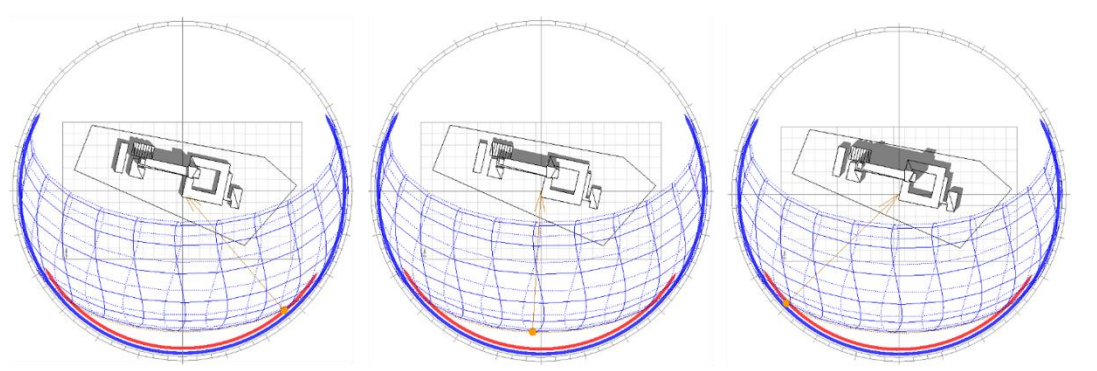
21st December, 15.00 hrs



Lefkosa Turkish Boarding School for Girls



Pallouriotissa Female Gymnasium



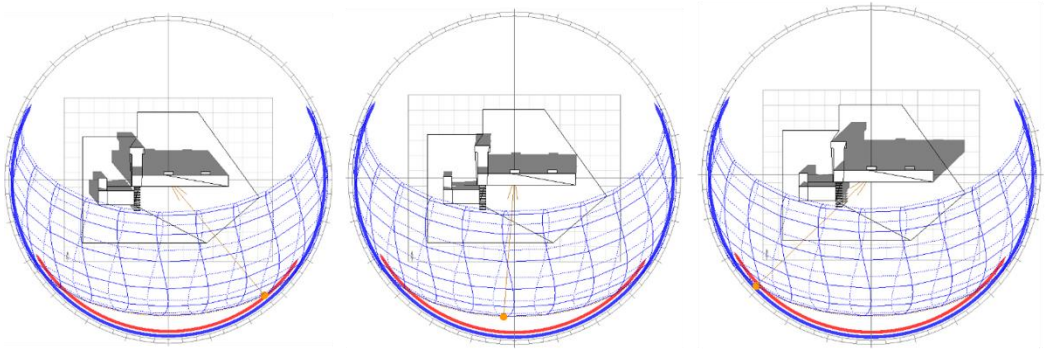
Kykkos High School

TABLE C: WINTER SOLSTICE

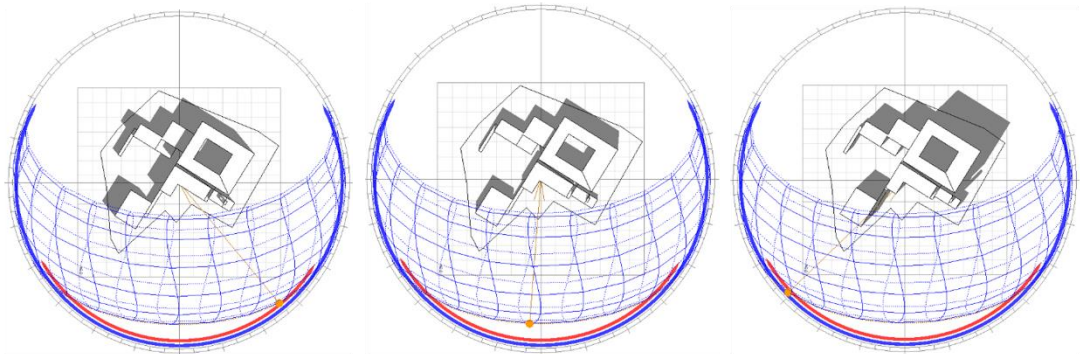
21st December, 09.00 hrs

21st December, 12.00 hrs

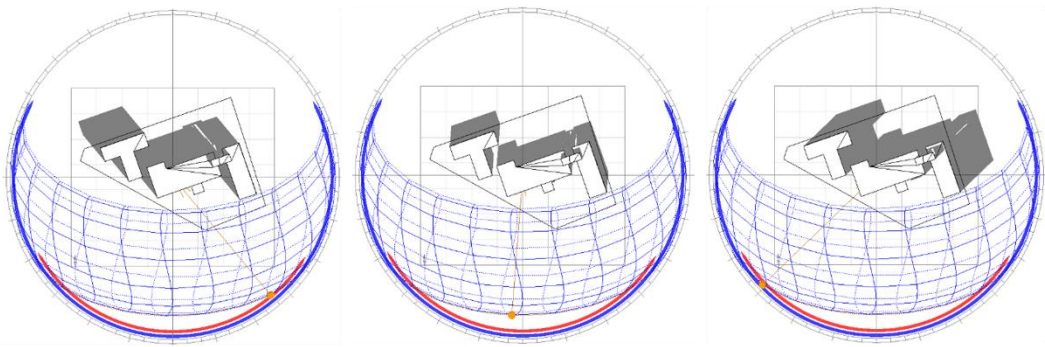
21st December, 15.00 hrs



Lefkosa Turkish Lycee



Limassol Terra Santa School



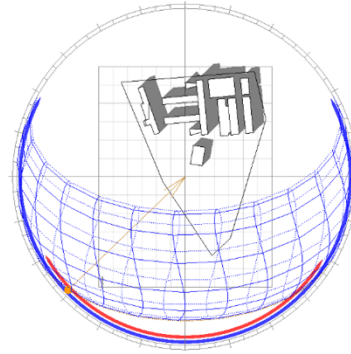
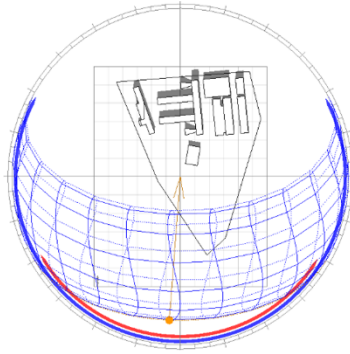
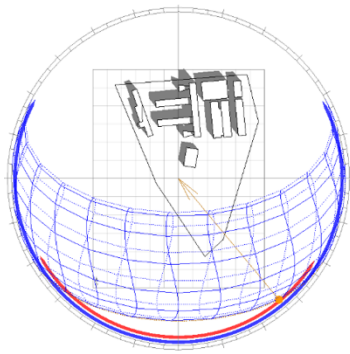
Famagusta Terra Santa School

TABLE C: WINTER SOLSTICE

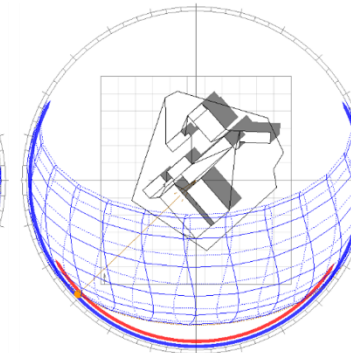
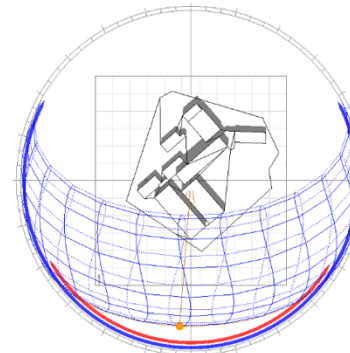
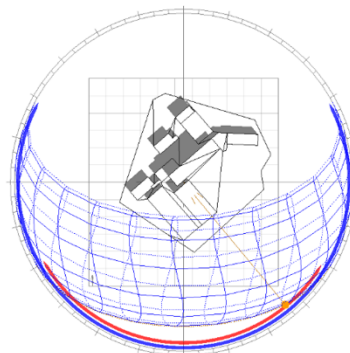
21st December, 09.00 hrs

21st December, 12.00 hrs

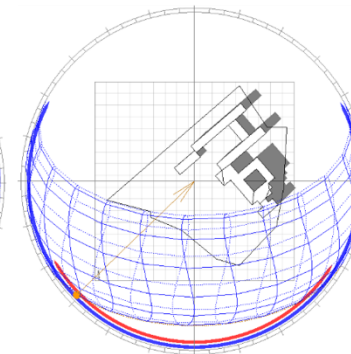
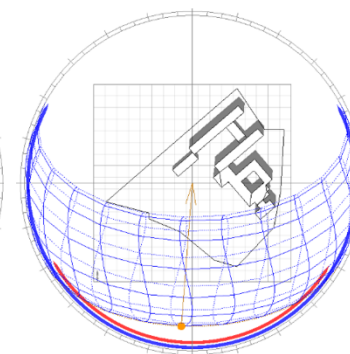
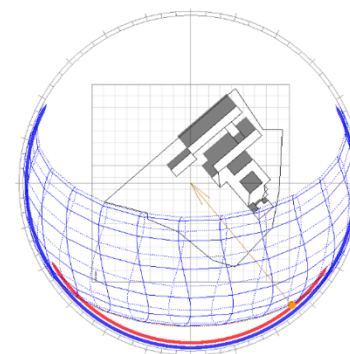
21st December, 15.00 hrs



Lefkosa Technical School



Lefke Technical School



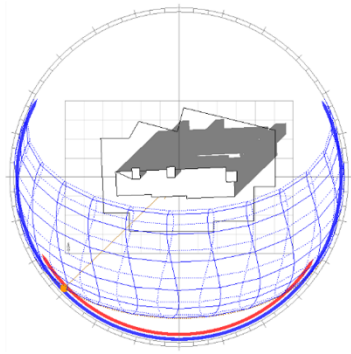
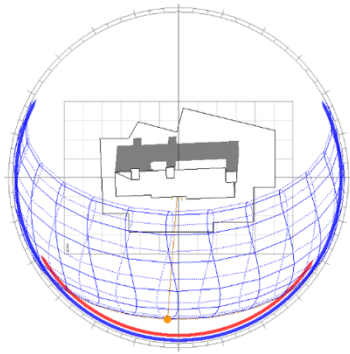
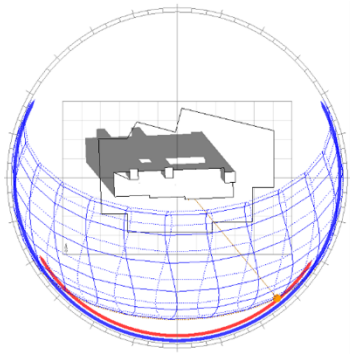
Limassol Technical School

TABLE C: WINTER SOLSTICE

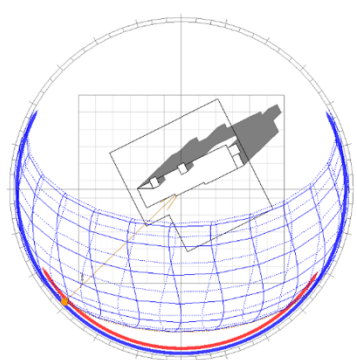
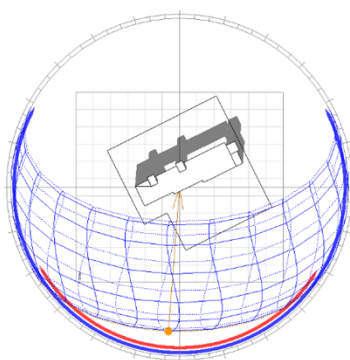
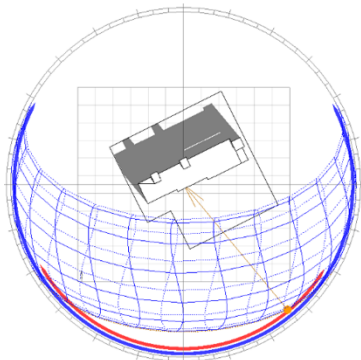
21st December, 09.00 hrs

21st December, 12.00 hrs

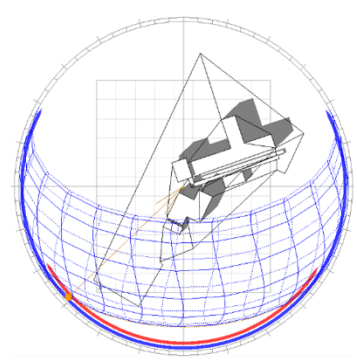
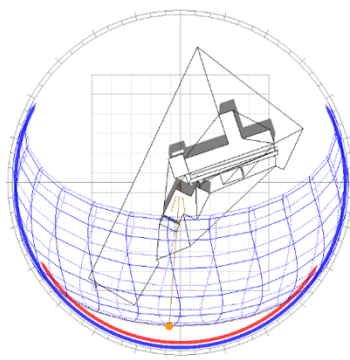
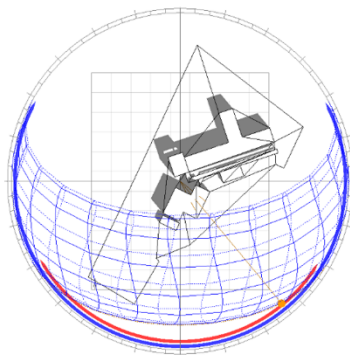
21st December, 15.00 hrs



Ataturk Elementary School



Limassol First Elementary School



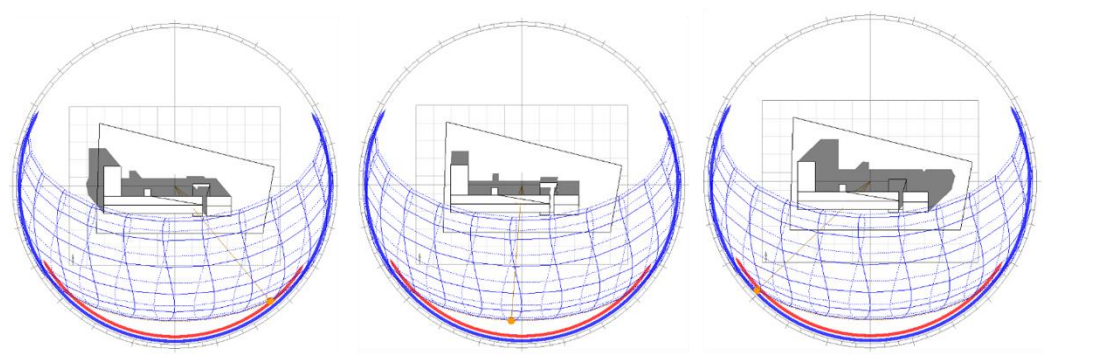
Lykavitos Elementary School

TABLE C: WINTER SOLSTICE

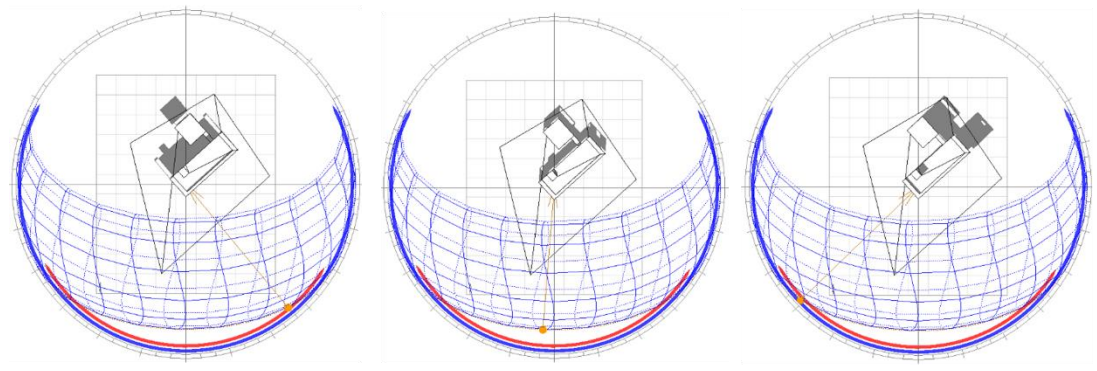
21st December, 09.00 hrs

21st December, 12.00 hrs

21st December, 15.00 hrs


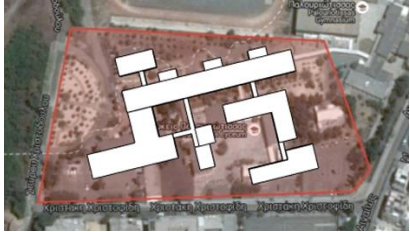
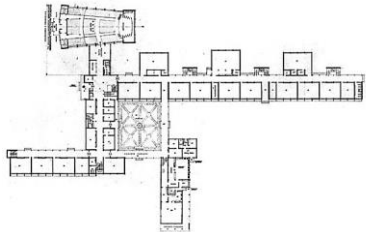
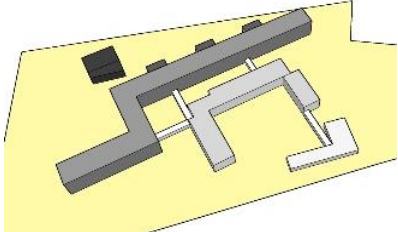






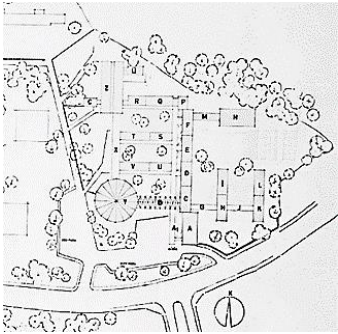
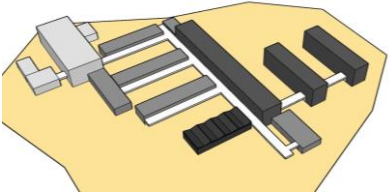


Koskluciftlik Elementary School



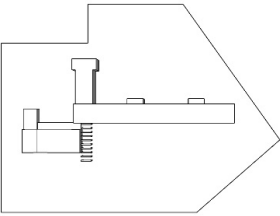
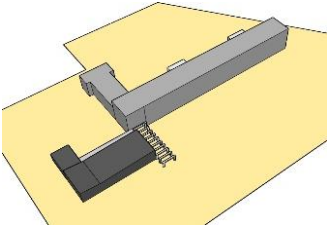





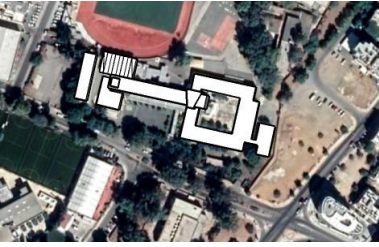
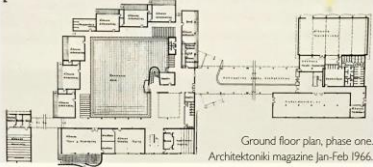
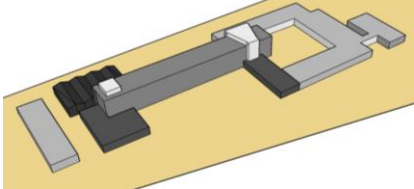


Famagusta Nursery School

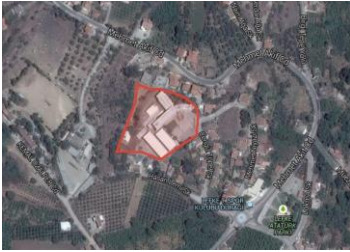

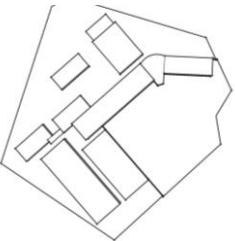
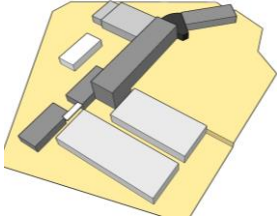


Appendix B: Inventory Study of School Buildings



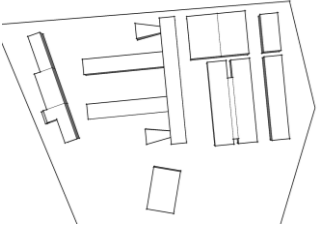
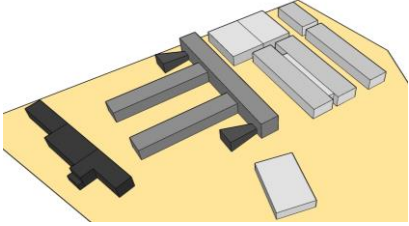


Name of Building	Pallouriotissa Female Gymnasium	
Date of design and construction	1957- 62	
Architect / Construction Firm	Demetris Thymopoulos	
Type	Secondary School	
Location	Lefkosa	
Main Building Materials	Reinforced concrete Exposed concrete	Steel framed windows
Architectural Features	Proportional grid system Egg-crate brise-soleil Honeycomb perforated panels	Semi-open transitional spaces Solid-void relationship Flat roof
Maps	Regional	Local
		
Layout & Mass Composition		
School Views		
	South-east View	North-west View



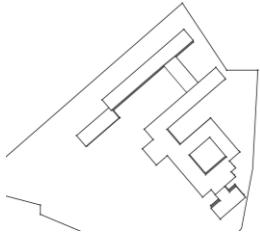
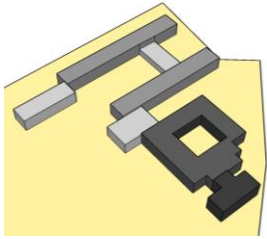


Name of Building	Lefkosia Turkish Boarding School for Girls	
Date of design and construction	1960	
Architect / Construction Firm	Ahmet V. Behaeddin	
Type	Secondary School	
Location	Lefkosa	
Main Building Materials	Reinforced concrete Glass Terracotta brick walls	Steel framed windows Plaster
Architectural Features	Concrete structural frame Vertical Shading Devices Honeycomb perforated panels	Semi-open transitional spaces Ribbon windows Folded plate roof
Maps	Regional	Local
		
Layout & Mass Composition		
School Views		
	East View	West View




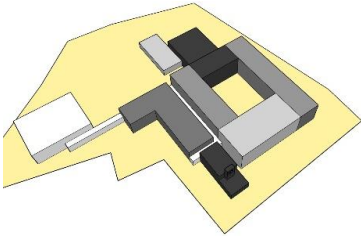


Name of Building	Lefkosia Turkish Lycee	
Date of design and construction	1960	
Architect / Construction Firm	Alister MacDonald	
Type	Secondary School	
Location	Lefkosia	
Main Building Materials	Reinforced concrete Glass	Steel framed windows Plaster
Architectural Features	Concrete structural frame Vertical Shading Devices Metal horizontal louvers Ribbon windows	Decorative cubic windows Stair towers Concrete pergola entrance
Maps	Regional	Local
		
Layout & Mass Composition		
School Views		
	South View	North View



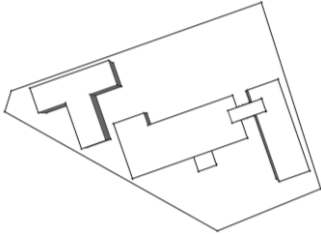
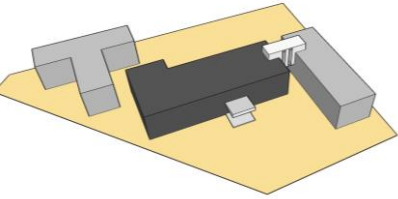


Name of Building	Kykkos High School	
Date of design and construction	1960	
Architect / Construction Firm	Iakovos and Andreas Philippou	
Type	Secondary School	
Location	Lefkosa	
Main Building Materials	Reinforced concrete Exposed concrete Glass	Steel framed windows Plaster
Architectural Features	Proportional grid system Double skin concrete frame Egg-crate brise-soleil Ribbon windows	Horizontality Stair towers Vaulted roof
Maps	Regional	Local
		
Layout & Mass Composition	 <small>Ground floor plan, phase one. Architektoniki magazine Jan-Feb 1966.</small>	
School Views		
	South-west View	North-east View



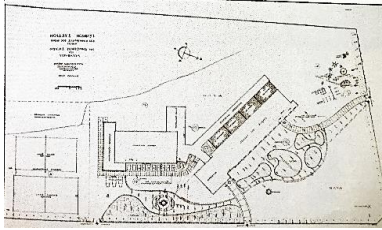
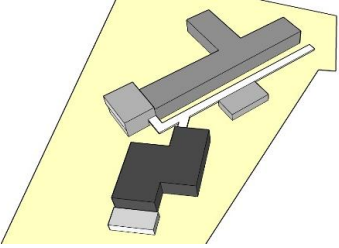

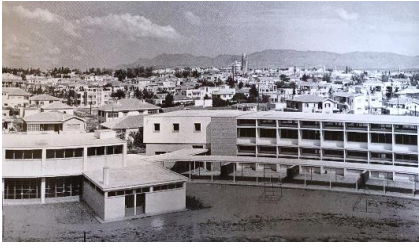
Name of Building	Lefke Technical School	
Date of design and construction	1955	
Architect / Construction Firm	Orman and Partners	
Type	Technical School	
Location	Lefke	
Main Building Materials	Reinforced concrete Steel framed windows River Cobbles	Yellow sand stone Plaster
Architectural Features	Concrete structural frame Cantilevered structure Rectangular and cylindrical volumes Sloped topography	Vertical shading devices Movable horizontal glass louvres Decorative circular openings Flat and slightly sloped roof
Maps	Regional	Local
		
Layout & Mass Composition		
School Views		
	South-east View	North-west View



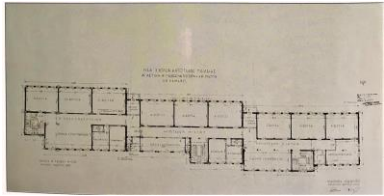
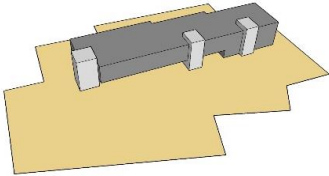


Name of Building	Lefkosa Technical School	
Date of design and construction	1955	
Architect / Construction Firm	Tripe and Wakeham Partnership	
Type	Technical School	
Location	Lefkosa	
Main Building Materials	Reinforced concrete Steel framed windows	River cobbles Plaster
Architectural Features	Concrete structural frame Vertical shading devices Mini cubic windows	Barrel shells Flat and single sloped roof Symbolic iron sculpture
Maps	Regional	Local
		
Layout & Mass Composition		
School Views		
	West View	South View



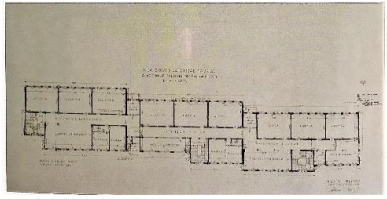
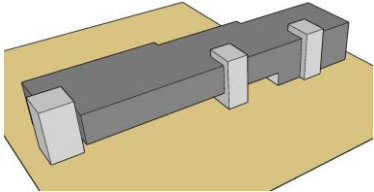


Name of Building	Limassol Technical School	
Date of design and construction	1955	
Architect / Construction Firm	Orman and Partners	
Type	Technical School	
Location	Limassol	
Main Building Materials	Reinforced concrete Steel framed windows	Yellow sand stone Plaster
Architectural Features	Concrete structural frame Concrete pillars Vertical shading devices Horizontal glass louvres	Circular stair towers Honeycomb grillwork brise-soleil
Maps	Regional	Local
		
Layout & Mass Composition		
School Views		
	South-west View	North-east View



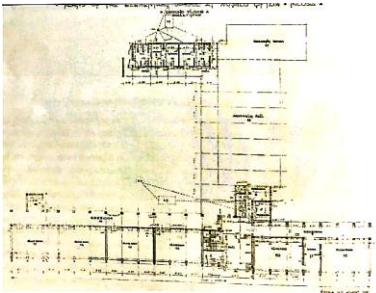
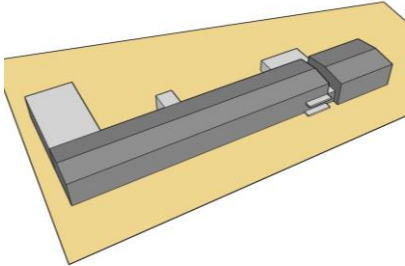


Name of Building	Limassol Terra Santa School	
Date of design and construction	1960–65	
Architect / Construction Firm	Stavros Economou	
Type	Religious School	
Location	Limassol	
Main Building Materials	Reinforced concrete Steel framed windows	Plaster
Architectural Features	Concrete structural frame Angled Sun Baffles Brise-soleil	Parabolic eaves Symbolic cross sculpture Dynamic surface treatments
Maps	Regional	Local
		
Layout & Mass Composition		
School Views		
	South-east View	North-east View



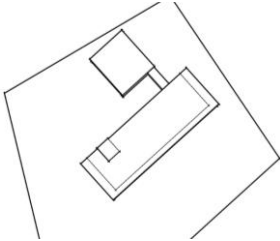
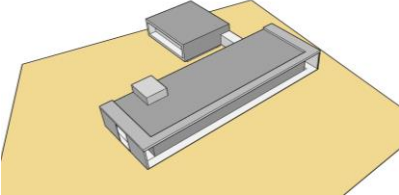


Name of Building	Famagusta Terra Santa School	
Date of design and construction	1959–60	
Architect / Construction Firm	Stavros Economou	
Type	Religious School	
Location	Famagusta	
Main Building Materials	Reinforced concrete Steel framed windows	Yellow sand stone Plaster
Architectural Features	Concrete structural frame Brise-soleil Ribbon windows	Parabolic eaves Filtered screens Trapezoid entrance definition
Maps	Regional	Local
		
Layout & Mass Composition		
School Views		
	South-east View	North-west View

Name of Building	Lykavitos Elementary School	
Date of design and construction	1955-57	
Architect / Construction Firm	Dimitris Thymopoulos	
Type	Elementary school	
Location	Lefkosa	
Main Building Materials	Reinforced Concrete Steel framed windows	Plaster Yellow sand stone
Architectural Features	Concrete structural frame Vertical louvers Egg-crate shading devices	Colonnaded semi-open walkways Flat roof
Maps	Regional	Local
		
Layout & Mass Composition		
School Views		
	North-west view	South-east view

Name of Building	Lefkosa Ataturk Elementary School	
Date of design and construction	1955-57	
Architect / Construction Firm	Rousou & Pericleous Brothers	
Type	Elementary School	
Location	Lefkosa	
Main Building Materials	Reinforced concrete Steel framed windows Plaster	
Architectural Features	Concrete structural frame Rectangular prism Horizontality	Stair towers Circular openings Semi-open transitional space
Maps	Regional	Local
		
Layout & Mass Composition		
School Views		
	South View	North View

Name of Building	First Elementary School	
Date of design and construction	1954-55	
Architect / Construction Firm	Rousou & Pericleous Brothers	
Type	Elementary School	
Location	Limassol	
Main Building Materials	Reinforced concrete Steel framed windows Plaster	
Architectural Features	Concrete structural frame Rectangular prism Horizontality	Stair towers Circular openings Semi-open transitional space
Maps	Regional	Local
		
Layout & Mass Composition		
School Views		
	North-east View	North-west View

Name of Building	Koskluciftlik Elementary School	
Date of design and construction	1955	
Architect / Construction Firm	Ahmet V. Behaeddin	
Type	Elementary School	
Location	Lefkosa	
Main Building Materials	Reinforced concrete Glass	Steel framed windows Plaster
Architectural Features	Concrete structural frame Rectangular prism Horizontality	Ribbon windows Transparency Slightly sloped roof
Maps	Regional	Local
		
Layout & Mass Composition		
School Views		
	South View	North View

Name of Building	Famagusta Nursery School	
Date of design and construction	1955	
Architect / Construction Firm	Unknown	
Type	Nursery School	
Location	Famagusta	
Main Building Materials	Reinforced concrete Steel framed windows	Plaster
Architectural Features	Proportional grid system Rectangular prism Elevated up from the ground Horizontality	Transparency Mini circular windows Subtraction from the geometry Flat roof
Maps	Regional	Local
		
Layout & Mass Composition		
School Views		
	South-east View	North-west View