THE REPUBLIC OF TURKEY
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FLEXIBLE LEARNING SPACES: INSIGHTS FROM USE PATTERNS IN PUBLIC PRIMARY SCHOOLS

Doctor of Philosophy (PhD) Thesis

YASEMİN BURCU BALOĞLU

ISTANBUL, 2020

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ABSTRACT

FLEXIBLE LEARNING SPACES:
INSIGHTS FROM USE PATTERNS IN PUBLIC PRIMARY SCHOOLS

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The educational landscape has been changing with the shifting paradigms in pedagogical approaches and advancements in the technology. School buildings constitute the primary architectural products of the educational systems. The spatial needs to provide efficient communication, cooperation, interaction, adaptation to the evolving student-centered pedagogical approaches made it a challenge for school design to be ready for change and transformation to meet the contemporary requirements. Besides, school buildings have also been expected to meet the demands brought by the surrounding social environment and physical or psychological needs of the users, functional obsolescence, demographic and economic factors, and the concerns for sustainability. A prominent architectural response stimulated by the innovative ideas on how the physical environment can accommodate these changes and support learning has been flexibility, as a significant parameter in the learning space design.

The literature and prior experiences in practice also indicate that flexibility has different interpretations and implementations in the context of learning space design, which can contribute to the solutions of contemporary concerns of school design. However, to achieve successful outcomes from learning processes, the spatial design is required to go hand-in-hand with the pedagogical methods and educational activities. Thus, discussing a flexible design approach for the institutions that belong to a particular educational system emerges the need for the comprehension of that system's educational culture, pedagogical methods, and user requirements for the development of coherent strategies.

In the broadest sense, this thesis discusses flexibility and the relevant concepts in the context of state primary school architecture in Turkey. The study aims to derive strategies for flexibility to be utilized in design processes by bringing insights from educators' opinions on the fundamental spatial requirements at schools and examining the relations between educational practices and design of the physical space. A two-tiered field study process following an exploratory research approach has been conducted to explore the use patterns and identify the prioritized problems within the existing school building stock produced through prototype-based methods.

Within the scope of the field study, fifteen state-governed primary schools located in Bayrampaşa, Istanbul has been visited. The first phase of the study included a survey among the teachers, which aimed to reveal the relationships between educational activities and learning settings. According to the analysis of the data, learning spaces'

ability to accommodate the changing needs of different educational activities, need for a variety of subject-specific areas as well as enhancement of both interior spaces and school ground for children's physical activity and play needs emerged as some of the most prominent issues regarding school design from teachers' viewpoints. The second phase involved the determination of functional alterations at schools through on-site observations as well as revision of technical documents for the evaluation of the current situation from a design point of view. The interpretation of the findings from the second part showed that the alterations at schools have often been conducted in a contradictory manner to the need for spatial variety emphasized by teachers to support the educational activities. The functional changes are founded to be developed around the concerns for increasing the number of standard classrooms to accommodate large numbers of students. The outdoor spaces are also observed to be underutilized in terms of their contribution to learning processes and the amount of accessible area. A primary shared concern revealed through both parts of the study has been the need for searching for alternative spatial solutions to respond to crowdedness at schools.

The theoretical work around the subject and the interpretation of the findings of the field study were then used together to inform the setting out of ideas on how flexible design features may be approached in primary schools in Turkey. As an outcome of the thesis, a set of complying practical design strategies has been suggested to employ flexibility in interior spatial organization and outdoor space use at primary schools. The inquiry, for the first time, searched for the educators' thoughts of learning spaces as a primary component together with the observations at school settings to assess solutions for flexible design in Turkish Primary Schools, and the thesis is believed to contribute to the literature in this respect. It is also considered that the suggested ideas regarding flexibility can contribute to the development of strategies for the planning processes of future schools or interventions to the existing primary school buildings.

Keywords: School Architecture, Flexibility, Primary Schools, Learning Spaces

ÖZET

ESNEK ÖĞRENME MEKANLARI:
DEVLET İLKOKUL YAPILARINDA MEKAN KULLANIM ÖRÜNTÜLERİNDEN İÇGÖRÜLER

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Eğitim alanı, pedagojik yaklaşımlarda farklılaşan paradigmalar ve teknolojideki ilerlemeler ile birlikte değişmektedir. Okul yapıları, eğitim sistemlerinin temel mimari ürünleridir. Etkin iletişim, işbirliği, etkileşim, gelişen öğrenci merkezli pedagojik yaklaşımlara uyum sağlama nedenleriyle ortaya çıkan mekânsal ihtiyaçlar; okul tasarımlarının çağdaş gereksinimleri karşılamak için değişime ve dönüşüme hazır olmasını gerektirir. Ayrıca, okul yapılarının sosyal çevrelerinin getirdiği talepleri, kullanıcıların fiziksel veya psikolojik ihtiyaçlarını, işlevsel eskimeyi, demografik ve ekonomik faktörleri ve sürdürülebilirlikle ilgili endişeleri karşılaması da beklenmektedir. Öğrenme mekanlarında tercih edilen bir özellik olarak esneklik; yapılı çevrenin değişimleri nasıl karşılayacağı ve öğrenmeyi destekleyeceği yönünde yenilikçi fikirlerin ortaya koyduğu mimari açıdan belirgin bir yanıt olmuştur.

Konuya ilişkin literatür ve pratikteki uygulamalar, esnekliğin öğrenme mekanı tasarımı bağlamında farklı yorumlamaları ve uygulamaları olduğunu göstermektedir. Bununla beraber, öğrenme süreçlerinden başarılı sonuçlar elde edilmesi için, mekânsal tasarımın pedagojik yöntemlerle ve eğitim etkinlikleriyle örtüşmesi gerekir. Bu nedenle, belirli bir eğitim sistemine ait kurumlar açısından esnek bir tasarım yaklaşımının tartışılması ve tutarlı stratejilerin geliştirilmesi için o sistemin eğitim kültürünün, pedagojik yöntemlerinin ve kullanıcı gereksinimlerinin anlaşılmasına ihtiyaç duyulmaktadır.

Bu tez çalışması geniş anlamıyla, Türkiye'de okul mimarisi bağlamında esnekliği ve ilgili kavramları ele almaktadır. Çalışmada, eğitimcilerin okullardaki temel mekânsal gereksinimler hakkındaki görüşlerinin alınması ve eğitim uygulamaları ile fiziksel mekanın tasarımı arasındaki ilişkilerin incelenmesi ile tasarım süreçlerinde yararlanılabilecek esneklik stratejilerinin oluşturulması amaçlanmıştır. Kullanım biçimlerini anlamak ve tip proje yaklaşımıyla üretilen mevcut okul binası stokundaki öncelikli sorunları belirlemek için keşifçi bir araştırma yaklaşımını izleyen iki aşamalı bir saha çalışması yürütülmüştür.

Saha çalışması kapsamında İstanbul ili Bayrampaşa'da bulunan on beş devlet ilkokulu ziyaret edilmiştir. Saha çalışmasının ilk aşaması, öğretmenlerle, eğitim etkinlikleri ve öğrenme ortamları arasındaki ilişkileri ortaya çıkarmak için gerçekleştirilen anketi içerir. Elde edilen verilerin analizi doğrultusunda, öğretmenlerin bakış açılarıyla okul tasarımıyla ilgili en belirgin konular belirlenmiştir. Öğrenme alanlarının farklı eğitim faaliyetlerinin değişen ihtiyaçlarını karşılayabilme kabiliyeti, çeşitli konulara özgü

alanlara ihtiyaç duyulması, hem iç hem de dış mekanın çocukların fiziksel aktiviteleri ve oyun ihtiyaçlarını karşılayıcı biçimde zenginleştirilmesi söz konusu konulardan en belirgin olanlarıdır. İkinci aşama, sahadaki gözlemler yoluyla okullardaki fonksiyonel değişikliklerin belirlenmesini ve mevcut durumun tasarımcı bakış açısından değerlendirilmesi ve karşılaştırma yapılabilmesi için okul projelerinin gözden geçirilmesini içerir. İkinci kısımdan elde edilen bulgular, okullardaki değişikliklerin, öğretmenlerin eğitim faaliyetlerini desteklemek için vurguladığı mekânsal çeşitlilik ihtiyacına karşıt bir şekilde gerçekleştirildiğini göstermiştir. Ayrıca, işlevsel değişikliklerin, çok sayıda öğrenciyi barındıracak standart derslik sayısının arttırılmasına yönelik kaygılar etrafında geliştiği gözlemlenmiştir. Dış mekanların öğrenme süreçlerine katkıları ve erişilebilir alanların miktarları bakımından verimli şekilde kullanılmadığı görülmüştür. Okullardaki kalabalık durumu karşılamak için alternatif mekânsal çözümlerin araştırılması gereksinimi çalışmanın her iki bölümünün sonucunda da ortaya konan ortak bir endişe olduğu görülmüştür.

Konuyla ilgili teorik çalışma ve saha çalışması sonucunda ortaya çıkan bulguların yorumlanması, Türkiye'deki devlet ilkokul yapılarında esnek tasarım özelliklerinin nasıl ele alınabileceği konusundaki fikirlerin oluşturulması için birlikte değerlendirilmiştir. Tezin sonuç ürünü olarak, ilköğretim okullarında iç mekanın organizasyonu ve dış mekan kullanımı açısından esneklik yaklaşımının uygulanması doğrultusunda bir dizi pratik tasarım stratejisi ortaya konulmuştur. Bu araştırma, ilk defa eğitimcilerin öğrenme alanları hakkındaki görüşlerini Türkiye'de ilkokullarda esnek tasarıma yönelik çözümlerin değerlendirilmesi için temel bir bileşen olarak ele almıştır ve tez bu açıdan literatüre katkı sunmaktadır. Ayrıca, esnekliğe ilişkin önerilen fikirlerin, gelecek okul planlama süreçleri için stratejilerin oluşturulmasına veya mevcut ilköğretim okul binalarına yapılacak müdahalelerin geliştirilmesine katkıda bulunabileceği düşünülmektedir.

Anahtar Kelimeler: Okul Mimarisi, Esneklik, İlkokul Yapıları, Öğrenme Mekanları

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ABBREVIATIONS

AHP	:	Analytic Hierarchy Process
CABE	:	Commission for Architecture and the Built Environment
ICT	:	Information and Communication Technologies
ISMEP	:	Istanbul Seismic Risk Mitigation and Emergency Preparedness Project
OECD	:	The Organisation for Economic Co-operation and Development
RIBA	:	Royal Institute of British Architects
STEM	:	Science, Technology, Engineering and Mathematic

1. INTRODUCTION

Architecture has been undeniably intertwined with education. School facilities, like all other physical settings, serve a variety of functions, but their most significant purpose is the responsibility to provide an enabling environment for educational practices. Learning is described as a relatively long-lasting change in behavior that results from experience (Sanoff and Walden 2012). As demonstrated in many studies, today, it is known that children learn from direct experiences with their surrounding environments (Weinstein and David 1987), and physical aspects of educational settings have significant impacts on learning (Barrett et al. 2015, Heppell et al. 2004, Leiringer and Cardellino 2011, Martin 2005).

The educational landscape is changing with the shifting paradigms in pedagogies as well as the advancements in the technology. There are embedded perceptions and a long history about the spaces where learning traditionally occurs. These existing assumptions, on the other hand, are being challenged under the influence of innovative ideas on how designed spaces can support learning more efficiently. One of the prominent architectural responses stimulated by these ideas has been flexible learning spaces.

Flexibility has been a constant component discussed within architectural discourse with its various dimensions regarding time, user, use, and movement. Recent architectural vocabularies regarding school design, both language-based and built, have been widely driven by notions of flexibility (Wood 2018). This situation, on the other hand, raises questions about what flexibility really offers for learning processes and people. School architecture is a process linked with pedagogical approaches as well as the way that educational activities are carried out. Thus, it requires the consideration of these different aspects within a whole picture from the designer's point of view. Accordingly, discussing a flexible design approach for the institutions that belong to a particular educational system emerges a need for the comprehension of that system's educational culture, pedagogical methods, and user requirements.

There has been an increasing trend in the production of educational facilities due to population growth and rapid changes in the educational system, which seems to proceed in the foreseeable future in Turkey. Carefully considered proposals of school design

indeed have the potential to contribute to the development of future school projects and to make interventions to the existing ones to support educational activities.

In a broad sense, this thesis discusses flexibility and the relevant concepts in the context of primary school architecture in Turkey. The study aims to derive strategies for flexibility to be utilized in design processes by introducing insights from educators' opinions on the primary spatial requirements at schools and examining the relations between educational practices and design of the physical space. Primary school buildings constitute the settings for the very early years of children's formal education in many countries, including Turkey, and they are also the first academic institutions that children experience. For this reason, the architecture of these schools has a particular meaning in children's lives, and primary schools have been included to be examined in details within the scope of this study.

In order to construct a theoretical framework, first, meanings of flexibility as an architectural feature has been reviewed through the literature. Then, the definition of flexibility in the context of educational spaces has been clarified and refined by breaking the terminology down into categories by timescales. The implementations of the flexible design in learning settings in response to diverse requirements were examined through international examples to contextualize the information obtained from the definitions. Acknowledging the interdependence of teaching methods with the shaping of the physical learning space, the evolution of learning environments up to our current day was reviewed, and the impacts of student-centered pedagogies on the formation of design approaches including flexibility were explained. Later, the dominant approaches and recent developments driving the school design processes in Turkey, as well as the place of flexibility within the current school building guidelines, were examined to present a better understanding of the existing system.

A two-phased field study following an exploratory approach has been undertaken within the scope of the thesis to examine the spatial use patterns and identify issues regarding the existing building stock. Within the first phase, the relationships between educational practices and learning settings, as well as the prioritized spatial requirements at schools, were identified through a survey among teachers' from fifteen primary schools located in Bayrampaşa, Istanbul. The second phase of the inquiry included the collection of data

regarding functional changes, alterations, and outdoor space use through direct observations in the same school buildings in Bayrampaşa as well as the examination of project drawings for the comparison and evaluation of the current situation from a designer's point of view.

For the school visits, it was aimed to reach a diverse sample of schools in terms of typology, which were constructed according to the prototype-based projects produced or approved by the Ministry within the same area. Bayrampaşa constituted an appropriate area for the research, for it accommodates various prototype-based state primary school buildings projects that were built or completely refurbished during the last twenty years. The thesis also aimed to focus on schools that are located in crowded urban centers and often subjected to re-building or modifications due to challenging conditions of accommodating educational activities to serve a large number of students. Bayrampaşa district also emerged as a proper location to respond to these concerns for sampling.

Finally, the theoretical work around the subject and the information derived from the analysis of the findings of research have been used to form suggestions on how flexible design features may be approached in state primary schools in Turkey to respond to the determined prioritized needs and particular spatial requirements of the educational practices.

1.1 AIM AND SCOPE

Educational buildings are defined as structures in which people are provided with education as well as constituting a stage for the transfer of intergenerational culture (Öymen Gür and Zorlu 2002). In other words, these structures contribute to the integration of individuals into society. Besides, accessible, public education is recognized as one of the central responsibilities of democratic societies. The school buildings not only affect how teaching and learning are performed but also give clues about the shared values that are held by society. Thus, governing bodies are expected to produce policies to provide education within qualified physical spaces in terms of design supporting the requirements of the educational activities as well as the students and the educating staff. This situation constitutes one of the main reasons which place school building design to be a subject of research and debate in our present day. State-funded school buildings

which are built according to the regulations to accommodate certain curricular activities may be recognized as showcases which give clues about how schooling is approached and realized in a particular culture.

In Turkey, the predominant approach to state-funded school design has been the repetitive implementation of similar prototype projects produced by the governmental institutions or authorized private architectural offices since the earlier times of the Turkish Republic. Many scholars and design professionals tirelessly underline that this approach brings many problems regarding the spatial design qualities of educational institutions in different scales (Ciravoğlu 2004, Güzer 2014, Karabey 2014). Despite the criticisms, the same type of schools are still being built today in all around the country regardless of the diversities in needs of pedagogical approaches and users, context, place, climate, culture. For the conceivable future, prototype-based projects are likely to continue to be implemented similarly for economical, practical, or managerial reasons.

Especially in the crowded urban centers, the ongoing situation of maintaining, repairing, and replacing the existing school building stock has resulted in the need for a wide range of projects from small-scale expansions to the rebuilding of the new facilities, notably during the last two decades. The design of these projects must follow a series of regulations and spatial standards determined by the guidelines issued by the Ministry of National Education. From a different perspective, this means that the improvement of the design codes to address the concerns and spatial needs of contemporary educational practices can enhance the building of qualified physical environments of school buildings. Thus, more research on the educational culture in Turkey and its relation with architecture can make valuable contributions to design processes. Flexibility, the related concepts and integration of their diverse methods to school design may also be assessed within this framework.

As put in by Burke and Grosvenor (2008), the need for flexible solutions in school architecture has been more or less recognized throughout the history of education. In today's conditions, the notion of flexibility has gained more acceptance and become a frequently discussed attribute by the design professionals, educators and scholars regarding contemporary education systems and the design of twenty-first-century schools. Flexibility is argued to be one of the built environment parameters which is

thought to have positive impacts on learning (Dudek 2000, Karabey 2014, Leather and Duarte Morinho 2009, Lippman 2010, Moore and Lackney 1994, Perkins 2001), presented as an enabler of the adoption and adaptation of emerging changes in education (Leiringer and Cardellino 2011), and demonstrated to be a guiding factor for the shaping of the contemporary physical learning spaces in primary schools in some empirical studies (Barrett et al. 2015). The term has also been cited in many evidence-based reviews and design guidelines for future schools and often been employed as a distinguishing physical characteristic and one of the abstract social forces that influence school design (Monahan 2002).

Hill (2003) emphasizes that flexible architecture is based on the principle that a building can absorb, or adapt to reflect, changes in use. Kronenburg (2007) also underlines the basic features of flexible buildings as that they are intended to respond to changing situations in their use, operation, or location. Thus, flexibility is by its nature, related to change. Accordingly, flexible structures are expected to be dynamic, to adapt, to transform, to remain relevant to the cultural and societal trends, and to interact with the users rather than inhibiting them (Kronenburg 2007). The developments which have positioned flexibility as a preferable architectural means for school design may be summarized as the shifts in the pedagogical approaches and the surrounding social environment, advances in technology, changes in the physical or psychological needs of the users, demographic factors, economic factors, physical and functional obsolescence and concerns for sustainability. Besides these factors, the spatial needs to provide efficient communication, cooperation, interaction, adaptation to the evolving student-centered educational approaches made it a challenge for schools to be ready for change and transformation to meet the contemporary requirements.

Review of the literature shows that, although flexibility is often offered as a preferable design feature to support educational activities, the explanations on its definition and contents are often vague. Besides, there are still gaps in research on the examination of approaches and methods to provide flexibility. Moreover, it is often highly complicated to understand from the sources, who or what contributes to flexibility, since the agent may be the design of the building, the users or the combination of both. As a part of the thesis, it has been aimed to contribute to the clarification of the terminology through the examination and comparisons of the definitions of flexibility provided within different

sources. It has been intended to gain a better understanding of what flexibility is, how it applies to space, as well as determining which methods, or who contribute to the flexible design in the context of learning space design.

School design is interdependent with pedagogical approaches as well as educational activities. Thus, the consistency between the teaching and learning practices and the design of physical environment which surrounds them is mentioned as an essential feature of qualified school design (Moore and Lackney 1994, Neill and Etheridge 2008, Walden 2015). Walden (2015) asserts that future school buildings should be the ones where learning processes and pedagogy are inseparable, which facilitates social learning, offers individual and team activities and exists as a place for encounter and sensory experiences for children. In a similar manner, flexible educational spaces by themselves cannot be expected to act as catalysts for direct improvement in learning. As it is also emphasized within the emerging themes for the twenty-first-century learning environments defined by the Organization for Economic Co-operation and Development (OECD), and included in various other sources, the involvement of user opinions to school design processes has become an essential requirement to achieve these qualities (Walden 2015, Woolner 2010). This may only be possible through overcoming the communication problems between designers and educators and the main users of schools, teachers and students (Walden 2015). As a common concern of many explanations of flexibility, the users take a central role.

Accordingly, in the case of learning spaces, understanding the current requirements of educational practices and their relations with space through learning about the first-hand experiences may have a critical contribution to the development of coherent strategies and methods to accommodate the demands of present and future users. Regarding the subject, Wood (2018) advocates flexibility should not be approached as just a space-related issue and claims that without an understanding of a timescale and actors who will be responsible for the design or operation of the flexible attributes, flexibility becomes a problematic term. Kvan (2013) also emphasizes the importance of the valuation of qualitative dimensions of the learning- teaching experiences and outcomes of design by the users. Thus, it may be implied that hearing about the experiences of users from first hand also becomes crucial to bring new insights to learning space design.

Especially at primary schools, teachers constitute one of the main user groups with their legitimized role to guide and control the educational activities. In Turkey, there still seems to be a lack of research to understand how the educators' assess the educational settings designed according to the regulations defined by the official institutions within a prototype-based project approach. With the recognition of these factors, the thesis aims to contribute to the fulfilment of this gap through presenting teachers' opinions about the school designs' ability to support current educational practices. Moreover, it is intended to reveal the sources of the changes in spatial requirements that emerge in different timescales, and define the priorities to be addressed to enhance learning experiences with the design of the physical environment.

In Turkey, flexibility as an architectural means has been adopted in some parts of the current school building manuals; however, the presented strategies comprise only limited aspects of flexible design. The gathered information from the review of literature and analysis of the findings of the research part is then aimed to be utilized to bring insights from the actual use patterns at schools to the development of flexible design strategies. Thus, as a final output, the thesis aims to present alternative practical design ideas that comply with the determined spatial requirements to utilize the positive outcomes of flexible design approach in Turkish public primary schools. To summarize, as explained in details throughout the section, the aims of the thesis may be listed as follows:

i. to contribute to the clarification of the terminology regarding flexibility and the related concepts in the context of educational space design through the examination and comparison of the definitions provided in different sources,
ii. to determine the current issues regarding the relations between the educational practices and physical environment at primary schools through the field study,
iii. to find out the sources of the changes in spatial requirements at primary schools through hearing the opinions of the educators through the field study,
iv. to discuss the flexible design approach in a broader sense to be utilized in primary schools in Turkey,
v. to present alternative complying suggestions and methods for flexibility which may be implemented in the existing schools, or contribute to the formation of design ideas for future schools.

1.2 STRUCTURE OF THE THESIS

Structure of the thesis has been developed within a parallel approach following the above mentioned aims sequentially, responding each of them step by step. The thesis recognizes the position of the users of the physical space as an essential component to integrate flexibility in school design. Therefore, it is aimed to comprehend how flexible design can be utilized through presenting viewpoints of the users, which mainly consists of the students and educators in the case of schools, along with the designers' perspective. Structure of the thesis may be briefly explained in three main interrelated parts which are the review of literature, the research and findings, and development of design strategies.

As an initial step, the meaning of flexibility with its different dimensions in the context of educational environments was examined through the review of the relevant literature. The review begins with the comprehension of the relations between children and the physical environment with regards to different aspects of childhood development. Then, the impact of the physical design of schools on learning experiences is demonstrated. The evolution of school design with the changes in educational philosophies and pedagogical methods, has been examined within a chronological framework to introduce how flexibility had emerged as a criterion for the design of educational environments in the next part. Finally, under the light of the review of literature and examination of examples in practice, different aspects of flexibility and flexible strategies for the design of educational environments were extracted and introduced. The second part of the thesis explains the research methodology, results, and interpretations of the findings of the field study conducted in the primary schools within the scope of the thesis. In the final part, the user feedback derived from the surveys and expert opinions obtained through the observations during the school visits were then used to inform the setting out of complying, practical ideas to employ flexibility in terms of interior spatial organization and outdoor space use in primary school buildings.

Children typically learn in different ways and set changing types of interactions with their surrounding environment as they grow. Following the introduction part, the review of literature presented within the thesis begins with the second chapter, which overviews the interaction between children and the built environment during various stages of their development within the framework of learning processes. This part of the study also

describes the developmental features of primary school children who belong to 6-12 age group.

The third chapter presents an examination of the path to our current day school buildings in a historical context, following the beginning of the nineteenth-century after the Industrial Revolution, which led to the establishment of the first standardized models of school facilities. The emphasis was given to the changes in the pedagogical approaches and their reflections on the school design. Following the examination of educational structures' development in the Western world, a chronological description of the approaches to the design and construction of school buildings in Turkey has been examined within the chapter. The foundation of the Republic was considered as a turning point, and school buildings that are produced with the beginning of this period up to now were investigated throughout the review. Current approaches to the design processes of school buildings in Turkey and criticisms towards the dominant prototype-based project approach were explained. The design criteria regarding flexibility provided within the recent guides of school building standards were examined and presented.

The fourth chapter focuses on the background studies of flexibility in the context of learning space design. After presenting a brief review of diverse approaches towards flexibility in the general architectural discourse, its definitions regarding educational space design provided in different sources have been compared. The derived flexible design features were then categorized according to their functions to respond to requirements that emerge within different timescales. Different flexible design strategies to meet short term and long term requirements at schools have been explained and summarized at the end of the chapter.

The fifth chapter clarifies the methodology, results and interpretations of the findings of the two-phased field study which is conducted to examine the spatial use patterns and the sources of the changes in spatial requirements in Bayrampaşa primary schools. The rationale behind the adopted research approach, data collection procedures, information about the research site and typologies of the schools, and data analysis processes as well as the results and interpretations of the findings of both phases of the study has been explained in details within the chapter.

To contextualize the data on primary requirements derived in the light of the field study and the review of literature, the sixth chapter suggests ideas for utilizing a flexible design approach in design processes of state primary schools in Turkey in response to the determined prioritized needs and particular spatial requirements of the educational practices. The main emphasis is given to practical, realistic proposals for to be implemented in the case of the existing school building stock. Directions for further research, and conclusions are presented at the end of the section.

2. THE ROLE OF EDUCATIONAL SPACES ON CHILD DEVELOPMENT AND LEARNING EXPERIENCES

Primary school buildings often constitute the first formal institutional environments that children experience, spend a significant amount of their time inside. Children's spatial experiences in these environments have critical reflections on their development. On the other hand, how they perceive and experience the school environment can also be related to their developmental characteristics and needs of the particular age group they belong. Thus, the comprehension and consideration of the developmental characteristics of children as the users of the physical environment emerge as a fundamental requirement for the discussion of school architecture from the designer's standpoint. Section 2.1 briefly examines children's understanding of space and their interaction with the physical environment at different stages of cognitive, socioemotional, physical development while seeking for what these interactions can mean in everyday life and pedagogical methods. Based on the various developmental aspects described in the prior section, Section 2.2 aims to examine the literature on the impact of school environment on child development and presents a review of current studies on the effects of physical design features of learning spaces on students' learning experiences with the main focus on the primary school level age period. Primary school students usually consist of children aged 6 through 11 years. The term 'environment' may be referred to describe diverse interrelated factors, including the physical, social, and cultural contexts. However, within the section, the term has been mainly used to refer to the physical, designed, built environment.

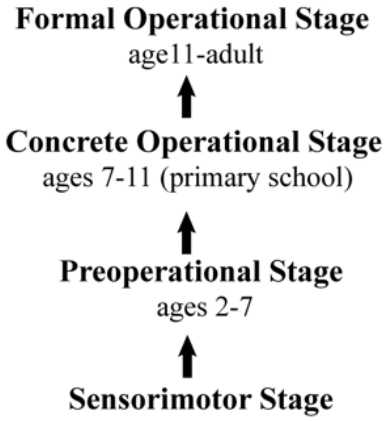
2.1 CHILD DEVELOPMENT AND THE PHYSICAL ENVIRONMENT

Child development refers to the physical growth, and cognitive, emotional development through which an individual experience from infancy to adolescence (Levin 2011). As children grow up, their needs and expectations change in line with their physical, mental, and psychological development, and accordingly, their interaction with their surrounding environment at different stages also changes. Besides, the perception of the built environment has been proved to be related to the physiological, psychological, socio-emotional development as well as the characteristics of the physical environment (Öymen Gür and Zorlu 2002).

Studies regarding child development constitute a multi-disciplinary area which includes interrelated perspectives of different fields such as ecologic psychology, developmental psychology, and environmental psychology. Respectively, as presented in many prior sources, the theories about the subject have often been concentrating on multiple themes, namely physical growth, cognitive, language and emotional-social development (Kail 2012, Levin 2011). According to the related literature, the characteristics of physical settings can influence the children's developmental process in various ways. However, among these, the comprehension of how children create knowledge, cognitive development, and socioemotional development are often located at the center of a vast body of research on the children's interaction with the physical environment.

Piaget's theory of cognitive development and his explanations about the formation of the concept of space in children has been one of the fundamental sources, which is still widely referred in studies regarding the development of children's perception of space and their relations with the environment. According to Piaget, development reflects children's efforts to understand the world and emphasizes the different stages of thinking that result from their changing theories of the world (Kail 2012). The theory divides perceptual and cognitive levels of childhood development into four categories as the sensorimotor stage from birth to age 2, the pre-operational stage from ages 2 through 7, concrete operational level from age 7 to age 11, and finally the formal operational stage from age 11 to adolescence and adulthood as shown in Figure 2.1. (Ginsburg and Opper 1988, Kail 2012, Levin 2011).

Figure 2.1: Stages of child development defined by Piaget



Piaget's constructivist approach assumes that knowledge in children is constructed by engaging actively with the physical and social world, abstract thinking is built on concrete

experience, and conceptual change occurs through assimilation and accommodation (Daniels and Shumow 2003, Piaget 1964). Thus, the theory takes the interaction of the child with the environment as the fundamental basis of development (Moore and Sugiyama 2007). Within the Piagetian perspective, changing notions of places are judged to be a function of the maturing cognitive structures of mind (Hutchison 2004). A more recent approach, Vygotsky's theory also recognizes that the cognitive development of children happens in sequential stages similar to Piaget's model; however, the assumption emphasizes the role of social interaction in the development of cognition. Vygotsky stresses that knowledge can be acquired by engaging with others through encouraging activities since the child's mental development and perception processes are directly related to the environment in which they interact (Kozulin 2003).

Both Piaget's and Vygotsky's constructivist theories of child development highlight the active role of the child in interaction with the feed from the environment, and in a way, construct a basis for contemporary child-centered pedagogical approaches to education (Daniels and Shumow 2003). Children need to be situated within an environment which actively engages them to be curious about their surroundings so that they would learn by themselves through exploration. Accordingly, the design of the physical environment becomes critical to respond to children's nature as inventive, creative, critical thinkers while fostering engagement, discovery, and allowing for gradual change. Within the school environment, constructivist idea rejects the notion of the teacher being the only source of knowledge, but adopts the notion suggesting that the place of learning, the situation, and the social context all interact with the learner to produce constructions of their understanding (Woodman 2016).

Examining the developmental stages in relation to the changes in children's relationship with the physical environment, the evidence suggests that the use of symbolic representations of space is developed early in childhood and children explore the space around them even before they are mobile and even infants are interested in many of the things that fall within their reach (Spencer and Blades 1993). According to Piaget, children older than 4 years continue to develop sensorimotor schemes applicable to a wide range of objects, to improve skills in language, and to acquire mental representations for increasingly large portions of the surrounding world (Ginsburg and Opper 1988). Primary school children match the concrete operational level during which they begin to

comprehend the logical relationships between objects and events, use a variety of strategies to solve non-hypothetical problems and think logically in line with Piaget's classification (Levin 2011). In other words, this stage includes the period during which a child learns the environment by experience and formulates it based on concrete concepts. Christopher Alexander (1977) notes that around the age of 6 or 7, children develop a great need to learn by doing, to make their mark on a community outside the home. If the setting is right, these needs lead children directly to the necessary skills and habits of learning. Tuan (2001) also asserts that children's idea of place becomes more specific as they grow, and after the age of 5, they become even more curious and interested in new places. Accordingly, it may be understood that primary school children start to set up more conscious relations with their surrounding environment in comparison to younger ages.

Another important point regarding the relations between cognitive development and the physical environment is, as underlined by Day and Midjber (2007) is that there are differences between the children's and adults' view and experiences of the physical environment because adults are already aware of the purpose of the design and practical use of a place. Children's viewpoints are centered on the particular experience they have in that space. Tuan (2001) similarly explains the difference by emphasizing that a child's imagination is usually tied to the activities, and their eyes are mostly on the present and immediate future, which makes them perceive places more circumstantial, different from the adults. Only after the ages of 13 to 15, children start to give conscious values to the aesthetics of their surroundings with a more developed sense of space (Day and Midbjer 2007). However, their environmental experiences continue to be influential throughout life (Weinstein and David, 1987). Correspondingly, primary school students may be unaware of the pedagogical methods which form the basis of their education, and they may not belong to an age level in which they can make mindful aesthetic judgments like adults. However, their experience of school environment may have impacts throughout their life. As it may be inferred from the prior studies, children's interaction with the environment and exploration has a crucial role in their development. Keeping children's awareness alive and further developing through education, education can enable them to have some influence over the environment they live in in the future (Soygeniş and Erktin 2009).

The physical environment's impacts on the socioemotional development of children have also been a widely studied issue, especially by the researchers from the environmental psychology field. For instance, evidence suggests that factors related to the ecological context in which the development occurs, such as noise, crowding, pollutants, chaos, and housing, school, and neighbourhood quality influence children's both cognitive and socioemotional development (Evans 2006). Maxwell and Chmielewski (2008) mention that healthy socioemotional development can also affect other aspects of a child's life, which increases the importance of designing the physical environment. Studies show that children's understanding of places in which they spend time, constitutes a basis for developing self-identity through place attachments, social integration as well as civic participation (Maxwell and Chmielewski 2008, Spencer and Blades 1993) Besides, although the development of self-esteem is a life-long process, primary school period children between the ages of 6 to 9 years are at a critical stage in the development of the self which may be affected by the design of the physical environment (Maxwell and Chmielewski 2008, Proshansky and Fabian 1987). For instance, Maxwell and Chmielewski's (2008) study shows that, if the physical environment permits children to get their supplies, provides them with a task-appropriate workspace and allows them to observe aspects of themselves within a space through artworks, photos or other related items, children feel a sense of accomplishment that can lead to a sense of mastery and a sense of self-worth. Exploratory activities within an encouraging physical environment are also found to support the autonomy, and self-confidence of children (Evans, Kliewer and Martin 1991).

Many studies demonstrate that physical development and the healthy growth of children may also be directly or indirectly affected by the design of the environment. Moreover, experience has a considerable effect on which bodily movements are displayed and, the environmental factors can influence even infants' acquisition of motor milestones, such as starting to walk (Levin 2011). Besides, children's engagement in regular physical activity is highly associated with physical and psychosocial health benefits as well as healthy growth (Žaltauskė and Petrauskienė 2016). More walkable and more pedestrian-friendly neighborhoods or the design of school buildings, outdoor areas which support physical activity through providing various facilities have been associated with enhancing the healthy growth and general well-being of the children (Day and Midbjer 2007, Ozdemir and Yilmaz 2008, Žaltauskė and Petrauskienė 2016). The concerns about

designing educational settings, outdoor facilities to enhance exercise and physical activity are also related to avoiding childhood obesity for primary school students (Ozdemir and Yilmaz 2008). Accordingly, the design of the built environment emerges as one of the primary variables thought to affect physical activity levels and the development of children.

It may be acquired from the review of the related literature that the design of the physical environment has been pointed out by many studies as a critical factor to affect all dimensions of child development. Thus, building up enabling physical settings in which children spend a serious amount of their time emerges as a primary concern to support their holistic development.

2.2. THE IMPACT OF PHYSICAL DESIGN OF SCHOOLS ON CHILD DEVELOPMENT AND LEARNING EXPERIENCES

Starting from the preschool years, children spend most of their time at schools and, they are continuously interacting with the physical settings within these educational institutions. It has been recognized and discussed for many years that children learn from direct experiences with their surrounding environments (Dudek 2000). The importance of these processes was highlighted by many early education theorists. A considerable body of literature and empirical work suggest that besides its contribution to academic achievement, the design of the physical environment at schools is influential on students' behaviors, attitudes, cognitive development, and it has a remarkable potential to be a prominent contributor to children's overall development (Clark 2002, Earthman and Lemasters 1996, Moore and Lackney 1994, Weinstein 1979, Weinstein and David 1987, Woolner 2010). On the contrary, if not suitably designed, the physical setting might cause lower levels of academic performance (Upitis 2004), increased disruptive behavior, less positive social interaction, and increased stress levels among preschool and elementary school children (Earthman and Lemasters 1996, Maxwell and Chmielewski 2008, Tanić, et al. 2018). Thus, it may also be assumed that a child's life is profoundly affected by the quality of the school environments.

Education constitutes an open and dynamic system that is in close relationship with the environment. The integration of the educational aims with the design of buildings and

spaces which accommodate them constitutes a significant concern for contemporary school design. Architectural space has long been recognized as a powerful tool for schools to respond to the unique needs of students and support the teaching methods (Martin 2005, Lackney 2011, Nicholson 2005). In other words, the design of learning settings contributes to the quality of learning practices and affect the ways how children learn. Regarding this potential, school building has even been defined as 'a teacher' (Nicholson 2005, Sanoff 2001) or a 'three-dimensional textbook' (Taylor 2009) in some sources. From another point of view, the design can also give clues about space's linkage with the teaching style, what is happening inside that space as well as the expectations of behavior reinforced by the educational institutions' policies (Martin 2005). As Nicholson (2005) emphasizes, children are highly aware of the clues and symbolic messages transmitted by school buildings.

Another critical point is that the physical environment at schools not only serves functional needs for educational activities but also has a significant relation with children's development and well-being. Some qualitative analyses concluded that a high-quality physical environment emerges as a critical factor to increase pupils' motivation and to enhance teacher's morale and motivation (Clark 2002, Lackney 2011). Moreover, the physical environment in general and in specific ways is believed to affect the social success of the children, which affirms that the function of schools is not only to ensure academic performance alone (Dudek 2000). As Itoh (2001) also emphasizes, there is a need to view the school as a place where children live in instead of a place where they are transmitted knowledge and skills stated in the curriculum. School architecture, indeed, should be given its value and treated as a background and contributor to the social development of children.

Outcomes of studies conducted over the years provide convincing evidence that the quality of the physical environment at schools is a significant factor in student learning experiences. Among the school environments, pre-schools and primary schools have substantial importance for child development since they are the first social institutions that children meet as a dominant force in their lives. As also emphasized by Dudek (2007), successful perceptive design makes a difference for children at every age; however, it particularly becomes fundamental for children growing towards the end of primary school and the advent of secondary school.

According to the classification provided by Öymen Gür and Düzenli (2004), mediators of information transferring in educational institutions can be examined under three main headings namely education through curricular activities, controlled free time activities and free time activities. In other words, all the time period during which a student stays at school and all the activities the child engages into can contribute to learning. A significant portion of the research examining the relationship between physical space and learning practices prioritize the core learning units or classroom environments as the main domains. Also, there is a considerable amount of prior research on the students' experiences outside the classroom and outdoor spaces at schools. The following two sections include the review of earlier studies concerning the relations between learning experiences and space, inside the classrooms and outside the classrooms at schools.

In terms of core learning spaces, the physical environment refers to the overall design and layout of a given classroom and its learning centers. It should be noted that most of the prior research related to the impact of the physical environment on learning experiences has concentrated on the traditional type of classrooms which are often defined with clear boundaries or comparisons of this type with other alternative proposals. However, the methods of different pedagogical approaches and alternative educational systems may reflect spatial design in diverse ways following their particular spatial needs.

Search for the most convenient ways of the formation of the boundaries defining the spaces in which the educational activities are performed has been one of the major issues examined in the related literature. An earlier study conducted by Moore (1986) shows that children show significantly more exploratory behavior, social interaction, and cooperation in spatially well-defined learning settings. The author lists the features which make a space more defined as partially surrounding walls or partial dividers of movable furniture to accommodate different group sizes, changes in levels either on the floor or the ceiling, changes in the textures and materials, utilizing lighting to define spaces or implied boundaries suggested by the placement of columns, posts, or other active visual elements (Moore 1986). Following a similar manner, the review conducted by Evans, et al. (1991) reveals that while volumetrically open, undifferentiated settings lead to visual and auditory distraction, open classrooms with better-defined activity spaces support children's involvement, child-initiated behaviors, and exploration during the educational

activities. In a more recent study, Tanić, et al. (2018) also asserts that there is a need to achieve a balanced relationship between a strictly defined and an open form of the physical environment to provide conditions in which school children can express their attitude toward their immediate social environment through their behavior. According to the authors, this includes the organization of a dynamic and shifting environment, spatial planning, which needs to enable a higher degree of privacy in certain zones (Tanić, et al. 2018). Architecturally well-defined spaces created with the productive use of resources to engage students into educational, creative, or social activities have been found to promote better learning for children (Moore and Sugiyama 2007).

The impacts of size, density, number of students (per unit area, or people per class), scale, and shape on core learning spaces are also significant issues documented by many studies. Classroom size and density have been found to have impacts on elementary school children's academic performance and social behavior patterns (Moore and Lackney 1994, Sanoff 2001, Weinstein 1979). Moore and Lackney (1994) present considerable evidence that the size of the school and classroom can make a difference in academic achievement where small sizes increase participation and better scores on learning achievement. The authors (1994) also assert that high-density conditions lead to aggression and decreased social interaction where larger schools with a thousand or more students discourage a sense of responsibility and meaningful participation. Another study by Maxwell (2003) reveals that primary school students are more vulnerable to adverse effects of high spatial density in classrooms which have less space per child. Woolner (2010) explains this situation claiming that adequate space seems likely to be more important for younger primary school children, whose learning activities might be more active in comparison to older children. Regarding scale, Tanner (2000) argues that building in scale with respect to the capabilities of children, for instance, locating the windows low enough to allow them to see out or designing the handrails, light switches within their reach promotes a sense of belonging.

The ambient environment features such as lighting, color, acoustics, temperature, air quality has also been subject to experimental work regarding their effects on the learning processes and children's behavior (Barrett, et al. 2015, Day and Midbjer 2007, Earthman and Lemasters 1996, Evans 2006, Martin 2005, Sanoff 2001, Tanner 2000, Upitis 2004, Weinstein 1979, Woolner 2010) as well as both students' and teachers' ability to

concentrate on educational tasks (Clark 2002, Evans 2006). Intensity and color temperature have been found to affect various physiological processes as well as blood pressure, pulse, respiration rates, brain activity, and biorhythms of children (Sleegers, et al. 2012, Tanner 2000). In a quite recent study conducted by Barrett, et al. (2015) in primary schools, three groups of parameters related to the physical environment at educational settings were defined as naturalness, individualization, and stimulation. Naturalness parameter included light, sound, temperature, air quality and links to nature, individualization parameter included ownership, flexibility, and connection factors and finally stimulation parameter was used to refer how exciting and vibrant the learning setting is as a result of complexity and color in the same study (Barrett, et al. 2015). The authors (2015) found out that naturalness and giving the occupants' opportunity to adjust to the environment for more comfortable and moderate levels of stimulation found to be supporting pupils' learning outcomes. The same study also indicated that distinct architectural characteristics of classrooms such as unique location, shape, display shelves, intimate corners, or facilities specifically designed for children strengthen primary school children's sense of ownership (Barrett, et al. 2015). Supporting the findings of Barrett, et al. (2015) on the effects of individualization of physical environment, Maxwell and Chmielewski (2008) also suggest that primary school children's self-esteem may be supported through alterations in the classroom's physical environment by allowing visual personalization, utilizing art displays or other student projects inside the classroom.

The effects of classroom layout and arrangement of the furniture on improving learning opportunities is another common issue which has been investigated through many studies. Classroom layout affects the social interaction between both teachers and students (Darren and Gifford 2001) and effective organization of space and furniture layout can facilitate learning processes and stimulate children's work (Martin 2005). Itoh's (2008) study shows that open-plan arrangement in classrooms in which students have the choice to sit or study wherever they want, takes the authoritarian role from the teacher and fosters self-control in students' behavior.

Besides the core spaces of learning, there are also outdoor spaces, course-specific spaces, spaces for social activities, circulation zones, and other in-between areas that contribute to the learning processes at schools. The relationship between learning processes with the design of outside spaces, schoolyards, and play gardens constitutes a widely studied topic.

To begin with, many studies advocate that outdoor play and interaction with nature have been found to have many positive effects on a child's cognitive development and the creation of a more natural landscape and vegetation on school grounds helps to provide the necessary setting for creative play (Arbogast, et al. 2009, Lindholm 1995). Another primary issue which gains a growing interest of the studies related to children and built environment is the influence of physical environment on physical activity of school age children. Improving the design and accessibility of outdoor environments are seen as efficient strategies to increase physical activity and are believed to promote better health among students (Ozdemir and Yilmaz 2008). Moreover, presenting alternative spaces for outdoor activities and play to the children who mostly stay passive in indoors emerges as a necessity where studies prove that availability of playgrounds and recreational facilities are associated with higher possibilities of primary school children to be sufficiently physically active (Žaltauskė and Petrauskienė 2016). Outdoor recess time can be a valuable tool for improving a child's emotional and intellectual development while stimulating comprehensive thinking as well as motivation (Day and Midbjer 2007). Besides, as also revealed by Burke and Grosvenor (2003), younger children recognize the importance of outdoor spaces and they wish large school gardens filled with different objects and facilities such as playgrounds, natural features through which they can engage into different activities instead of just empty grounds.

Considerable evidence from prior studies has shown that outdoor environment is a rich source of stimulation for the cognitive development of children and that outdoor itself can be thought of like a classroom. Findings of the study performed by Özdemir and Yilmaz (2008) in Turkish primary schools indicate that schoolyards with advanced landscape features are preferred more, and this, in turn, affects students' positive satisfaction. Another empirical research also demonstrates that primary school children's access and activities in natural areas and schoolyards are more creative than students' activities outdoors that lack natural elements (Lindholm 1995). Beyond supporting physical activity and play needs of the students, schoolyards may also provide rich sources for hands-on learning and exploration, and one of the efficient ways of achieving this seems to be utilizing natural elements. The study conducted by Camasso and Jagannathan (2017) proves that hands-on gardening opportunities at schools has positive effects on students' knowledge of science and strengthen the overall academic performance in primary schools.

Besides the functionally defined area schedule, there are also the internal circulation areas and in-between zones that link separate spaces at schools. Dudek (2007) claims that poorly designed circulation can make moving around the building difficult and even facilitate bullying where generous, well-designed circulation will promote a positive ethos and make sense of the school building as a coherent public institution. Moore (1986) underlines the importance of providing modified open spaces, which allow freedom of movement and help minimize student traffic congestion. Besides, easy wayfinding and clearly marked pathways to activity areas improve utilization of space at schools (Tanner 2000). Lackney emphasizes the need for creating special places such as breakout spaces, alcoves, table groupings to facilitate social learning and stimulate the social brain as a fundamental design feature of school environments (Sanoff 2001). Thus, circulation zones and other in-between areas may be conceived as much more than a corridor regarding their potential contribution to learning and socializing processes.

3. HISTORICAL EXPERIENCES WITH SCHOOL BUILDINGS AND RECENT APPROACHES TO LEARNING SPACE DESIGN

The recent research about learning environments has often been referring to a group of widely used notions through which contemporary approaches to school design are compared to long-existing traditional views. In order to explain the origins of the basic concepts and terminology, a historical overview of school buildings and their evolution with the changing conditions following the Industrial Revolution, and recent developments that occurred during the last few decades are presented in Section 3.1. The period at the beginning of the nineteenth-century after the Industrial Revolution has been appraised as a critical milestone during which social transformation shifted the populations from rural to urban, and the first standardized models of schools were established to accommodate high numbers of students (Dudek 2005). These schools constituted precursors to the school layouts with standard rectangular shaped classrooms which are still common to be seen today. Within the relevant literature, the comparisons between traditional and flexible, innovative approaches to school design are extensively discussed through examples from Europe and the United States. The scope of the thesis focuses on primary school design in Turkey. As it has been demonstrated in various sources, the reforms in the education systems and development of school structures in Turkey had followed the exemplary approaches in the Western world since the late-nineteenth century, and this vision became more prominent with the establishment of the Republic (Akyüz 2008). Accordingly, the developments in the Western World were focused on for the examination of the historical experiences with educational structures. The discussion of flexible design in the context of educational buildings demand for an understanding of its interdependence with pedagogical approaches. Within the section, it is intended to investigate the historical school forms with an emphasis on how teacher-centered philosophies have changed and child-centered objectives started to influence the design of the physical space, its contents and its use up to the current day. Afterwards, the contemporary themes guiding the twenty-first-century century school design and the place of flexibility as a significant approach contributing to these themes are explained in in Section 3.2.

A chronological description of the approaches to educational building design in Turkey is overviewed through Section 3.3. Reoccurring causes of long-term change, such as increases in population and economic concerns and their impacts on the school

architecture are discussed. Within the section, the evolution of early examples of school design and the reasons for the emergence of the "prototype-based project approach," which has been and still dominant in school building design and implementation processes in Turkey for years, are also examined. The "prototype-based project approach" (tip proje yaklaşımı) mentioned here and in the following parts of the thesis refers to the project design processes which ignore differences in the spatial, physical, social, and cultural context. Accordingly, the terms "prototype-based project" or "type project" (tip proje) refers to the officially approved, generic, and mostly uniform educational building projects to be implemented multiple times in different locations with minor changes. The terminology used to describe these types of projects has been explained through the similar wording in some prior sources regarding Turkish school design (Güzer 2014).

Section 3.4 focuses on explaining the concerns for building qualities following the Marmara Earthquake that occurred in 1999 and changes in the education system, which both significantly influenced the school design and construction processes in Turkey. The causes of the need for building more schools and the continuous changes in the structure of the education system are also highlighted through the presentation of official statistic data. For setting up a basis for further discussions on flexible design strategies in the case of Turkish primary schools, the chapter also aimed to present the current regulations regarding design processes. The characteristic features of the recent prototype-based school projects and general design requirements determined by the related institutions have been overviewed, and the reasons for criticism of the dominant approach to prototype-project based school designs are discussed. In the last section of the chapter, and the current design criteria for Turkish primary schools in the context of flexible design through the examination of recent school building standards guidelines were explained.

3.1 SCHOOL DESIGN FOLLOWING THE INDUSTRIAL REVOLUTION IN THE WESTERN WORLD ,

Tracing the evolution of school buildings from earlier examples to modern-day schools demonstrates that the design and provision of educational structures emerge from interrelated and dynamic incorporation of policies, economic imperatives, demographics, cultural values, and architectural theory. Consequently, throughout history, the architectural form and layout of schools have been influenced by the evolution of

educational philosophies, changing curricular objectives, teaching methods, and cultural values (Lackney 2015). The review of the literature points out that education and its occurrence in physical environments have often been led by the needs and new ideas that emerged during the periods in history following some critical milestones. Some of these pivotal developments may be summarized as the shift from the agrarian culture to urban life, the Industrial Revolution, the Second World War, and the changes brought by the improvements in technology and communication during the information age. The general trends which emerged respectively as a result of these developments became the establishment of schooling systems, the expansion of mass education systems, the challenge to traditional forms of education, and finally, the questions about the future of schools (Burke and Grosvenor 2008).

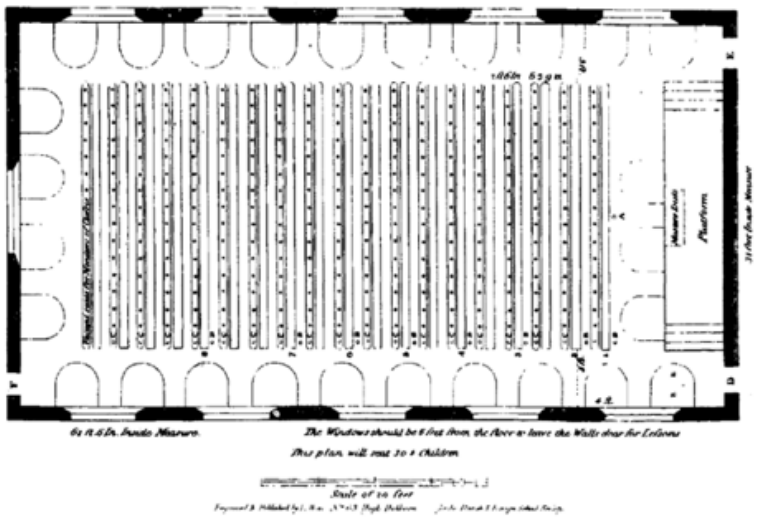
As may be derived from the research on the historical development of school buildings, the original seeds of the Western school systems consisted of cathedral schools where education was dominated by churches (Schalz 2015). State-mandated public education systems or standardized models of school spaces did not exist before the nineteenth-century (Sanoff and Walden 2012). During the Colonial Period in early American society consisting of village settlements where children were expected to participate in agricultural work of the families, education was informed by essential survival needs and teaching of Christian morality and the first schools were set up in either private homes or churches (Lackney 2015). Later, one-room country school buildings had been accepted as the appropriate design response to serve the basic educational and social needs of small village communities as the earliest promises of a public and democratic system of education (Hutchison 2004). In Germany, similarly, schoolhouses were parts of churches in which more than a hundred children were supervised in a single room (Schalz 2015). In the United Kingdom, before the establishment of mass schooling, in addition to the churches, public spaces such as the market, the theatre provided learning opportunities for city children (Burke and Grosvenor 2008).

Industrial Revolution may be regarded as one of the most critical milestones to influence the changes in the approach to school building design. The period brought the integration of the market economy, advancements in the technology of mechanization, the rise of the corporations, the production shift from farm to factory, and accordingly change in population from rural to urban (Lackney 2015). Urbanization and modernization played

significant roles in shaping the course of school design (Gislason 2009). More students started to attend schools, especially in cities. Nation-states, as well as most of the countries in Europe, had established compulsory education and systemized their national educational systems by 1900, thus designing schools to serve the masses of children had become the leading issue of the period (Burke and Grosvenor 2008). The costs were aimed to be minimized by putting more students in each school building, and curriculums were diversified to adjust the demands of the new economies (Gislason 2009, Hille 2012). Therefore, the need to construct large elementary schools within the urban areas became an overriding necessity (Dudek 2007, Hille 2012), and functional considerations began to be reflected in the design and construction of school buildings (Lackney 2015).

England became the first country to experience industrialization and sought for educational provision for the industrial classes from the beginning of the nineteenth-century. Right after the establishment of the Elementary Education Act in 1870 which made education compulsory for all children between the ages of 5 and 11 (Dudek 2007), the monitorial system, also known as the Lancasterian model which aimed to maximize the number of students that could be taught effectively under a single teacher with least expense became a common approach (Gislason 2009). The system founded by Andrew Bell and Joseph Lancaster was specifying the features of an ideal classroom as being a parallelogram, the length about twice the width with windows high above the floor level to restrict the views from outside as presented in Figure 3.1 (Dudek 2000, Lippman 2010).

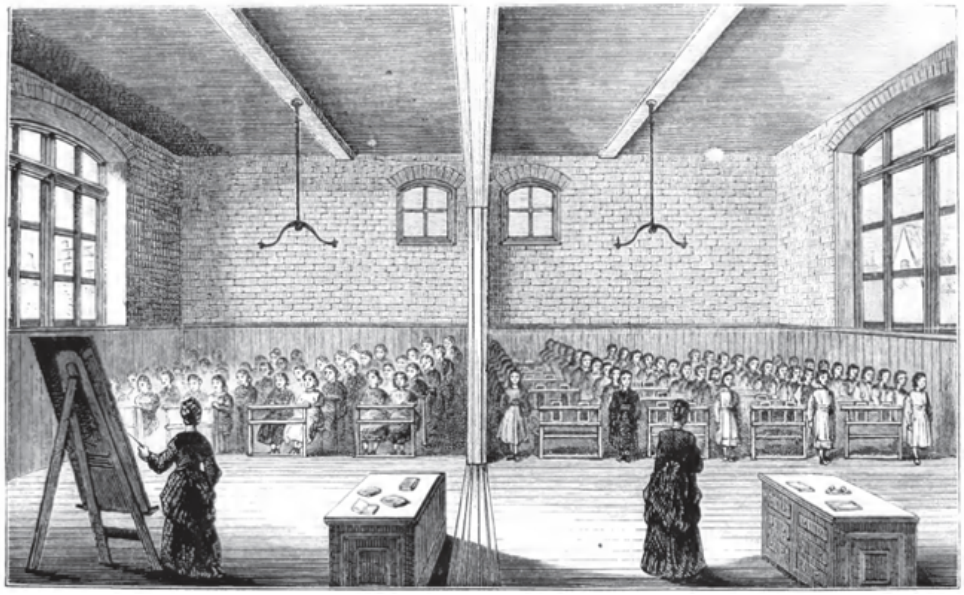
Figure 3.1: Lancasterian classroom plan for a British school for 304 children



Source: Seaborne, M., 1971. *English school: 1370-1870 volume 1: its architecture and organisation.* London: Routledge and Kegan Paul

The configuration of paired, separated classroom arrangements organized around a communal hall was started following Edward Robert Robson's proposals to provide well-lit and ventilated classrooms, in response to the health concerns for the poor working classes as represented in Figure 3.2 (Dudek 2000). Detailed advices for the design of state school classrooms, and the need for circulation spaces around desks and at the front of the room for presentations were defined in precise dimensions in Robson's book published in 1874 (Robson 1877).

Figure 3.2: Ideal classroom layout proposed by Edward Robert Robson in 1874.

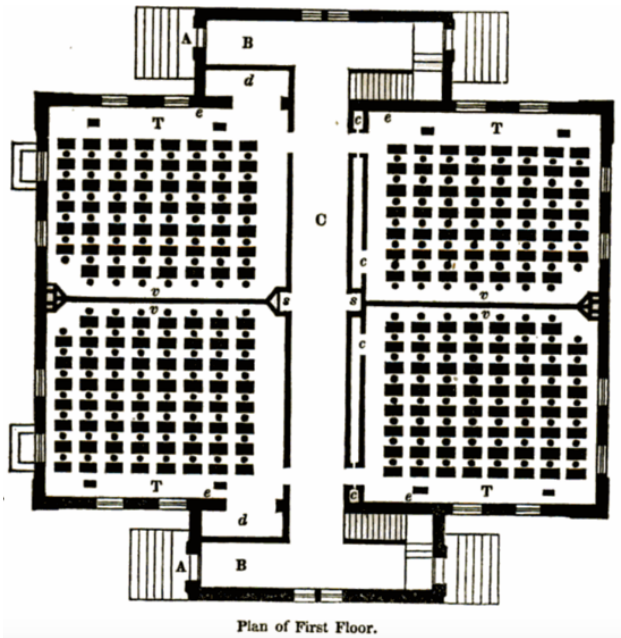


Source: Robson, E.R.,1874. *School Architecture.* London: Bradbury, Agnew and Co., p.376.

In the United States also, the need for educating large groups of immigrants in urban centers, the rising school-age population lead to the provision of large multi-storied classroom buildings as an educational and architectural response following the Industrial Revolution (Hille 2012, Lackney 2015). The gradual shift from the non-graded, one-room schoolhouse to multi-grade and multi-classroom schools became a significant change in public education (Hutchison 2004). The Common School Movement which aimed to provide free public education in primary and secondary levels started in the 1840s (Lackney 2015) The curriculums were expanded to include various lessons such as basic science, languages, music, art and physical exercise so the need for diversified, larger schools had increased in the urban centers (Hille 2012). The conventional design pattern with separate standardized, similar sized classrooms arranged side by side which is today coined as the 'factory model' (Baker 2012, Lippman 2010, Taylor 2009, Upitis 2004) or

'cells and bells' (Nair and Fielding 2005, Sigurðardóttir and Hjartarson 2018) became widespread during the time. Boston's Quincy Grammar School, originally built in 1848, was an interesting example referred by Lackney (2015), Hutchison (2004) and Gislason (2009), for being the first graded public school in the United States as an early educational building reflecting the design principles of the traditional model. The building was consisting of four stories, and the first three levels were housing twelve classrooms opening up into a common hallway, as seen in Figure 3.3, while the fourth floor hosted an assembly hall that could accommodate the entire student body (Hutchison 2004). Each classroom, as seen in Figure 3.4, included rows of bolted seats and housed fifty-five students in rooms measuring 9.4 meters by 7.9 meters (Lackney 2015). The rigid arrangement of the classroom was supporting the teacher-centered methods, which were heavily relied on textbook work (Gislason 2009). During the last decades of the nineteenth- century and the early decades of the twentieth- century, schools were mostly standardized, utilitarian, and factory-like spaces created to produce learning, as defined by Tanner and Lackney (Baker 2012). The teaching philosophies employed in these schools during the time were almost totally teacher-centered (Hille 2012).

Figure 3.3: Boston Quincy Grammar School first floor plan



Source: Gislason 2009, p. 235.

Figure 3.4: Interior view from a Boston Quincy Grammar School classroom

Source: Folsom, A., 1926. *Grammar school, class V. div. II. Quincy District.* [Photograph] Boston: Digital Commonwealth Massachusetts Collections Online.

Along with traditional, teacher-centered pedagogies and school designs to support them, progressive movements with an emphasis on child-centered education also emerged in Europe and the United States beginning from the end of the nineteenth-century (Hille 2012). These movements adopted a general critique of the public educational systems with the argument that neither the needs of the state or church nor the economy should not take precedence in shaping child development (Lackney 2015). Progressive approaches emphasized the importance of the child-centered approach, learning by doing, self-discovery, and self-motivation for learning with dissatisfaction with traditional methods (Hille 2012). Some examples included Friedrich Froebel's development of kindergarten in Germany, Maria Montessori's educational programs in Italy, John Dewey's expressions on activity and interaction-based learning in the United States (Lackney 2011). Dudek (2000) asserts that within the history of school design during the early part of the twentieth century, a dilemma had occurred. On one side, there was the urge to impose discipline and control while on the other side, there was an emerging desire to encourage individual creativity by the production of school buildings that were not enclosing and confining. Eventually, the progressive educational ideas had driven critiques of traditional school design and trace how progressivism had been translated into architectural practice during the following periods up to today (Gislason 2009). There had also been a shift toward creating more child-scaled, flexible, and convertible spaces that can adapt continuously changing and developing pedagogy (Sanoff and Walden 2012).

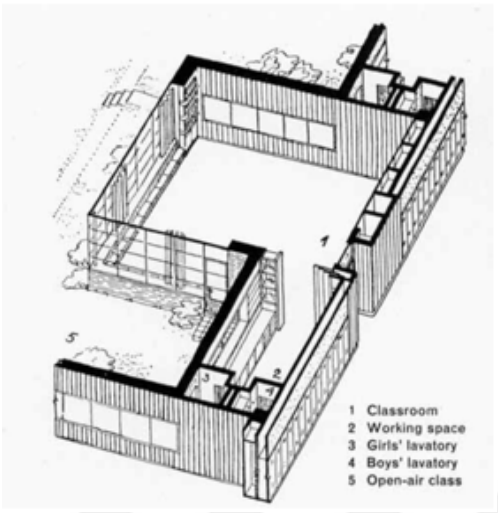
John Dewey opened the Laboratory School for young children in 1896, transforming a former residence into a school design to support hands-on activities by using different design features such as arrangeable furniture (Burke and Grosvenor 2008). Following Dewey's ideas, a range of architectural innovation commenced as some schools became more connected to the outdoors and laboratories, studios, workshops, and gymnasia were incorporated as hands-on learning spaces (Dovey and Fisher 2014). Montessori approach became one of the most significant progressive pedagogies at the time, which is still applied in many schools today. Montessori methods were developed by an Italian educator Maria Montessori and the first school, Casa Dei Bambini (Children's House), was opened in 1907 in Rome (Sanoff and Walden 2012). This approach aimed to facilitate purposeful activities to enhance independent, self-directed learning and learning by doing through utilizing some program-specific tools and materials related to different themes such as sensory education, culture, art, mathematics, science, or practical daily life (Lillard 2016). Steiner/Waldorf Education system was another example developed by an Austrian philosopher and scientist Rudolf Steiner, and the first school was opened in 1919 in Stuttgart, based on the belief that each person should find a balance between the body, soul and the spirit (Ashley 2009). Accordingly, Waldorf system aimed to holistically integrate the intellectual, practical, and artistic development of the children. Likewise Montessori, Reggio Emilia system has taken its roots from a small Italian city in which it was developed during the post-war reconstruction period after the Second World War, with the collaborative efforts of the general community under the guiding influence of the educationalist Loris Malaguzzi. Most of the time, children were involved in project-based activities, and they were encouraged to share their understanding through different languages such as writing, sculpting or drawing (Lippman 2010). The notion of child-centered learning brought by these progressive approaches formed the basis for much current educational thought to this day (Hille 2012, Baker 2012).

The common feature of the progressive methods was, as Lippman (2010) explains, that they all viewed the learners as active participants and recognized how the physical setting influenced the acquisition of knowledge, thus their schools were designed accordingly. Progressive educators emphasized that public education should pay attention to children's physical and psychological development as well as their academic success (Lange 2018). Classrooms were planned to accommodate less numbers of students, and the concept of

flexibility was introduced for the organization of the school building with the progressive approaches (Lippman 2010).

Along with these developments, an alternative wave of progressive schools was built to house these alternative programs. Eliel Saarinen's The Crow Island Elementary School built in 1940 is mentioned as a significant example to represent the alternative approach to school design at the time which may also be discussed with its features in terms of flexibility (Baker 2012, Harrison and Hutton 2014, Lackney 2015, Lippman 2010, Perkins 2001). The design of the school followed John Dewey's progressive educational philosophy that stresses children's need for self-expression, the development of their attitudes as well as their emotional and social adjustment. Thus, the finger-shaped school building included L-shaped modular classrooms which were multifunctional and adaptable physical component of a fully integrated learning environment to support a variety of individual and group learning activities (Harrison and Hutton 2014). Each classroom had an entrance foyer with storage and an adjacent bathroom, a separate kitchen, project area and the main classroom space with exterior glass walls on two sides of the classroom and a door to a semi-enclosed, wind-sheltered outdoor classroom, as seen in Figure 3.5 (Lackney 2015). Transitions between the outside world were aimed to be permeable by the use of natural lighting, including skylights and large wall windows, and natural elements were used wherever it was possible (Hutchison 2004). Another important feature of the design for the time was that the school was child-scaled, with ceilings several feet lower than usual, and light switches positioned at lower heights and furniture were also designed to comply with children's anthropometry as seen in Figure 3.6 (Burke and Grosvenor 2008). From its features, it may be inferred that the classrooms were treated as an active and flexible variable designed to support and enhance learning activities.

Figure 3.5: Axonometric drawing of a classroom from Crow Island School



Source: Burke and Grosvenor 2008, p. 100.

Figure 3.6: Interior view of a classroom at Crow Island School

Source: Hedrich, K., 1926. *Crow Island School in Winnetka.* [Photograph] Chicago: Chicago History Museum Images.

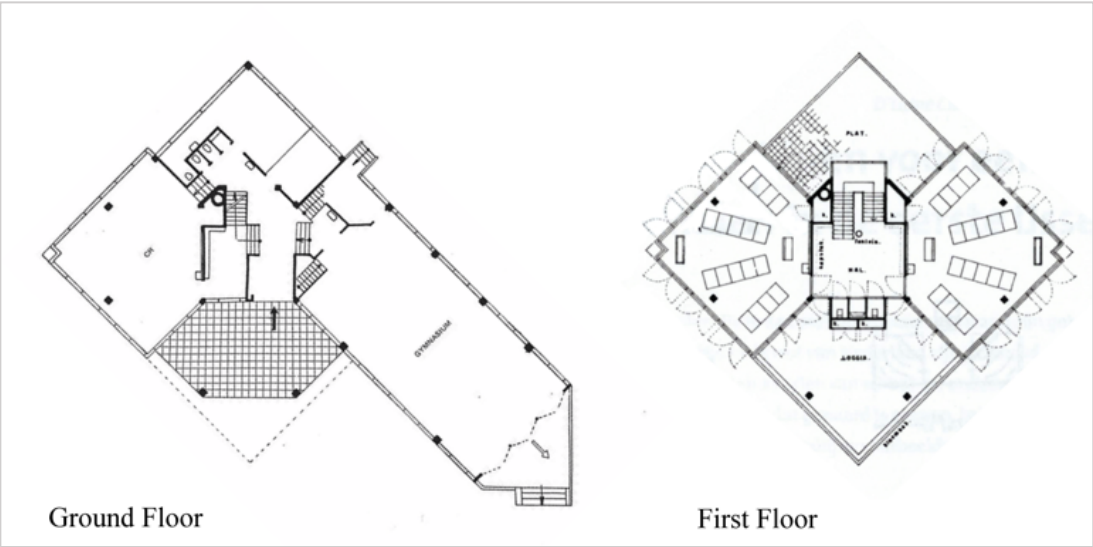
Alvar Aalto's Tehtaanmaki School built in 1937, and Richard Neutra's many modern school buildings built throughout the 1930s were also mentioned as innovative school buildings of the period (Baker 2012, Hille 2012). The idea of outdoor classrooms doubling the instruction space by pairing gardens with rooms then continued to be a common feature of innovative school design from the 1930s through the 1960s.

The health problems that preceded the First World War continued following the war years, and some different approaches also appeared in parallel to the needs and necessities that occurred during the period. Open-air school movement emerged as an architectural expression directly related to the promotion of health and hygiene as an integral part of the educational program (Hille 2012). First Open Air School for Sick Children designed by Johannes Duiker and Bernard Bijvoet in 1929–30 in Amsterdam is mentioned as an important example built during the period (Hille 2012). The four-floor building was in the shape of a cube consisting of large glazed rooms with revolving windows that could be fully opened and allowed teachers to work with the pupils on the outdoor balconies as seen in Figure 3.7**.** The square-shaped floor plan was subdivided into four quadrants around a diagonal central staircase. East and west quadrants on each floor were containing one classroom per level and were sharing an open-air classroom on the south side, as shown in Figure 3.8. Burke and Grosvenor (2008) comment that Open Air School in Amsterdam became an inspiration for those looking for healthy ventilation and lighting conditions as well as advocators of new openness, flexibility, and informality in educational practice in response to the failure of education systems to enable the potential of all children to be achieved.

Figure 3.7: Open-Air School designed by Johannes Duiker and Bernard Bijvoet

Source: De Architect. Available at: https://www.dearchitect.nl/projecten/restauratie-eerste-openluchtschool-voor-het-gezonde-kind

Figure 3.8: Ground and first floor plan drawings of Open-Air School



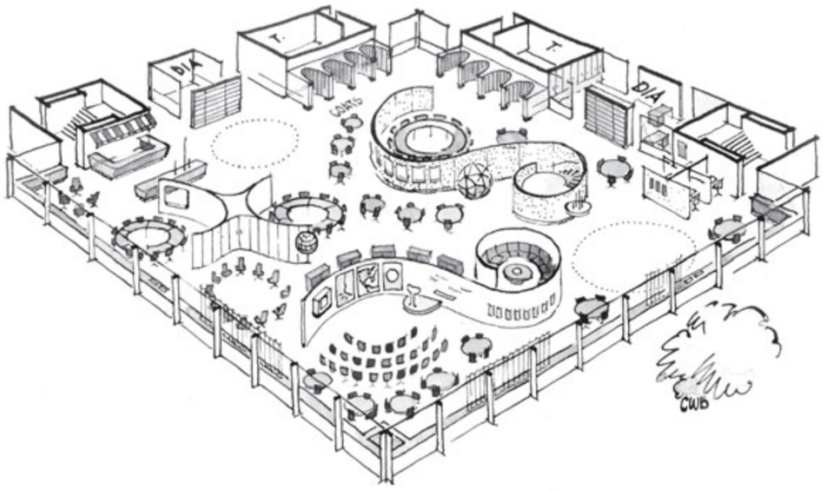
Source: Architectuur Centrum Amsterdam Available at: https://www.arcam.nl/openluchtschool/

The production of factory-like school projects based on the rapid construction of economic educational buildings without questioning their uniqueness and their fit to the teaching practices became dominant for a long time (Lippman 2010). After the end of the Second World War, especially in Western Europe and North America, school construction significantly increased in response to the schooling needs of the baby-boom generation, and this situation continued until the mid-1970s (Hutchison 2004).

In the middle of the 1960s, open education ideas aiming to promote widened learning opportunities for children, freedom, autonomy for self-directed study, less guidance by the teacher to foster self-responsibility originated in the United Kingdom, and spread through the United States (Lackney 2015). Open space education was aiming to respond to the problem of educating children of varying performance levels in different groups (Sanoff and Walden 2012). As a physical outcome, open school plan layouts started to emerge, and the concept influenced the design of thousands of schools from the late 1950s through the early 1970s (Lackney 2015, Sanoff and Walden 2012). Open-plan schools were planned as unpartitioned large, open, flexible spaces with few or no internal walls and adaptable to the characteristics of open education such as team teaching small-group and individualized instruction (Lackney 2015). The Disney School in Chicago, designed by Perkins and Will Architects, was opened in 1960 and became one of the significant examples of the approach referred to in many different sources (Baker 2012, Lackney

2015). The school was designed with large pod areas to serve as the major classroom spaces, with little space definition within them, as presented in Figure 3.9 (Baker 2012).

Figure 3.9: Open-Plan concept diagram of Disney School drawn by Brubaker



Source: Lackney 2015, p. 33.

Flexibility was thought to be a critical issue during the period; however, on the contrary, the architectural result was criticized for being placeless and uninspiring (Dudek 2000). In the earlier attempts, although the open-plan was designed to provide students an informal and flexible education, traditional teaching methods were maintained in the open-plan schools (Lippman 2010). As also mentioned by Harrison and Hutton (2014), much of the criticism of open schools in a way pointed out that spatial innovation by itself would not be not enough, but instead, it must be combined with pedagogic innovation. Moreover, teachers, as facilitating users, should have been taught how to utilize the educational spaces effectively to provide positive outcomes (Harrison and Hutton 2014). However, the controversy about using open-plan versus closed-plan for the design of educational facilities even continues today.

The research shows that schools, as we know them or, as public institutions for universal education, have existed only since the nineteenth-century (Hille 2012). From the review of the historical development of school facilities over the last few centuries, some shared significant trends that have affected school architecture may be recognized. These trends include the reduction of the class sizes fallen from hundreds of students to smaller groups which resulted in more classrooms per school, sorting of students according to their age, the emergence of flexibility in planning as a design consideration, specialization of spaces

and the creation of subject-specific areas and gathering spaces, compatible design for children's scale, the search for design solutions for child-centered approaches and concerns for promoting the school for public use of educational facilities by communities. Burke and Grosvenor (2008) claim that in many areas of the world, schools have been reduced to their barest recognizable elements with single places of meeting, teacher, means of instruction, and an organized form of seating arranged in lines.

Nevertheless, examination of the historical process also depicts that the concept of flexibility had often been recognized as an essential criterion for school design which is experimented through a diverse span of methods such as open-plan arrangements, utilization of mobile components or allowing variations in use in parallel to pedagogical innovations and other necessities.

Despite the evolution process, the factory model with repetitive identical classrooms and passive classroom configuration, which emerged under the effect of changes brought by the Industrial Revolution, seems to be remained up to the current day as a common approach to school design. Upitis (2004) explains the factory analogy by asserting that through the conventional model, a homogeneous group of children are put in a confined space, processed for a year and filled by knowledge, made sure that they have learned the curriculum and finally moved to the next processing container which would be another classroom. The same cycle continues until they have reached the level at which they are deemed ready to leave (Upitis 2004). The standard solution of organizing classrooms lined up along corridors is also claimed to particularly promote the teacher-centered approach and distance students from one another and teachers from each other (Lippman 2010). The model is also criticized for no longer providing support for learning today's interdisciplinary and knowledge-based economy (Taylor 2009), and child-centered pedagogies (Upitis 2004). This contradicting situation leads most of the comparisons between the traditional models of school design and contemporary trials and constitutes a basis for the debates of how school design should be handled to respond to today's concerns.

3.2 CONTEMPORARY THEMES GUIDING THE 21st CENTURY SCHOOL DESIGN AND FLEXIBILITY

School designs are expected to respond to changes in education systems, innovations, and other necessities that emerge during the time. Review of the literature and the recent

developments point out some interrelated themes which appear to be guiding the approaches to school design in the twenty-first century. Some of the particularly prominent themes may be summarized as the orientation towards child-centered and experience-based pedagogies (Woodman 2016), individualization of education according to the needs of the learners (Lackney 2011), advances in internet and computer technologies and the need for technology-rich infrastructures (Harrison and Hutton 2014, Lackney 2011), sustainability (Karabey 2014, Lackney 2011), and flexibility to adapt to multiple ways of educational methods (Harrison and Hutton 2014, Karabey 2014). In addition to these trends, Hutchison (2004) also reminds operational concerns such as budgetary realities, accessibility, and community use initiatives. Many of the themes are, indeed, also evident in the Organization for Economic Co-Operation and Development's (OECD) definition of the contemporary educational space as:

> *A physical space that supports multiple, diverse teaching and learning programmes as well as pedagogies, including current technologies; one that demonstrates optimal, cost- effective building performance and operation over time; one that respects and is in harmony with the environment; and one that encourages social participation, providing a healthy, comfortable, safe, secure and stimulating setting for its occupants* [1].

In relation to OECD's definition, the first and maybe one of the most critical issues is the changes in the understanding of education, which profoundly affects the physical structure of schools. As also emphasized by Burke and Grosvenor (2008), an expanded range of pedagogical possibilities is required of the school buildings for the twenty-first century. The main reason that lies behind this need has been the shift in pedagogical approaches from teacher-centered to student-centered models. Woodman (2016) states that the situation has even become evident in the terminology used to describe the learning settings. The author underlines that rather than the word classroom which is directly related to the traditional pedagogy of teacher-directed education of a social class of children, the term 'learning space' has started to be preferred focusing on learning rather than teaching in most of the recent sources (Woodman 2016).

[1] OECD., 2006b. *Evaluating quality in educational facilities.* Accessed September 10, 2019. Available at: www.oecd.org/edu/facilities/evaluatingquality (accessed 31 July 2019).

Although pedagogical, social, content objectives have been altered up to our present-day, in current architectural practice, the typical approach seems to be widely based on the educational models of traditional schools. As argued by Upitis (2004), factory-like schools which are still most common to be seen, almost totally embody an instructive model of learning in which the teacher has the knowledge which is transmitted to the students in an assembly-line like approach. In conventional, uniform teacher-centered spaces of learning constrained by four walls, the predominant approach to design has been the concept of rows of desks and chairs facing the teacher's desk and the blackboard in the front (Proshansky and Fabian 1987). As Dudek (2000) points out, these generic school plans have been a consequence of relating all the learning activities to fixed-feature classrooms, and the school facilities have been characterized by these standardized spaces since the advent of mass education. In most of the cases, the layouts include double-loaded corridors with traditionally designed classrooms on either side , which is referred to as the industrial assembly line model. Lippman (2010) criticizes these type of environments for not being designed to address the variety of ways in which people acquire knowledge, but instead designed to control unwanted student behavior where teachers play an authority role enforcing rules.

The concept of child-centered education emerged with the progressive movement became much more recognized today instead of the teacher-centered model (Sanoff and Walden 2012). According to the child-centered and experience-based approaches, the learning process becomes more effective when children understand practical applications for the information they receive. Children’s interaction with each other and with their environment is also highly emphasized within the new educational approaches, which introduced different typologies for school design. Consequently, as emphasized by Sanoff (2001), today there is a demand for contemporary schools to be more responsive and to become places where students and teachers engage in learning and teaching inside and outside of the classroom on the contrary to the traditional factory-like institutions. Another important point is individualization. As again explained by Sanoff (2015), the one-size-fits-all approach is gradually disappearing in today’s schools, and may give way to smaller and more diverse learning environments providing students more choices and options about what, where, and how they learn. Besides, a variety of teaching methods, including individualized assignments, small group work, lectures, learning by doing, and learning centers, would be used at schools (Sanoff 2001).

Regarding the classroom scale, Kuuskorpi and González (2011) demonstrate that students perceive traditional classrooms as passive areas that hinder the full use of space while they associate dynamic teaching spaces with flexibility and the possibility of creating different furniture configurations. Besides, as also underlined by Bannister (2017), twenty-first-century children need to have access to spaces to learn beyond school that potentially offer a much more global view of the world. As a resıult of the notion of agile classrooms is explored, recognizing the need for the classroom itself to be a flexible, multipurpose room, acknowledging that students should have the opportunity to understand where and how they learn (Bannister 2017). Sanoff (2015) also mentions that innovative learning environments may even be created in non-traditional settings such as outdoor spaces, museums, or children's centers.

It is also known that many countries have embraced innovative and diverse styles of teaching, with new curriculums emphasizing different aspects of learning experiences (Sanoff 2001). In addition to the existing progressive methods, new approaches to teaching such as STEM, which is based on a curriculum developed around the idea of educating students in four specific disciplines, namely science, technology, engineering, and mathematics in an interdisciplinary approach with the applied methods have been introduced and gaining acceptance. STEM education has also been recognized by the Ministry of National Education in Turkey, and there are ongoing projects to initiate this approach at primary schools[2]. The approach, for instance, demands new types of spaces at schools such as fabrication laboratories to support hands-on experiences to achieve the programmatic goals. Thus, it may be inferred that aligning the architecture with the pedagogic approaches to construct a meaningful relationship between practice, curriculum, and spatial form seems to need more research and attention today for designers. The environment can also be used as an integrated part of the learning processes.

The current and emerging opportunities brought by technological developments during the digital age also had immense effects on educational methods and architectural

[2] Milli Eğitim Bakanlığı, 2016a.

outcomes. The schools which are being built today will be serving for ‘alpha generation’ children as also referred by Nagy and Kölcsey (2017) who are very comfortable with technology, are used to the Internet and have well developed digital capabilities due to their exposure starting from very young ages. Their multi-tasking skills and abilities to collect information rapidly leads to the need for new teaching methods. Besides, related literature discusses powerful new technologies which have the potential to transform the learning environment through simulations, visualizations, immersive environments, game playing, virtual tutors and mentors, networks of learners, assistive technologies for disabled learners, automated archiving and tracking, and more (Taylor 2009). The situation emerges as a challenge for both educators and school designers, bringing new concerns into the scene. Equipping the learning spaces with proper, available, and adequate information and communication resources is one of the emergent needs regarding the design of the physical environment. Beyond these issues, the developments also blur the distinction between physical and virtual learning spaces and even linking activities without settings (Harrison and Hutton 2014). Accordingly, the learning spaces of the future are expected to be very different from those of today.

The review of sources under the title of future educational building design also indicates that the focus of thought shifts profoundly to sustainability and concerns about the environment (Taylor 2009). Sustainability may be viewed from multiple perspectives regarding the design of physical learning environments. The school building itself may be designed environmentally friendly, but more importantly, the design of learning spaces may contribute to the raising of environmental awareness in children (Scott 2010, Taylor 2009). A recent empirical study conducted by Tucker and Izadpanahi (2017) proves that the environmental attitudes and behaviors of children attending primary schools designed or adapted for sustainability have been significantly more pro-environmental. Taylor (2009) also underlines the opportunities that schools provide to demonstrate examples of ecologically responsive design. Thus, children’s direct engagement with sustainable design features such as solar panels, the use of recycled water, natural daylighting, gardens, and outdoor classrooms during learning can make important contributions to their attitudes and behaviors toward environment (Taylor 2009, Tucker and Izadpanahi 2017). This pedagogic approach, which aims to raise children's awareness about the protection of the environment and resources, also points out that learning can take place outside the classroom space.

In line with the concerns mentioned above, the studies tend to agree that contemporary approaches to education and educational space design demand the thinking of school as a whole learning space and a shift towards school design emphasizing flexibility which seems to play a central role as also highlighted by OECD (Heppell, et al. 2004). As education methods evolve and change, learning spaces need to be designed so that they can keep pace with these changes. A flexible design approach may support accommodating a wide range of teaching and learning practices; however, studies show that it becomes successful and meaningful only if educational practices are suited to the learning space (Gislason 2009). Thus, it may be concluded that the visioning and design process of contemporary schools needs to consider all the links between spatial design, pedagogical practices, and student outcomes.

3.3 A CHRONOLOGICAL DESCRIPTION OF EDUCATIONAL BUILDING DESIGN IN TURKEY

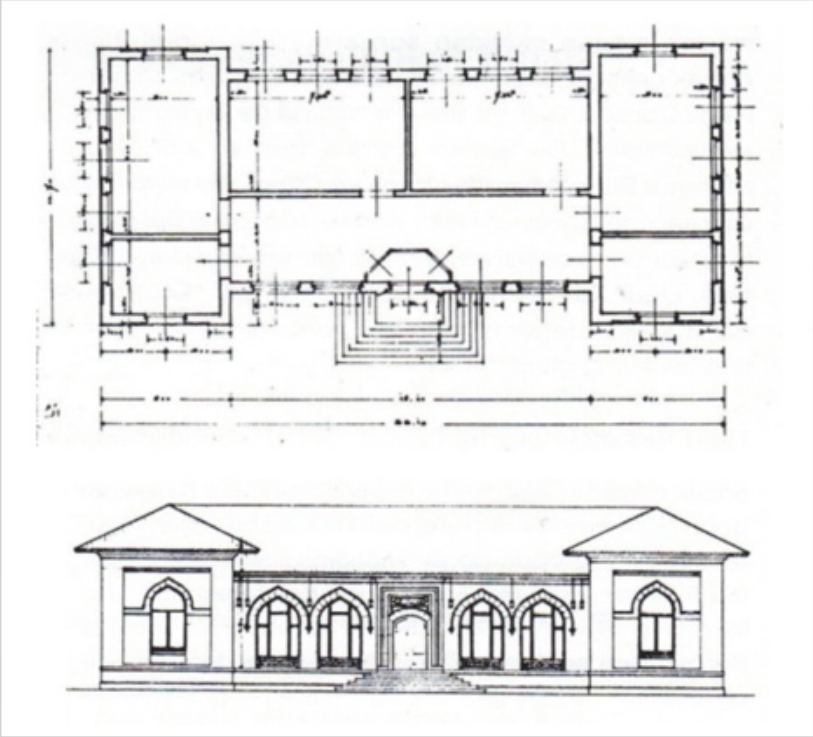
Educational systems often tend to change with the developments in their surrounding socio-economic, political, and cultural environment. The literature demonstrates that improvements and changes had always been on the agenda in Turkey as well, since the foundation of the Republic. The developments in the system and changes in the policies consequently had affected the physical structure of the schools.

In the late Ottoman Period, despite some reform movements towards westernization, the population's need for primary education was met with the Sibyan schools (Sıbyan Mektebi) or alternative space in private homes or adjacent buildings of mosques and prayer rooms (Koç and Sağlam 2015). There had been many innovations and developments in education as in all other fields during the period following the end of the Independence War and the foundation of the Turkish Republic. The formal national educational institution of the country Maarif Vekaleti, which later took the name Ministry of National Education (Milli Eğitim Bakanlığı) was established in 1923. After the Unification of Education Act (Tevhid-i Tedrisat Kanunu) in 1924, educational institutions and contents were regulated under the Ministry of National Education, ensuring the uniform implementation of a standard system (Kezer 2016).

Early policies of the Turkish Republic recognized the development of a new educational system based on Western teaching approaches and methods while focusing on the improvement of the literacy level and providing primary education to all citizens as major issues (Akyüz 2008). Primary school level education became compulsory for children aged between 7-14 with a constitutional amendment declared in 1926 (Kezer 2016). Education was believed to have a vital role in the empowerment of the national identity (Kul 2011), and the establishment of democratic culture (Ata 2000). Thus, the development of a modern system was given the utmost importance during the period.

Particular attention was given to the design and construction of "modern" primary schools during the Early Republican Period to provide primary-level schooling in every part of the country. There were already existing schools left from the Ottoman Period, which were capable of accommodating the needs with minor alterations in the cities; however, the major part of the population was settled in the rural areas at the time, which made schooling in the neglected villages more urgent (Kul 2011). Following the legislation which prohibited the construction of schools other than the projects approved by the Ministry in 1926, an architectural office was established under the roof of the institution, and a group of international and local architects together started to work under the coordination of Ernst Egli in 1927 (Ata 2000). Prototype school projects were produced by this architectural department to be built, especially in small towns and villages. Until the completion of the preparation of new school projects, some existing projects designed during the late Ottoman Period were constructed with minor alterations until the 1930s (Kul 2011). Although the construction costs were compensated and the projects were provided by the State, the schools were built by the village residents according to the law. Edirne Karaağaç Primary School project by designed by Kemalettin Bey, as seen in Figure 3.10 is mentioned in many sources as an example to these widely implemented first primary school buildings in many villages around the country (Koç and Sağlam 2015, Kul 2011).

Figure 3.10: Edirne Karaağaç Primary School plan and elevation drawings



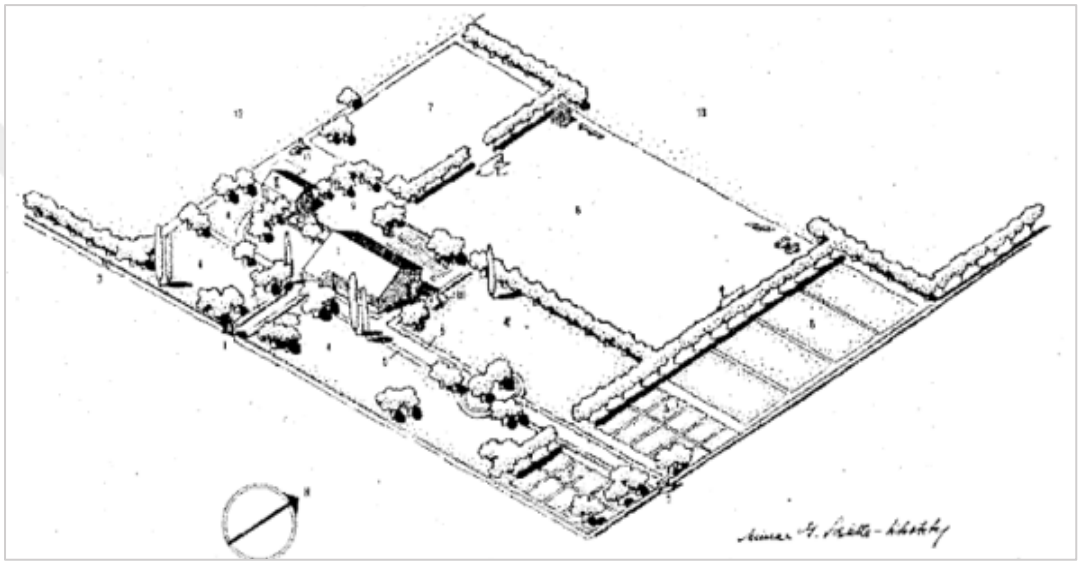
Source: Kul, 2011.

As it is claimed in the related sources, international education and design professionals were invited to contribute to the building up the new education system during the period. John Dewey was one of these professionals who was invited to Turkey in 1924. Some of Dewey's proposals in line to his pragmatic approach to education were then applied to the Turkish system. For instance, building libraries for schools had started, life sciences (hayat bilgisi) course was added into the curriculum of primary schools for first three grades to improve children's interactive relationship with their environment during the period (Ata 2000). Village Institutes (köy enstitüleri), as Ata (2000) claims, were also designed and established in 1940s in parallel to John Dewey's ideas of learning by doing and schools' being the center of the community life.

The search for finding different solutions for villages and cities and the need for building simple, inexpensive, robust school buildings in small settlements continued during the 1930s. Austrian architect Margarete Schütte Lihotzky was also one of the commissioned international designers by the Ministry's architectural office. Lihotzky's report regarding the design of village school buildings then became an important source of information about the considerations in the preparation of village school building projects during the period (Akcan 2012). As asserted by Akcan (2012), Lihotzky included different design

proposals for village schools, and each of them was developed considering local climatic circumstances, available local building materials, and village sizes. The small school projects consisted of two classrooms for fifty to sixty students, teachers' dwelling, service areas as well an ample space for gardening, as seen in Figure 3.11 (Kul 2011). The plan layout was designed to allow expansion of the building with additional structures in the case of need, and the proposal constituted an interesting example in terms of the flexible design approach.

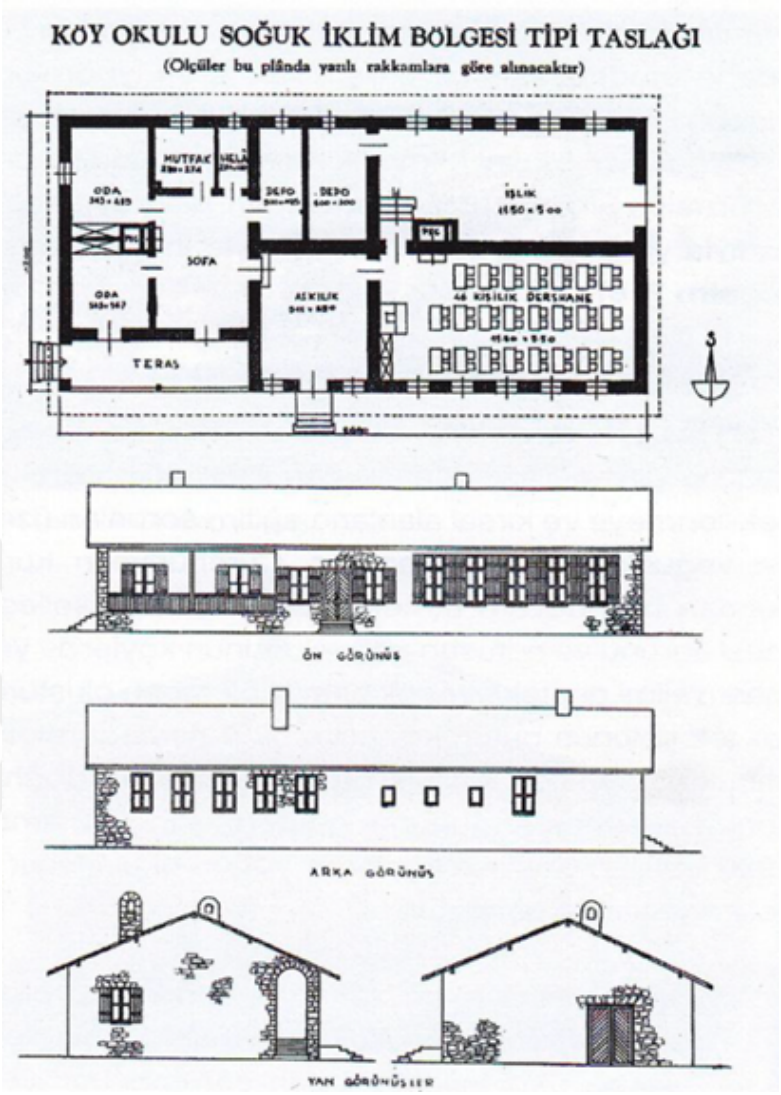
Figure 3.11 : Lithozky's site plan of a village school in Anatolia



Source: Akcan 2012, p. 211.

At the beginning of the 1940s, the need for the construction of more primary school buildings in villages was on the agenda. An architectural competition was organized in 1940 to provide prototype projects for these buildings. Architects Asım Mutlu and Ahsen Yapanar won the competition with three different prototypes designed according to varying climatic conditions, one of which is seen in Figure 3.12. The prior simple plans were enlarged with the addition of a workshop, the teacher's dwelling, and some other auxillary areas. These prototypes were repeatedly built in many different locations in the country (Kul, 2011). It may be inferred from both examples that very basic village schools had started to evolve in more complicated structures through the inclusion of more specialized areas with practice-based and hands-on learning spaces as well as other functional needs.

Figure 3.12: Type village school project to build in cold climate conditions



Source: Kul, 2011.

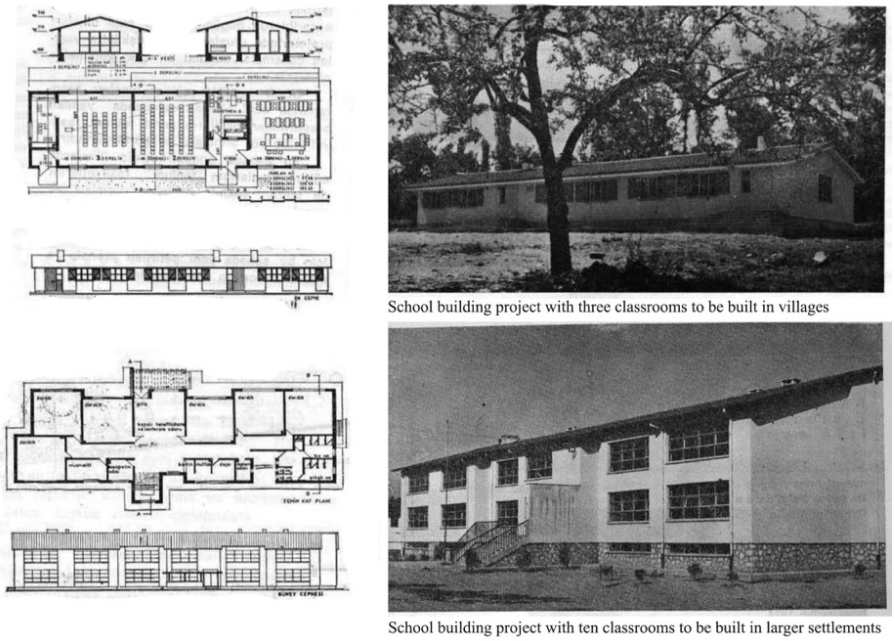
The state's preference towards using prototype-based projects which had been generated with regard to specific data and based on a repetition of a similar scheme became a typical effective response to obtain rapid, easy, and cheap productions to spread the educational buildings. On the other hand, the background of the ongoing criticisms about the implementation of prototype-based school projects dated back to this period, the end of the 1930s. For instance, architect Sayar (1936) claimed that producing prototype school projects through the state governed construction offices reduced the value of architecture while blocking the diversity and proposes the provision of compatible, unique projects through architectural competitions in his article in Arkitekt Magazine.

According to the examination of the early period developments, it may be summarized that the 1920s was a period during which the preparation of policies to establish a modern educational system and schools were conducted. The trial of various educational strategies to be applied in cities and villages were performed during the following two decades. Coming to the 1950s, the need for building more schools in the cities, especially in Istanbul to accommodate the schooling needs of the increasing population, began with the influx of workers to the industrialized regions of the country, and the inadequate number of schools became a highly critical issue. One of the immediate responses to the situation was the construction of schools using prefabricated building materials in Istanbul. This time, however, the buildings were criticized for not being suitable for educational purposes due to their expensive building and transportation costs, their resemblance to military barracks, insufficiency in allowing daylight, fresh air, and classroom size (Sayar 1959). At the end of the 1950s, the problems became much more prominent, and multiple-shifts education has emerged after 1955. Consequently, the growing need for building schools continued. The 1950s became a period during which the prototype-based project approach turned out to be the dominant process of producing school buildings that had been widely applied throughout the following years up to the current day (Koç and Sağlam 2015).

As may be understood from the articles published in Arkitekt magazine during the period, many prototype-based school projects were also produced and implemented by the Ministry of Construction and Settlement in cities and smaller settlements during the 1960s. Different from the previous projects produced until the 1960s, some of these projects included corridors and multiple-use rooms providing students some area to spend time during the recess periods, as seen in Figure 3.13[3].

[3] Bayındırlık Bakanlığı İlkokul Binaları. *Arkitekt*, 1978. 372(4), pp. 123-125.

Figure 3.13: Examples of prototype-based school projects generated and implemented by the Ministry of Construction and Settlement during 1960s



Source: Arkitekt, 1978, pp.124-125.

The projects were similar to the schools with traditional layouts that had been built in many other countries, including double-loaded corridors with classrooms to accommodate as many students as possible. The single-floor village school building, on the other hand, was allowing some flexibility through the use of movable partitions between two classrooms to be used for social gatherings and meetings in the villages. However, there were criticisms of the use of these project types at the end of the 1970s for their being outdated to respond to that day's spatial needs and not supporting local community activities[4]. At the end of the decade, some structural changes were started to be made in terms of building materials and skeletal systems.

During the 1980s and 1990s, there had not been very significant changes in the approaches to primary school design processes until the enactment of Compulsory Education Law in 1997, which extended the duration of compulsory education from 5 to 8 years. Analysis of the timeline points out that the factors related to schooling needs in parallel to the population growth and economic limitations have had the most significant

[4] Bayındırlık Bakanlığı İlkokul Binaları. *Arkitekt*, 1978. 372(4), pp. 123-125.

influence on the design, planning, and construction processes of school buildings in Turkey until the 1990s. Prototype-based schools, especially the projects produced during the 1950s and onwards, reflected similar design features of the traditional school typologies with separate rectangular classrooms along corridors that were also seen in western examples. This approach may be conceived as an economic and practical way of providing the similar standards for each school planned to be built under the supervision of the Ministry. On the other hand, it may also be inferred from the examination of the developments that the influence of progressive ideas that affected school design in Europe and the United States remained limited in Turkey. Alternative ways of improving learning environments to support teaching methods had not been brought into the agenda much for years despite the developments accelerated with the changes in the educational system, and increasing schooling needs emerged in the last twenty years.

3.4 RECENT DEVELOPMENTS AND CURRENT APPROACHES TO SCHOOL DESIGN PROCESSES AND IN TURKEY

Article 51 of the Basic Law on National Education, which is still valid today, states that the design and implementation processes of buildings and facilities belonging to educational institutions of all grades and types are legislated by the Ministry of National Education in Turkey, in line with the environmental requirements and the characteristics of the educational programs[5]. In other words, the dominant typology of school facilities, quality, and standards of educational structures are primarily determined by the State.

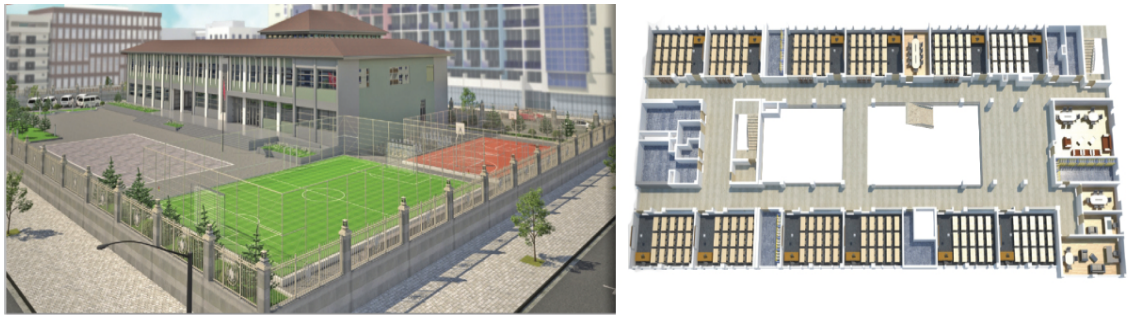
The Department of Construction within the Ministry has the responsibility to plan and produce architectural projects of the educational facilities according to requirements, to control the financial costs of the processes, to make the contracts for outsourced design and construction works of the schools, and to audit the compliance of all the private and public educational institutions to the determined regulations of building standards. Prototype school projects are also generated by the Department of Construction, and they are implemented in various locations around the country. For the preparation of projects,

[5] Milli Eğitim Bakanlığı, 2015.

the needs and requirements concerning the building programs are determined in accordance to the information and feedbacks taken from related general directorates and departments of the Ministry[6]. The schools are built in three different ways; new building on a new plot, demolition of a building and reconstruction on an existing site or making additional blocks to an existing structure (Köse and Barkul 2012). The standards of the recently constructed schools are expected to comply at least with the minimum design standards manual issued by the Ministry[7].

According to the statistics, there has been a total number of 24.967 primary schools in Turkey and 1618 of them are private schools[8]. The quantitative majority of the public schools within the existing building stock implies that most of the school buildings were built or converted according to the projects provided by the Ministry. Most of the project prototypes include the features of traditional schools with single or double-loaded corridors referred as the factory-style in various sources in literature (Lippman 2010, Taylor 2009). The same approach to design may also be observed in more recent examples of prototype projects produced and issued by the Department of Construction as seen in Figures 3.15 and 3.16. The single-block structures are more likely to be preferred in dense urban areas because of their compact footprints and introverted spatial arrangements (Köse and Barkul 2012).

Figure 3.14: 3d visualized image and standard floor plan of a prototype primary school project with 12 classrooms



Source: *Milli Eğitim Bakanlığı, 2016b. İnşaat ve Emlak Dairesi Başkanlığı Proje Kataloğu, 2016. [Online] Available at: http://iedb.meb.gov.tr/katalog/#/0*

[6] ibid.
[7] Milli Eğitim Bakanlığı, 2015.
[8] Milli Eğitim Bakanlığı, 2018.

Figure 3.15: 3d visualized image and standard floor plan of a prototype primary school project with 20 classrooms

Source: *Milli Eğitim Bakanlığı, 2016b. İnşaat ve Emlak Dairesi Başkanlığı Proje Kataloğu, 2016. [Online] Available at: http://iedb.meb.gov.tr/katalog/#/0*

Primary school buildings today, accommodate students between the ages of 6 to 11 enrolled in changing grades, and the size of the schools is mostly defined by the number of identical classrooms that each building includes. According to the standards manual for school buildings, the maximum amount of floor numbers are determined as two and in case of necessary conditions three floors in addition to a basement floor[9].The same document (2015) suggests avoiding large openings, and atriums that cover an area larger than one-third of a typical floor and proposes the ventilation and illumination of double-loaded corridors through openings located on both ends. The area per person, excluding the storage spaces, is determined as a minimum of 1.60 square meters in primary schools. Standard classrooms are suggested to be designed in a rectangular shape with a longitudinal side facing the building facade to gain daylight to accommodate thirty students[10]. As it may be inferred from the descriptions given in the manual, the explanations, and given standards are also regulated to ensure the design of particular school building types with minor differences. The guidelines also include detailed descriptions of the minimum design standards which should be complied for the design of all the classrooms, circulation zones, subject-specific spaces, social areas, libraries, multi-purpose halls, outdoor spaces, technical rooms, and wet areas[11].

[9] Milli Eğitim Bakanlığı, 2015.
[10] Ibid.
[11] Ibid.

A significant number of public school projects has been built according to the prototypical projects in a similar manner with almost identical architectural features during the last two decades despite some attempts of the Ministry to provide differentiated designs within the scope of special projects such as Istanbul Seismic Risk Mitigation Project (ISMEP) and some architectural competitions organized during the recent years (Karabey 2014).

Production of prototype-based school buildings is often preferred because it brings some advantages from the viewpoint of the state where this approach reduces costs, speeds up the process, makes the design standards more controllable, takes advantage of standardized material and construction systems, and enables providing schools in similar physical conditions everywhere in the country (Ciravoğlu 2004). However, this ongoing approach has long been criticized by both design professionals and academics due to various reasons (Ciravoğlu 2004, Güzer 2014, Karabey 2014).

One of the main issues is that prototype-based school projects are not designed according to the specific context in which they are planned to be located in (Ciravoğlu 2004, Güzer 2014). No diversities are given attention in terms of climatic conditions, location, or culture during the development processes of the projects (Güzer 2014). As a result, they become completely disconnected from their environment in both physical and social sense. A second problem is that the design of school buildings primarily to respond to the need for more classrooms brings a tendency to push other environmental values and spatial qualities of educational facilities to the background. The shape and size of the building sites, especially the ones which are located in the rapidly developing, dense urban areas are found to be insufficient in terms of enabling the design of engaging educational environments and pleasant schoolyards (Güzer 2014, Karabey 2014). Consequently, the school buildings lose their outdoor spaces, social areas, and other learning spaces outside the classrooms through time due to the lack of area despite the increasing needs.

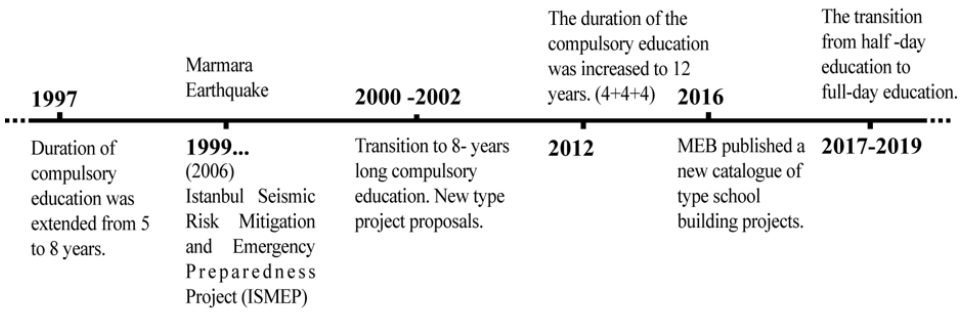
Some other problems mentioned in the sources are that the current prototype-based school building projects' have old and insufficient standards, and they are not able to respond and to cope with the advances in the curriculums in parallel to today's international trends (Karabey 2014). For instance, STEM approach which has also begun to be recognized by

the Ministry of National Education brings a need for decreasing the number of standard classrooms and providing specialized laboratories and workshops[12], thus there is an emergent need to include thematic, dedicated spaces in school buildings to enhance the learning experiences of children during sports and arts-culture related courses (Karabey 2014).

Moreover, some studies showed that prototype-based projects also need improvements regarding ergonomic standards and spatial, visual, acoustic, thermal comfort conditions (Tapkı and Türkyılmaz 2018). Köse and Barkul (2012) also underline that although type project implementations in primary education buildings are deemed to be appropriate in terms of costs at first glance, due to the lack of qualified architectural features and critical deficiencies in implementation phases, this approach causes later additional expenditures. The debates mostly culminate in the conclusion that investigation and evaluation of the compatibility between the prototype-based school projects, the needs of the educational practices, and the users may be a critical step to decide if it is appropriate to continue with the existing strategies or making changes and improvements.

In Turkey, the last twenty years particularly has become a period of significant change. Some of the critical developments in the educational system and operational processes, as shown in Figure 3.16, inevitably affected school design and procurement processes, as well as the use of the existing educational building stock during the last two decades.

Figure 3.16: Timeline of the recent developments in the Turkish education system



[12] Milli Eğitim Bakanlığı, 2016a.

The developments concerning primary school design may be summarized as follows;

i. The 1997 Compulsory Education Law extended the duration of compulsory education from 5 to 8 years. The separation of primary and secondary schools was eliminated, and all of them were converted to primary education schools. The new law also required the enhancement of the quality of the physical infrastructure in primary education by constructing new school buildings with the required features, renovating old school buildings, and increasing the number of classrooms in both old and new buildings (Köse and Barkul 2012),
ii. After the 1999 Marmara Earthquake, new regulations have been set, and the existing school buildings were strengthened or refurbished under new contract specifications. Many schools were renovated or rebuilt within the scope of the Istanbul Seismic Risk Mitigation and Emergency Preparedness Project (ISMEP) established in 2006[13],
iii. During the transition period to 8-years continuous compulsory education model, many prototype-based projects have been produced by the Ministry of National Education. In line with the directives of the Ministry, some architectural departments of the universities have also produced school projects which varied in size according to the number of students (Gedizlioğlu 2003). Some of these projects have been implemented in different regions and have been adopted as prototype projects at the beginning of the 2000s,
iv. The length of the compulsory education was increased to 12 years in 2012 with a structural reform adopting the Primary Education Law, and the education system was converted to a three-tiered model widely known as 4+4+4. This time, the new system required the separation of school buildings to serve as primary or secondary schools[14],

[13] ISMEP, 2014. *İSMEP Rehber Kitaplar 4: Güçlendirme ve Yeniden Yapım Çalışmaları,* İstanbul: Beyaz Gemi Sosyal Proje Ajansı.
[14] Milli Eğitim Bakanlığı, 2018.

v. In 2016, the Ministry published a new catalog of prototype school building projects, which also included primary school designs classified according to the number of classrooms they include[15],
vi. In 2017, the Ministry started to work to complete the transition of all schools from half-day education to full-day education until 2019, which led to an urgent need for new school buildings and development of new typical projects. The generation of prototype-based projects is still the dominant government policy to guide public school designs.

All these transitions in the system presented above have directly affected the design requirements and production of school buildings. New requirements for learning spaces have emerged with the changing programs and teaching models. Besides, existing educational facilities and classrooms became inadequate due to the rapid population growth and the increasing urbanization rate. Currently, Turkey has a population of 79,6 million, estimated to rise to about 84 million by 2023[16]. There are approximately 5,5 million students at the primary education level, with more than 240.000 teachers[17]. The numbers emphasize the need for developing effective strategies to accommodate the future needs of educational building design for this considerable amount of potential users. According to the Ministry sources, 77000 new classrooms at all levels are needed to overcome the problems related to the crowdedness by 2019[18]. As a general idea, there is an increasing trend in the production of educational facilities due to population growth and constant changes in the educational system, which seems to proceed in the foreseeable future. Another challenge is that the school buildings are usually expected to last long years without extensive modifications, but the programs which they serve transform several times in short periods. Thus, the ability to cope with these changes and

[15] Milli Eğitim Bakanlığı, 2016b.
[16] Turkish Statistical Institute, 2018. Main Statistics. [Online]
Available at: http://www.tuik.gov.tr/UstMenu.do?metod=temelist (accessed 31 July 2019).
[17] Milli Eğitim Bakanlığı, 2018.
[18] Milli Eğitim Bakalığı, 2017. *Bakan Yılmaz: Zorunlu eğitimi 13 yıla çıkaracağız.* [Online] Available at: http://www.meb.gov.tr/bakan-yilmaz-zorunlu-egitimi-13-yila cikaracagiz/haber/13763/tr#, 04.06.2017 (accessed 22 October 2017).

requirements becomes one of the central concerns of educational building design in Turkey.

3.5 DESIGN CRITERIA FOR TURKISH PRIMARY SCHOOLS REGARDING FLEXIBILITY

Integration of flexibility as a design feature to respond both the short and long-term requirements at schools, building learning spaces to be flexible at different scales and timescales, allowing for variation in use, supporting changing educational delivery systems through spatial design have long been on the agenda in many countries (Heppell, et al. 2004). The review of the literature indicates that flexible design approach has been included in school projects from time to time in Turkey, however more conscious attempts seem to be started after 1997. For instance, an emphasis on flexibility to be recognized as an essential criterion for the design of school projects was made for the projects that were carried out in cooperation with the architecture departments of universities at the beginning of the 2000s (Gedizlioğlu 2003). However, the features highlighted in many of these school projects emerged mostly in modularity and scalability of the structure in the long-term through additions. In the recent manual for the educational buildings design standards the main purpose of the preparation of the guideline is explained as;

> *School buildings designed according to the conditions of 15-20 years ago are not able to respond to today's needs. Following the rapidly developing technology and emerging needs, educational structures have also changed over time. Contemporary, functional spaces should be provided, and flexible, adaptable educational settings should be designed to support learning activities*[19].

It may be inferred from the above statement that problems regarding obsolescence of the existing standards and the need for flexible design solutions to support educational activities at schools have also been recognized by the officials in Turkey. The same guidelines prepared by the Ministry includes a phrase claiming that;

> *Flexibility and adaptability to allow for future changes are key requirements in any school design. The predictions on the use of movable partitions utilizing technological, mechanical, and automatic systems should be thoroughly tested during the design stages. Flexibility within*

[19] Milli Eğitim Bakanlığı, 2015, p.3.

> *the building should be provided through the use of sliding / folding movable doors and walls with taking the necessary precautions to prevent the acoustic problems which may occur during use. Long-term adaptability is important in terms of extending the school's lifespan, allowing the interior walls to move, to change the size of the space, or to use unoccupied spaces*[20].

So far, the definitions and methods included within the recent Ministry guidelines are quite limited, and as may also be understood from the above phrase, flexibility has been mostly referred within the scope of a single dimension of changing spatial size and arrangements through the use of mobile building components for short-term changes. However, flexibility is a multi-faceted issue with various dimensions and needs to be handled as a holistic strategy through the evaluation of different aspects of design to comply with educational activities conducted at schools as emphasized by many researchers and design-related professionals (Monahan 2002, Nair and Fielding 2005).

The need for addressing flexibility in the architectural design of Turkish schools had been emphasized by some earlier studies, but the prior works are based on theoretical frameworks in most parts. Thus, more investigation seems to be needed for the identification of underpinning principles and improvement of design standards regarding flexibility. Moreover, a better understanding of the context in a dense urban center in Turkey and the relations between the educational practices and physical environment at schools may contribute to developing efficient design strategies for flexibility.

[20] Milli Eğitim Bakanlığı, 2015, p.10

4. BACKGROUND STUDIES OF FLEXIBILITY IN LEARNING SPACES

The following part of the study aims to set up a framework for the discussion of flexibility in the context of learning spaces. Section 4.1 starts the chapter by presenting an overview of various approaches towards flexibility in architectural discourse through an examination of definitions provided by different theorists and designers. The review of literature provides extensive views of flexibility and related concepts in architecture; nevertheless, the term has a range of different aspects that are particular to the design of educational facilities. The terminology that has been used to describe learning spaces has been developing rapidly. Nevertheless, there is often an unclarity of what flexibility of an educational space really means, what it demands from the users and which constraints or contexts might support or limit the nominal flexibility of a learning space. Thus, Section 4.2 seeks to bring clarity to the definitions of flexibility through the examination of its various applications particular to the design of learning spaces and reveals its relevance to school design.

A critical aspect of flexible design approach is, as also stated in the Guidelines for the twenty-first century Schools prepared by the Commission of Architecture and Built Environment (CABE) and the Royal Institute of British Architects (RIBA), that it can contribute to different levels and scales of design to allow variety in use, occupancy, and layout (Heppell, et al. 2004). Accordingly, flexibility may be linked to different dimensions of the design of physical spaces that stage teaching and learning activities, and it may be discussed for almost all scales of the built environment, from building scale to interior layout, use of furniture and equipment. Sections 4.3 and Section 4.4 take these various interpretations under consideration while examining flexible design features through theoretical works and examples from practice according to their position to meet the requirements brought by short-term and long-term changes. The review of literature in these sections primarily focuses on design strategies which have been applied in the case of elementary-primary level schools. It is acknowledged that the flexible design approach may be considered together with the historical development of school structures starting from the years before the 1900s to today in parallel with Dudek's (2002) classification. However, considering the importance of the issue for the design of contemporary educational structures, attention is given to more recent definitions and examples widely applied in today's conditions.

The final section, 4.5 presents a table of the juxtaposition of the time-based categorization with flexible design strategies and solutions applied in educational spaces derived from the review.

4.1 VARIOUS APPROACHES TOWARDS FLEXIBILITY IN ARCHITECTURE

Although flexibility is not a new concept for architecture, a review of the literature shows that the way architects and designers have approached it in numerous arguments has changed over time. The words flexibility, adaptability, and polyvalence sometimes have overlapping meanings, which lead to confusion in terminology, and some definitions even contradict each other. Thus, it becomes tough to reach a common consensus about how these features contribute to the architectural process and architectural products. It may be possible to frame an argument around the works and theories of several scholars and architects. Some of them put the accommodation of functions on the core of their discourses while some others deal with embracing the user's interpretations of adjusting the space beyond the architect's control.

According to sources, the search for flexibility had already started with open plans and modular design at earlier times. For instance, Kronenburg (2007) states that it is only the last three centuries that rooms with dedicated functions and specifically associated furniture have appeared in Europe. Flexibility as an architectural feature has been consciously or unconsciously emergent in earlier times. However, the discussions on the theoretical point of view became more intense, especially after the 1950s (Forty 2004). At the time, functionalism was more dominant in architecture and the related design fields. Moreover, some of the claims were critical about the deterministic features of functionalism, while others were supporting and seeking solutions for multi-functionality. According to Forty (2004, p. 142), flexibility emerged as a modernist term and a spatial feature that introduced new elements, 'time' and 'unknown' to the scene as an alternative for an 'overwhelmed functionalist approach to design.' Consequently, recognition of not being able to foresee all the probable types of uses during the design stage had emerged against the existing notion of planning all parts of a building for specific purposes. One of the earliest statements on the issue may be Gropius' (1954) explanation, suggesting that architects' conceptions should be flexible enough to create a background fit to absorb the dynamic features of the modern life and they should not design buildings to serve as monuments to the designer's genius. Gropius (1954) pointed out the emerging spatial

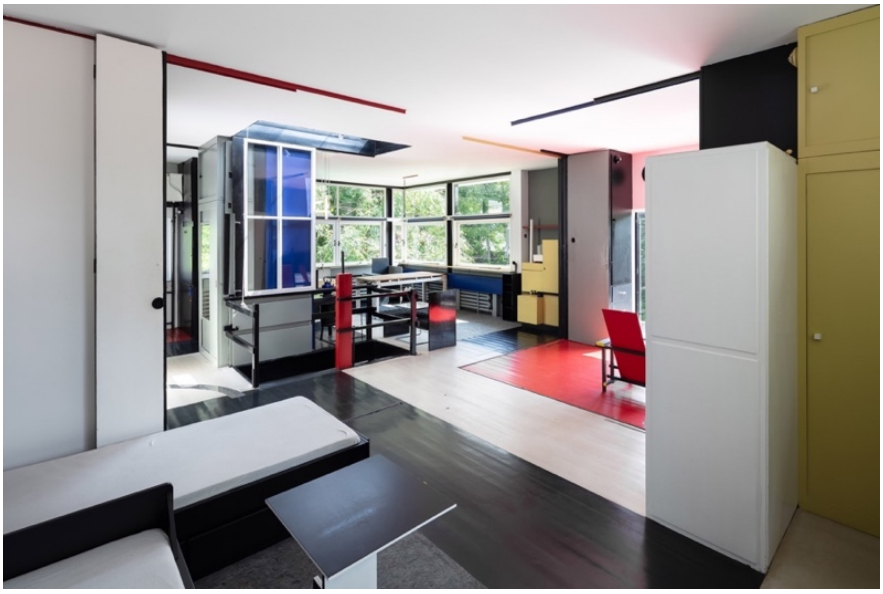
requirements with changing living styles through time and consideration of the needs of users who occupy the buildings. Norberg-Schulz (1967) admitted the significance of the argument by saying that the 'demand for flexible structures came to a fore by the time. From a different standpoint, Norberg-Schulz (1967) explained two ways of obtaining flexible structures as adding or taking away elements to make the building 'grow' or 'shrink' without losing its coherence, or making the components and their interrelations changeable. Different from Gropius, the author had put the functions at the center in his methodological explanation.

There were also efforts to take the actual users of buildings as the primary actors to maintain flexibility. Habraken (1972), for instance, underlined the essential role of the final occupants as the main actors to make their surroundings. In line with this viewpoint, Habraken (1972), came up with a support-infill conception for housing design in the early 1960s. The system was basically about separating the 'support,' which consists of the communal spaces such as entrances, corridors, staircases, meeting areas from the 'infill' units, which may be adjusted to the users' lifestyles before their occupancy with their participation to the design stage.

Comparatively, a more recent critique of functionalist approach came from Hertzberger (2005, p. 146) claiming that functionalism was indeed based on abstract human activities and the expression of efficiency. The author has warned architects not to make designs according to their predictions on how humans function in their homes. In Hertzberger's view, the direct application of all specific functions in space leads to dysfunctional results and severe inefficiency. He claims that (2005) there is no single solution that is preferable to all others, the correct solution does not exist because the design problem requiring the answer is also in a permanent state of change. Hertzberger (2005) then has come up with a concept of polyvalent multi-functional form. Accordingly, the author has offered a permanent spatial structure which allows polyvalent interpretations of users without the form's changing itself. In other words, Hertzberger proposes polyvalent spaces that are clearly defined, but at the same time open for different uses. According to this view, assigning functions to spaces and customization are not necessarily accepted as interdependent. The definition of spaces according to functions is a choice which can be done in case if it is needed, but these spaces can still serve for other functions.
Based on these various viewpoints, Forty (2004) identifies three types of strategies of

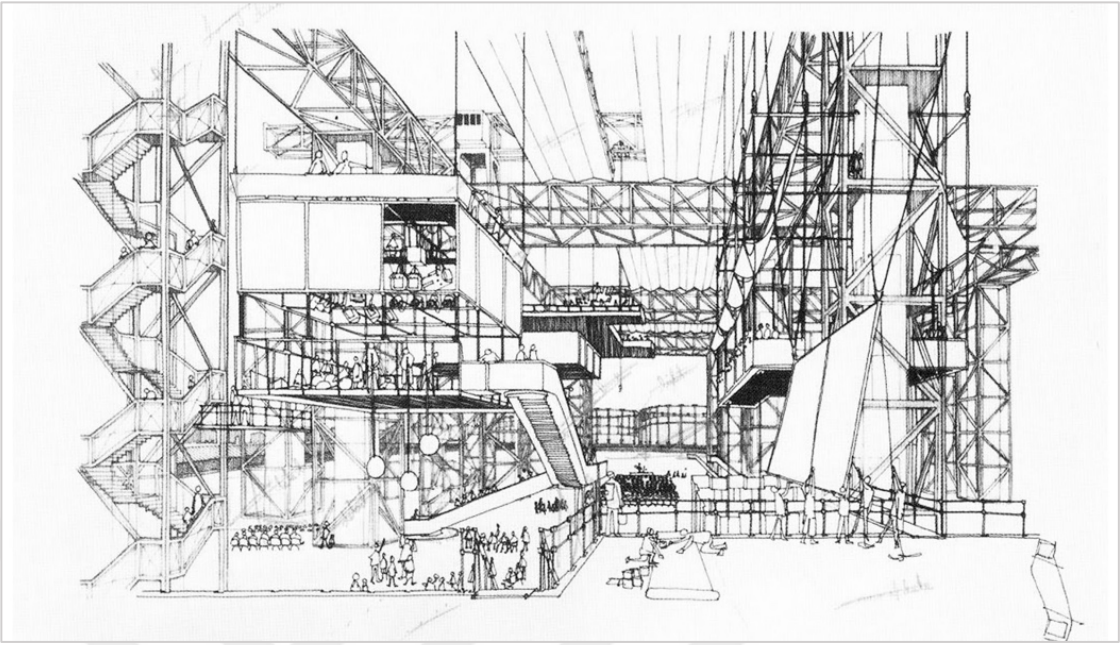
flexibility in architecture as redundancy, flexibility by technical means, and flexibility as a political strategy. According to the author's classification, the first strategy is redundancy, which means the creation of excess capacity to allow different interpretations and uses. This strategy may also be related to the idea of an open plan consisting of functionally unspecified spaces, which enable people a range of possible uses as in a way applied in Hertzberger's polyvalence idea. Koolhas and Mau, (1995, pp. 239- 240) also make a close description claiming that "flexibility is the creation of margin-excess capacity that enables different and even opposite interpretations and uses.". A second type, as asserted by Forty (2004), is achieving flexibility through technical means such as including sliding partitions, extensions of rooms, foldable furniture, movable windows even floors to alter the interior space according to daily or temporary use. The author (2004) mentions Gerrit Rietveld's Schröder House, which was constructed in 1924, in Utrecht, as a significant early example of this strategy. As preferred by the user, the movable partitions of the house allowed to make direct and useful configurations through dividing the space into private rooms or keeping it completely open as seen in Figure 4.1. Fun Palace, an education, and entertainment center designed by Cedric Price in 1964 is also mentioned as an example by Forty (2004) for pursuing flexibility through its open steel structure serviced by traveling cranes which moves and assemblies prefabricated walls, platforms, floors, stairs, and ceiling modules as seen in Figure 4.2.

Figure 4.1: Interior view from Schröder House showing sliding partitions



Source: Stijn Poelstra, 2018. Rietveld Schröder House [Photograph] Available at: https://www.rietveldschroderhuis.nl

Figure 4.2: Interior perspective, Fun Palace designed by Cedric Price



Source: Collection Centre Canadien d'Architecture. Available at: https://www.cca.qc.ca/en/search/details/collection/object/378817

Today, for sure, flexibility by technical means is much more available, affordable, and familiar with the developing technologies. The third type is flexibility as a political strategy refers to the opinion advocating that flexibility is not a property of buildings but a feature of spaces, and it acquires a characteristic through the uses which it is situated (Forty 2004).

The concept of change, indeed, is the common thread that runs through the definitions of flexibility and the keywords mentioned around this main term. Adaptability is again a commonly used word within this context, and there have been some attempts to specify its meaning compared with flexibility. For instance, Groak (1994) states that flexibility points to "capability of different physical arrangements," where adaptability of space indicates its "capability of different social uses". Quite contrary to this definition, Schneider and Till (2005) assert that the degree of flexibility in a building may be determined by observing its capacity to allow different social uses and different physical arrangements with its inbuilt opportunities for adaptability. Pinder, Schmidt, Austin and Gibb (2017) relate the word with physical changes and directly classify the types of adaptability as changing the configuration of an individual setting, the dimensions of a space, performance of a building, use of a building, size of a building and the location of

a building. In a more recent, work of Schneider and Till (2007), the authors claim that flexibility is "achieved by altering the physical fabric of building" while adaptability may be "achieved through designing rooms or units so that they can be used in a variety of ways". They also introduce a 'soft and hard' analogy, which refers to two different ways of flexible housing design. According to this diversion, 'soft' refers to tactics which allow a certain indeterminacy, whereas 'hard' refers to building components which more specifically determine the way that the design may be used with technical elements they involve.

It is important to note that the search for strategies to make buildings more flexible has been mostly about domestic spaces, especially mass housing which constitute one of the most affected groups from demographic, social, economic and environmental changes. The rise of the minimal dwelling solutions in limited spaces, the efforts to response for the varying demands of many occupants with a restricted number of plan types, the industrialization of housing and the movement towards user participation may be the dominant motivations of this situation. However, there are studies which focus on increasing the capacity to adjust changing conditions and needs for different building types such as hospitals, airports, and educational buildings.

The idea which reminds us that physical lifetimes of buildings are mostly shorter than their useful lifetimes causing obsolescence still maintains its validity in our present-day. This situation has become even more apparent with the advances in building systems and material technologies. The notions of spatial flexibility and adaptability also preserve their importance concerning some critical issues of contemporary architecture such as sustainability and mobility. Along with the developing computation and communication facilities, new forms of spatial experiences, ‘smart buildings’ which interact with their occupants and their environment, are introduced in the fields of architecture and design. Therefore, the sources of change which require flexibility are also in the process of transformation, and they increase in number.

4.2 FLEXIBILITY IN THE CONTEXT OF LEARNING SPACE DESIGN

A review of the research on the school design literature provides various interpretations and applications of flexible terminology. While the earlier definitions and related themes

emphasize the structural features of the buildings, in more recent studies, the scope has been broadened to the discussions around the influence of pedagogical and managerial concerns and other design attributes such as extending the learning and teaching activities to the whole school setting.

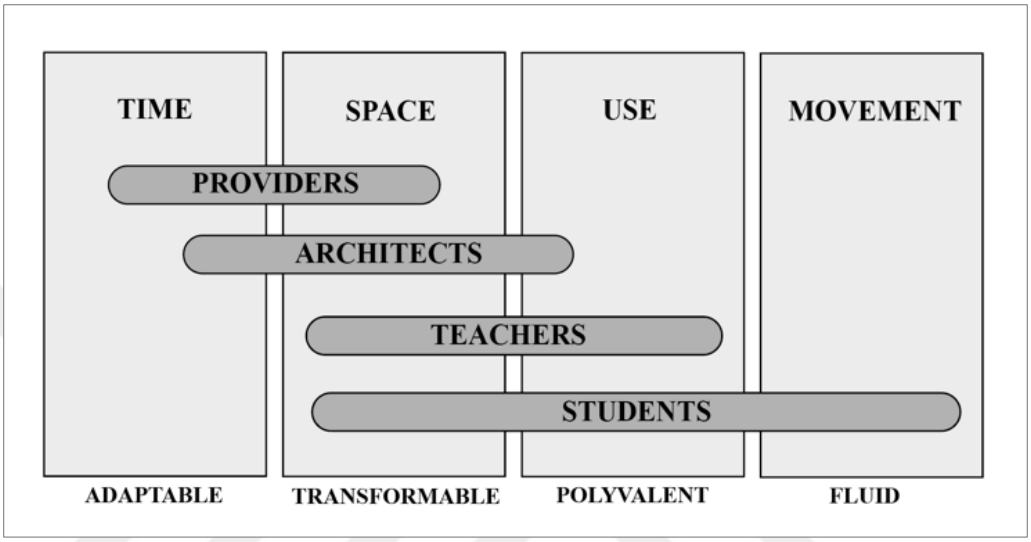
The concept of change and serving for differing preferences, indeed, are the common threads that run through the definitions of flexibility and the keywords mentioned around the term. Schneider and Till (2005), for instance, emphasize the degree of flexibility maintained by allowing different interpretations in use and physical arrangements with the built-in features of a structure. Monahan (2002) subdivides flexibility in five properties of space as fluidity, versatility, convertibility, and modifiability. The author suggests that fluidity represents the design of space for flows of individuals, sight, sound, and air. According to the same classification, versatility indicates the property of space that allows for multiple-uses, convertibility designates the ease of adapting educational space for new uses, scalability describes a property of space for expansion or contraction, and finally, modifiability invites active manipulation and appropriation of users.

In a similar manner with slight differences, Woodman (2016) uses sub-categories to assist the clarification of the definition in the case of school buildings. The author (2016) defines four categories of sources of change, which are movement, use, and time-related aspects, as given in Figure 4.3. Woodman (2016) also underlines the roles of actors in determining the design or conducting the way of use in physical learning spaces.

Woodman (2016) refers to the term adaptability to describe time-related flexibility in response to low magnitude and high-frequency architectural change. Time-related flexibility is related to the ability of a school building to change over an extended period to satisfy significant changes in need. According to the same classification, for space-related flexibility, the term transformability is employed to refer the ability to change a space from one form to another in a way that would require some effort. Space flexibility is about the manipulation of spatial elements to create different arrangements. Woodman (2016) cites Hertzberger's (2005) description of polyvalence concerning use-related flexibility. Initially, Hertzberger (2005) adopts the word polyvalence from chemistry to describe a space that can be pedagogically used in a variety of ways without the form itself has to change. Use flexibility is related to the changes in the way how space is used

without altering the space to support different pedagogical activities to be undertaken within the same setting. Woodman's (2016) final sub-category for the movement-related flexibility is fluidity to refer to the design features of spaces which support the free movement of teachers and students within a learning space.

Figure 4.3: The meanings of flexibility according to Woodman (2016)



The flexible design features are also frequently allocated into time-based categories according to their position to respond to short-term and long-term sources of change (Heppell, et al. 2004, Kemp 2015, Nair and Fielding 2005, Wood 2018). Kemp (2015) defines short-term flexibility as educational space's ability to accommodate transitions between different activities, learning experiences, and socializing. This type of flexibility allows users to change the space themselves, or the design of space enables users a variety of learning methods and activities (Nair and Fielding 2005). Accordingly, long-term flexibility of spaces responds to spatial requirements that emerged due to the curricula developments, changes in pedagogical methods, and demographical features as well as the need for more economical, environmentally sustainable solutions. The core structure is often designed to permit physical alterations to meet the circumstances over the years or decades to achieve long-term flexibility (Nair and Fielding 2005).

As a general idea, flexible solutions are formed through two ways; whether the building itself adapts to diverse functions or the users adjust the spaces to accommodate their desired activities. The later one presents a critical third dimension as the interpretations

of the users. Since flexibility is an interactive process rather than a ready-made solution to the problems of change as argued by Shabha (1993), human interaction with the teaching environment is the most influential aspect for its optimization. It may be inferred that, in all of the definitions and categorizations, the actual users and their interaction with the space has been highly emphasized. Wood (2018) also advocates that flexibility should not be approached as just a space-related issue and claims that without an understanding of a timescale and actors who will be responsible for the design or operation of the flexible attributes, flexibility becomes a problematic and ambiguous term. The author proposes (2018) that the responsible actors may be the actual users, the teachers or students for flexible aspects to response short-term or immediate changes while architects, managers, engineers will have their roles as the primary actors to deal with long-term flexibility. How people will inhabit and adjust the building for their needs and how this use will change over a building's lifespan may also contribute to both immediate and long-term categories, and they may be discussed under multiple flexible design aspects. Table 4.1 juxtaposes the types of main facets of flexibility as a summary of the review of these different perspectives and definitions about the notion within a time-based categorization. The scheme constituted a basis for discussion and determination of the spatial design properties regarding flexibility at schools through the incorporation of the design strategies mentioned in the related literature.

Table 4.1: Time-based categorization of the main facets of flexibility

Time-Based Categorization	Flexibility Facets	Sources of Change	Definitions - Citations
SHORT-TERM AND INSTANT CHANGES Flexible design attributes in response to short-term and instant changes (Kemp, 2015; Nair and Fielding, 2015)	**Versatility Polyvalence (Variance)**	use	- versatility indicates the property of space that allows for multiple-uses (Monahan 2002) - a space that can be pedagogically used in a variety of ways without the form itself having to change (Hertzberger 2005, Nair and Fielding 2005)
	Modifiability Customization	use	- modifiability invites active manipulation and appropriation of users (Monahan 2002)
	Fluidity	movement	- the design of space to support free flows of individuals, sight, sound and air within a learning space (Monahan 2002, Woodman 2016)
LONG-TERM CHANGES Flexible design attributes in response to long-term changes (Kemp, 2015; Nair and Fielding, 2015)	**Convertibility Transformability Adaptability**	time space	- the ease of adapting educational space for new uses (Monahan 2002) - time-related flexibility in response to low magnitude/high frequency architectural change building (Woodman 2016) - a building concept that begins with a basic structure but assumes it will change as needs change (Oblinger and Lippincott 2006)
	Scalability	time	- a property of space for expansion or contraction (Monahan 2002)

4.3 FLEXIBLE DESIGN FEATURES TO RESPOND SHORT TERM AND INSTANT CHANGES

The short-term changes refer to the requirements which occur on an hourly, daily, weekly, or monthly basis. The design features which support learning spaces to respond to short-term and immediate changes mainly revolve around three dimensions of flexibility, which are versatility or polyvalence, modifiability, and fluidity. The flexible design strategies derived from the review of prior sources are grouped and examined under three subtitles.

Accordingly, the main titles that are going to be explained in the following sections can be listed as;

a. Spatial layout and organization to allow multi-usability and variance
b. Setting up indoor-outdoor relations to support versatility and fluidity,
c. Flexibility in mobile building components and furniture scale.

4.3.1 Flexible Spatial Layout and Organization

Flexible design strategies regarding versatility or polyvalence are mainly associated with formation of multi-purpose areas which allow variance for interpretation of use (Hertzberger 2005; Loeffelman 2007), cluster areas (Hertzberger, 2008) and experiences with open plan approach to general layout (Dovey and Fisher 2014, Sigurðardóttir and Hjartarson 2011). The spatial layout and organization of buildings are recognized as critical factors related to flexibility (Heppell, et al. 2004, Pereira, Kowaltowski and Deliberador 2018) and review of the literature shows that several proposals have been made regarding the aspect.

4.3.1.1 Open-Plan Proposals

The background of the open-plan proposals as a flexible design strategy for school layouts date back to 1960s and 1970s, and the strategy may be considered as one of the widely practiced attempts applied as a result of inquiry-based, child-centered movements (Moore and Lackney 1994). The open classroom schools, or schools- without- walls movement was originated in the United Kingdom, then migrated to the United States and became very popular in the late 1960s based on the belief that students will do better if they are removed from the constraints of the box-like classrooms (Nair 2014). For open-plan schools, it was argued that architectural design does not necessarily determine teacher practice, but that teachers determine and arrange their spaces in accordance with their perceived needs (Burke and Grosvenor 2008). Multiple classes were conducted simultaneously in a single ample space at the earlier examples of these schools built according to this idea to foster student collaboration, team teaching, and interdisciplinary learning through open, flexible layouts (Harrison and Hutton 2014).

However, some open-plan design features had side effects and open plan approach was then criticized for being a too literal interpretation of the open education philosophy

which caused high levels of noise and distraction, reduced task involvement which prevented the realization of the main goals of promoting team teaching and collaborative learning (Chiles 2015a, Sanoff 1993).

Reconceptualization of school environments by removing the walls and partitions on plan layouts to promote flexibility in use, indeed, demanded to be aligned with a change in teaching practices and a profound shift in pedagogy. Open plan schools' lack of zoning for creating open or semi-enclosed, quiet areas where children could go for privacy, to read a book, or work silently without distraction also led to problems in the 1970s (Fisher 2007, Nair 2014). The disorder caused by the incompatibility between teaching practices and school buildings has also been pointed out as a significant reason for the failure (Lippman 2010). Regarding the disappointing results of the prior attempts, Leiringer and Cardellino (2011) call attention to open spaces' possibility of impeding privacy which is needed to allow individuals to control their interaction with others. Thus, it may be inferred that the degree to which open plan areas support social interaction and sharing of knowledge is debatable.

Giving reference to the failure of earlier open-plan layouts, Lange (2018) explains that the problem of loudness may be easily solved with today's innovative materials such as specialized acoustic glass panels. The author (2018) then remarks that the main problems of the initial open-plans proposals were pedagogical where the teacher's way of using the space tended to stay traditional and academic outcomes failed accordingly. Lange (2018) underlines that these kinds of transformation need architecture, teaching and curriculum to change together. Gislason (2015) also supports this opinion by emphasizing that open plan layouts demand a good operational ability, direct cooperation between teachers, and training of the teachers in team teaching otherwise they tend to organize the spaces in a traditional way.

Despite the failure of the open-classrooms to accommodate hundreds of students in one space, the essence of the idea is still influential today (Lippman 2010, Nair 2014). More recent interpretations of plan layouts and organization have taken the problems under consideration with regards to current pedagogical approaches and emphasize improving the spatial variety for different forms of activities rather than proposing totally open spaces for improvisation. An earlier proposal, named as modified open-plan by Moore

and Lackney (1994), for instance, suggests a mediating solution through the organization of space into a variety of defined large and small activity spaces open enough to allow children to experience various possibilities available to them while providing enough enclosure. The plan consists of a mixture of several open areas with smaller enclosed spaces with separated yet connected activity areas, as seen in Figure 4.4.

Figure 4.4: Modified open plan layout proposed by Moore and Lackney (1994)

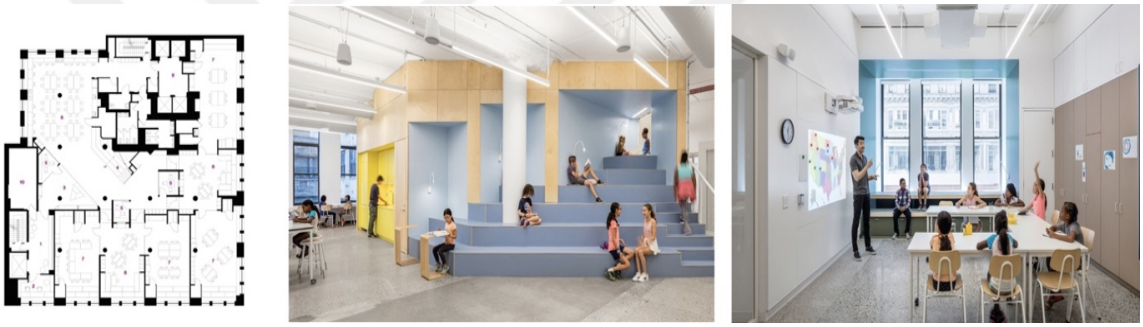
Source: Moore and Lackney, 1994, p. 50.

In a similar manner with Moore and Lackney's (1994) suggestion, Nair (2014) comments that open-plan approach may be successful in school layouts if discrete zones for various activities are created while retaining the agility of an open plan to provide various sized groups of students and interdisciplinary work. Chiles (2015a) mentions open studio learning in which each level contains a mixture of different sizes and types of learning spaces, fully or semi-enclosed, and arranged around the open-plan circulation spaces. By this way, the author (2015) claims that long views provide stimulation and the mixture of closed and open spaces allows maximum flexibility for different forms of teaching.

Fisher (2007) also discusses the link between pedagogy, space and learning environments, and citing Piaget's classification of children in developmental phases, the author suggests a progressive approach to flexibility in the learning space where the level of flexibility and the amount of open space increases as the child develops. Since in the later stages of schooling after pre-school, exploring and retreating becomes heavily weighted, having opportunity to gradually experience larger shared spaces, students become more comfortable in their interactions with others and require spaces for more independent thinking and reflection (Fisher 2007).

Regarding more recent open layout proposals, Lange (2018) discusses the example of a small-scaled project, Altschools located in New York, for a flexible approach which is provided through locating a variety of learning venues in terms of size, shape, and enclosure to the layout as seen in Figure 4.5. The school is housed in an multi-story building constructed in 1903 in the urban context. The classroom units are given place for instructional activities however children are also provided more quiet zones and niches for individual or group study. Separate enclosed units are divided by soundproof glass panels and visual openness is not disturbed. Re-organizable furniture for different activities is used inside the units. The steps in the central area serve as a gathering space for presentations or other non-formal events and another larger zone, design laboratory with tables also serves as a multi-functional working and break-up space.

Figure 4.5: Plan drawing of Altschool, and photographs showing the central gathering area and individual classroom unit



Source: AltSchool, New York. (2019). [image] Available at: https://www.architectureplusinformation.com/altschool [Accessed 9 Aug. 2019].

It may be concluded through the examination of prior studies and examples that how and how much a learning space is defined and assigned for particular functions constitute the determining factors to achieve the optimum amount of flexibility through open-plan approaches. Thus, including open-plan layouts in school facilities should be handled by giving attention to the teaching methods and learning activities that are planned to be performed within these environments.

4.3.1.2 Flexible Design Proposals for Classrooms and Core Spaces of Learning

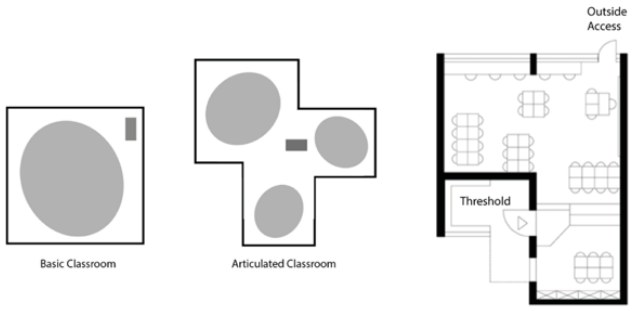
Traditional type classrooms are being added each year to the existing thousands. However, classrooms' role as being the primary containers of learning has been challenged in the recent years both by practitioners and academics (Benade 2017, Hertzberger 2008, Neill and Etheridge 2008, Taylor 2009, Sutherland and Fischer 2014). The confrontations intend to question traditional, classroom-based education as an

appropriate way of designing schools for the twenty-first century in which pedagogical innovations demand spaces which enable exploration by both the teachers and students.

Nair and Fielding (2005) underline that flexibility should first be applied to the primary learning areas where students spend most of their time, which are the classrooms. Kurani (2013) criticizes the current concept of traditional classrooms by emphasizing that all the spaces at schools can contribute to the ways of learning through observation, discussion, creation, or performance. Providing a stage for multiple modes of instruction and learning became an essential feature of useful learning spaces (Neill and Etheridge 2008). These concerns form the basis for the debates on flexibility regarding the core spatial units of learning at schools.

Allowing variance and multi-usability within classrooms has started to become essential parameters for the design of contemporary schools. One of the prominent examples of this approach has been developed by Hertzberger (2008). The author (2008) structures his proposal for 'articulated classrooms' on the idea of decentralizing the concentration from teacher to student. Based on this idea, Hertzberger (2008) articulates the classroom space in an L-shaped form rather than the usual rectangle in Montessori Delft School, so that space allows performing different activities simultaneously, and the children are not confronted with distraction as seen in Figure 4.6.

Figure 4.6: The plan diagrams showing Hertzberger's (2008) comparison of traditional and articulated layouts and L-shaped classroom plan of Delft School

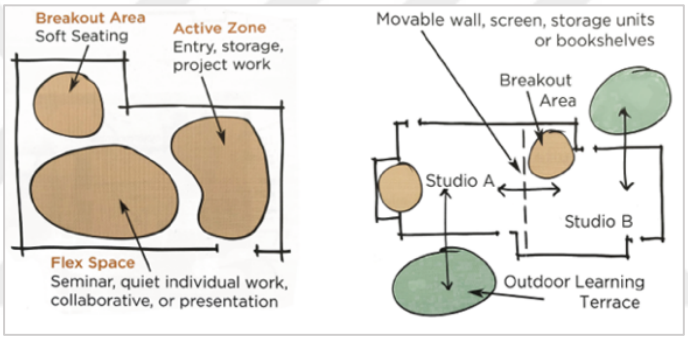


Source: Hertzberger, 2008

A similar approach has been followed both by Nair and Fielding (2005) and Lippman (2004) proposing L-shaped classrooms which they name as learning studios as shown in Figure 4.7. According to this idea, the L-shaped units may afford flexibility within the space, and alternative configurations may also be obtained through their combination.

The irregular plan of the units creates breakout spaces and flexible learning zones which support different learning modalities. Nair and Fielding (2005) also offer giving access to the adjacent zones through the use of movable partitions and creating connections to outdoor learning areas planned for each core unit in their learning suites proposal. The layout they propose includes two different types of space, one of which is the area separated for the instructional teaching, presentations, and group work, equipped with tables and chairs. The other adjacent space serves for more informal ways of learning, and resting and accordingly equipped with soft seating units. The authors (2005) also propose a method of extending the classroom activities to outdoor space, which is given direct access from the classroom.

Figure 4.7: Sketches showing different activity zones in learning studios and learning suites



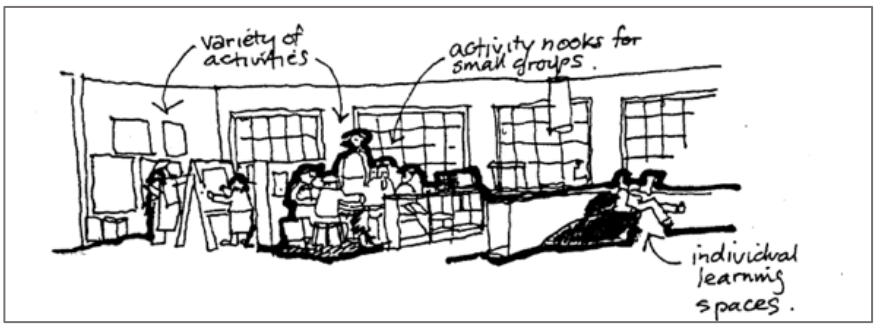
Source: Nair and Fielding, 2005

Regarding the forms of the learning spaces, Woolner (2010) also makes comparisons of different classroom shapes and argues that rectangular- shaped classrooms are preferred because they do not have hidden corners and can be equally adapted through the arrangement of furniture and equipment for independent learning while fitting together easily on a plan. The author (2010) proposes a different approach which includes the construction of rooms in various sizes to respond to the need for different sized rooms for different purposes, especially in large schools. On the other hand, in some studies, it is argued that an L-shaped classroom has all the advantages of a rectangular room, but also provides more opportunities for teacher adaptation (Dudek, 2007).

In an earlier study, Moore and Lackney (1994) suggest that elementary school classrooms may need various types of activity zones such as a flexible traditional main area, a wet area for occasional art or science and a more cozy corner for more quiet study or one-to-one teaching as shown in Figure 4.8. According to the authors (1994), well-designed

activity settings within the classrooms may contribute to a greater degree of engagement with learning activities.

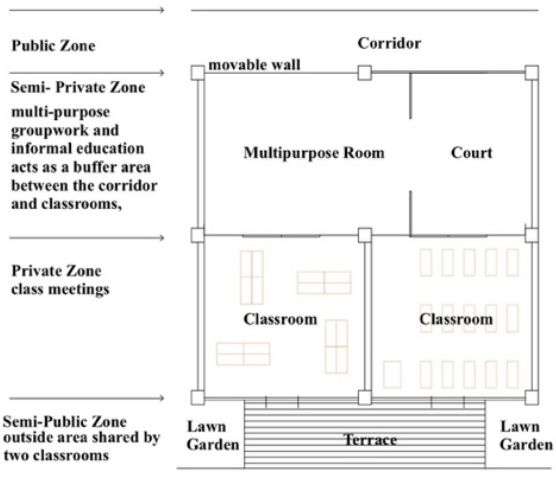
Figure 4.8: Moore and Lackney's (1994) proposal for classrooms to accommodate various activities



Source: Moore and Lackney, 1994, p.57.

Nair (2011) claims that enclosed spaces for direct instruction are needed at schools however these separate areas could also be adjacent to a visible and controllable common space for teamwork, independent study, and internet-based research. In relation to this idea, Nair and Fielding (2005) present the grade unit method, in which one core learning unit is divided into three areas with permeable boundaries according to their amount of allowing privacy as: a private zone including the traditional furniture layout for instructional courses and class meetings, a semi-private zone designed as a multi-purpose room for group work and informal education and a public area used for circulation but may be used for educational activities when needed as depicted in Figure 4.9.

Figure 4.9: Spatial use diagram showing the division of spaces and variations in use according to Nair and Fielding, 2005



Besides the concerns about the current situation of the traditional classrooms, there has been an increased awareness and interest in where else learning can take place within the school (Harrison and Hutton 2014). There are many studies which suggest the inclusion of a variety of learning spaces regarding layout, size, and shape to provide flexibility on a day-to-day or short term basis. In her review of the school layouts produced for of New Schools for New York Project, Genevro (1990) suggests the value of schools having rooms in a variety of sizes to accommodate classes and small discussion groups as well as large assemblies in terms of flexible design. Ehrenkrantz (1999) similarly mentions the need for flexibility to support the dynamics of cooperative learning in small or large groups and to provide enough space for multiple and different activities to occur in learning environments. The author (1999) also proposes to include different types of spaces in varying sizes at schools rather than having just classrooms and spaces of a uniform size. In a similar manner, RIBA's guideline suggests that multi-purpose teaching spaces, non-dedicated spaces shared with other uses are needed at schools (Heppell, et al. 2004).

Another issue regarding flexible design in the core spaces of learning is the rapid advances in information and communication technologies (ICT), the introduction of internet facilities, wireless connectivity within schools as well as the changing mobility, space and time constraints. Neill and Etheridge (2008) underline that flexible learning environments should accommodate an instructional technology shift from centralized information technology infrastructure to decentralized computing and networking. Loeffelman (2007) points out that dedicated spaces within classrooms and dedicated computer laboratories are being replaced with the opportunities to change the entire classroom or some parts into laboratories through wireless technology and break-out spaces as well as other informal settings may also be enriched with technological equipment and facilities to support project-based learning settings. From a more technical perspective, Fisher (2007) also underlines that the contemporary flexible design opportunities for the organization of spaces introduced by wireless connectivity which means that projectors, computers, printers, and other technical equipment can be easily moved. Nonetheless, the situation emphasizes that design for pedagogy and people is not restricted by equipment requirements anymore.

Today's primary school level students can be involved in everything from word processing to concept mapping, coding, robot making, drawing and animation to scientific research. These changes also contribute to the shaping of teaching and operating cultures of schools and expected to create shifts in the expectations of the physical learning environment. There are many recent researches and attempts to create spaces to support changing styles in education by incorporating the twenty-first century skills into learning and teaching and to reorganize traditional classrooms and other learning areas. Future Classroom Lab Project, for instance, aims for students to get more access to technology during the day, rather than just being in a specific place of technology or accessing technology only in certain time periods (Bannister 2017). According to the guidelines of the project, six zones of learning are defined to accommodate different approaches and aspects of teaching and learning as; creating, interaction, presentation, investigation, exchange, and development within the learning spaces as depicted in Figure 4.10.

Figure 4.10: Diagram showing a prototypical learning space design developed according to Future Classroom Project principles

Source: Bannister, 2017, p. 12.

To summarize, it may be understood from the literature that the methods of flexible design inside the core learning units are provided, whether through giving opportunities within the classrooms to accommodate different activities or offering a variety of learning spaces in size, shape, enclosure, and equipment. The contemporary interpretations of open-plan approaches are also highlighted as a mediating solution between the two contrasting design approaches of conventional classrooms with rows of desks and totally open layouts.

4.3.1.3 Learning spaces outside the classrooms

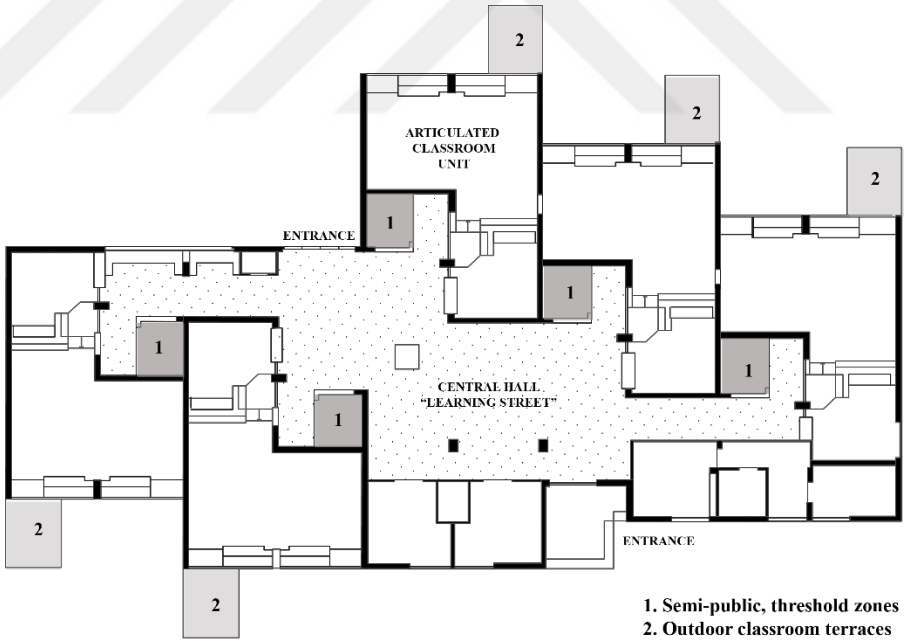
The extension of the learning activities to other spaces of the schools through the creation of multi-purpose areas and informal learning clusters have been common design attributes regarding versatility. The literature review shows that there has been a keen interest and research on how public space theories may be applied to the design of learning environments with the merging role of informal learning in the twenty-first century. The potential of a model which utilizes circulation zones, hallways, and other in-between spaces to extend educational activities and to support interaction between children has been handled through many design proposals.

In their article, Nair and Gehling (2010) discuss Jan Gehl's theory of public space and how it might apply to educational environments today. Gehl's (2011) theory acknowledges that human's social nature is motivated by social experiences, and it is indirectly supported whenever social activities are given favorable conditions through physical planning in public space, and when the life between buildings is enriched as more stimulating environments. In parallel with Gehl's theory, Nair and Gehling (2010) argue that spatial components of good public places such as the marketplace, thoroughfare and meeting place may produce educational spaces that operate like the real urban realm which offers diverse activities, spontaneous interactions and participation. The authors (2010) claim that the spaces between formal learning areas should be designed specifically for informal learning, learning from peers, learning by application, and learning a range of highly sought-after soft skills that are increasingly demanded by the today's professional world. Nair and Fielding (2005), for instance, give the example of associating lobby and common spaces with art courses and activities regarding this idea. It is also recommended that the design of hallways should be approached as active meeting places by adding windows and suitable furniture (Nair and Gehling 2010).

Hertzberger (2008) similarly claims that the corridors and hallways at schools should be inhabitable as actual extensions of classrooms rather than just serving as bare circulation spaces for accessing and connecting rooms on either side of them. The architect and author (2008) proposes a typological concept, learning street starting from the idea that school can be organized as a complex through urban types such as streets and squares, which create spaces associated with different learning situations. Hertzberger relates his design idea with the behavior patterns of the students to explain the reason behind his

learning street approach. The architect asserts that students have to sit still for long hours in the classroom so as soon as the bell rings they explode in movement. Therefore, rather than including just large corridors for circulation, it would be more preferable to create a street-like environment through including nooks and places for people to sit and perform other activities (Dyer 2016). Accordingly, the learning street articulates various functional areas of the school, fostering closeness between the student and the educational activities. In-between areas are located at the entrance to each classroom mediating between the public zone of the hall, and the private zone of the classroom according to Hertzberger's (2005) proposal as shown in Figure 4.11. The architect (2005) describes this kind of transitional spaces as thresholds to provide the spatial condition for the meeting and dialogue between areas of different orders. Hertzberger (2008) underlines that the partitions between classrooms and corridors should be more open to make the children feel that hallways are still their domain.

Figure 4.11: The circulation zone surrounded by the articulated classrooms and threshold areas in Montessori Delft School based on the image in Hertzberger (2005)



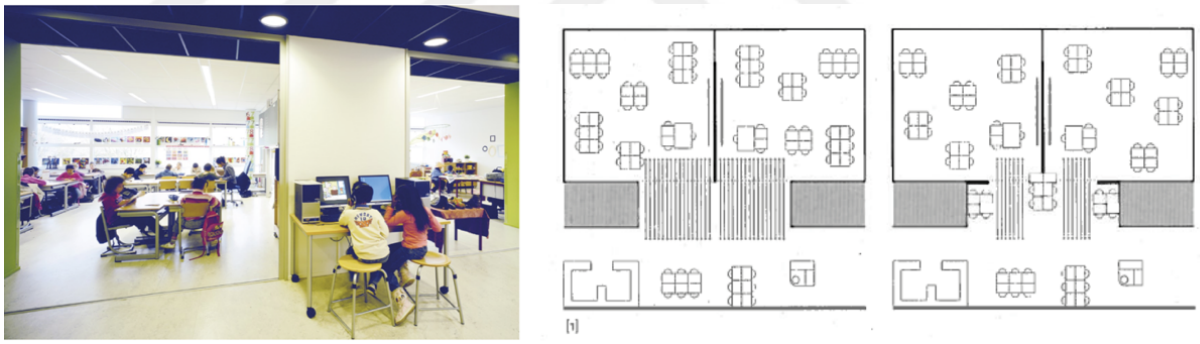
The street metaphor may also be seen in the design of an earlier project, Amsterdam Apollo Schools and a more recent one, Extended School De Spil Arnhem designed by Hertzberger as shown in Figures 4.12 and 4.13. The transitional areas are treated as informal learning spaces and contribute to educational activities serving as working stations or exhibition displays of student works. In Extended Arnhem Schools the link

between the classrooms and the learning street is also strengthened by the use of transparent movable partitions so that more permeable boundaries are obtained between the spaces.

Figure 4.12: Threshold zones in front of the classrooms in Amsterdam Apollo Schools built between 1980-1983

Source: AHH - Educational Projects. (2019). [image] Available at: https://www.ahh.nl/index.php/en/projects/education [Accessed 9 Aug. 2019].

Figure 4.13: Permeable boundaries between the classrooms and the learning street in Extended School de Spil Project, Arnhem built between 2004-2007



Source: AHH - Educational Projects. (2019). [image] Available at: https://www.ahh.nl/index.php/en/projects/education [Accessed 9 Aug. 2019].

Similarly, Loeffelman (2007) suggests the structuring of spaces in a way that as well as serving their primary purpose, they can also be planned to be used for other activities to improve versatility rather than being too specialized. The author (2007) also criticizes narrow hallways for being impractical and too cramped to accommodate an assembly of children. Loeffelman (2007) gives the example of classroom clusters and niches as break-out spaces to support project-based learning, where informal interaction focuses on group interactions versus just the individual as shown in the example in Figure 4.14. Similar to Hertzberger's learning street idea, the author (2007) also proposes building learning pathways to increase the amount of efficiently used spaces, especially in primary-

elementary level schools. Shabha (1993) and Chiles (2015b) also support the idea of integrating all the zones outside the classrooms to informal educational activities by claiming that the segregation between circulation and teaching areas may be wasteful of resources and the most prohibiting aspect of change and adaptation.

Figure 4.14: Loeffelman (2007) gives the example of classroom clusters, break-out spaces and common activity zones in West Haven Elementary School

Source: West Haven Elementary School, Utah, United States. (2019). [image] Available at: http://www.designshare.com/index.php/projects/west-haven-elementary/images@468 [Accessed 9 Aug. 2019].

Loeffelman (2007) also mentions the need for multi-functional spaces in addition to specialized learning environments at schools. The specialized learning environments such as library, art or music rooms should be located in transitional zones which can serve as semi-public, accessible places. The multi-functional areas should provide space for group gatherings and allow different types of configurations. The author (2007) gives the example of the library and story-telling spaces, serving as accessible multi-functional semi-public zones, as exemplified in Figure 4.15.

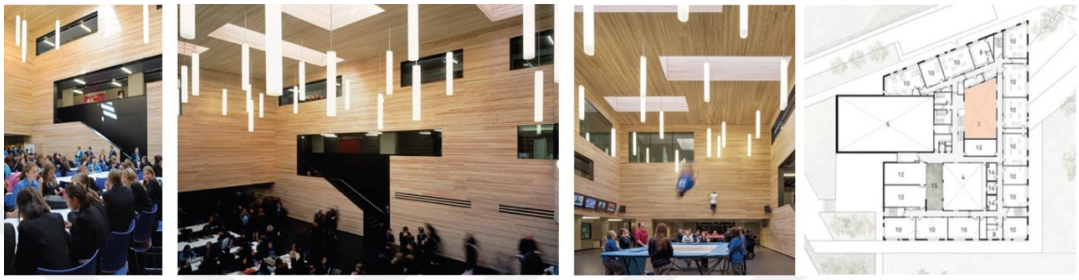
Figure 4.15: The plan drawing and photographs of Edward Everett Hale School library and central story-telling space

Source: Dudek, 2007, p. 24.

Kemp (2015) presents examples of utilizing large atrium spaces located at the centers of the schools as active focal points for gatherings, meetings, performances as seen in Figure 4.16. The author (2015) also mentions multi-functional staircases as a way of extending educational activities from core spaces to the general layout of the schools. In fact, many

contemporary examples of designing stairs to form an area for students to sit, to eat lunch, to read a book, or to gather can be found in practice. A similar approach may also be seen in some of Hertzberger's school projects such as Amsterdam Apollo Schools, extended school Presikhaven and Spil Centre Waterrijk as shown in the examples in Figure 4.17.

Figure 4.16: Multi-purpose atrium at Christ's College which provides a large entrance space as well as accommodating multiple functions during the school day



Source: DSDHA Christ's College (2009). Available at: http://www.dsdha.co.uk/projects/524aa0a1f785240002000001/Christ-s-College (accessed 17 November 2019).

Figure 4.17: The multi-functional staircases and informal learning spaces in Amsterdam Apollo School (1983), Extended School Presikhaven (2009) and Spil Centre Waterrijk (2011)

Source: AHH - Educational Projects. (2019). [image] Available at: https://www.ahh.nl/index.php/en/projects/education (accessed 10 Aug. 2019).

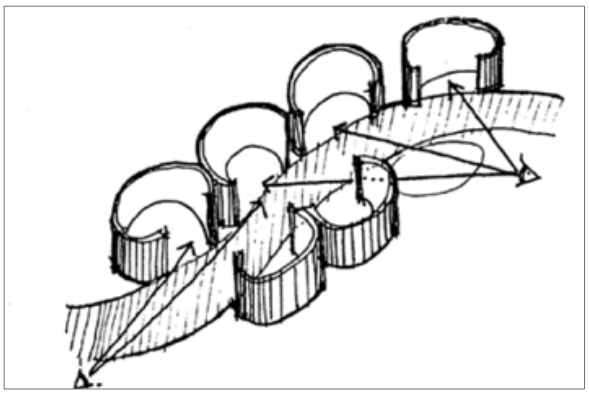
Hutchison (2004) also underlines that the design of educational facilities had been usually incorporated clear and recognizable areas, each of which served a single purpose; however, multipurpose strategies can be applied to compatible spaces, and the under-utilized areas of schools to support expandability. For instance, the library and computer laboratory spaces may be combined to obtain a research space. Similarly, the auditorium area, which is only used for specific occasions may be allocated together with the cafeteria to form a 'cafetorium' which will constitute a flexible, multi-use space that can be used either as a theatre or dining area.

In their paper Sigurðardóttir and Hjartarson (2011) examine the changes in the design of

school buildings in Iceland and suggest that there is a shift from conventional settings to more open and flexible environments. The authors (2011) present cases from Icelandic schools to discuss transparency and fluid boundaries between diverse stages of school practice including the central hall and the school library, as well as specialized program areas such as art and science rooms. The paper also describes how central multi-functional community halls may be used efficiently to accommodate different functions such as serving as a canteen with removable furniture on a daily basis, a hall for social learning and cultural events, a gallery for exhibitions and sometimes even an open plan school library and also facilities to read aloud and tell stories; work in groups; play cards, board games and chess; or make use of a computer laboratory with an array of digital tools for individual studies, as well as varied project work.

On the other side of the discussions, Moore and Lackney (1994) claim that clear circulation paths and super-visible corridors are critical issues to avoid vandalism and providing safety. The authors (1994) acclaim the planning of circulation zones to be used as social breakout spaces, however they point out that the circulation paths should be cleared of visually obstructing objects to facilitate effective supervision when possible. Yet, their proposal for super-visible circulation paths still enhances the cluster zones for informal learning activities and social interaction as shown through the sketch in Figure 4.18. In addition to the concerns for safety, Heppell, et al. (2004) also remind that providing a balance between flexibility and specificity with regard to particular subjects should be carefully managed.

Figure 4.18: Diagram showing the circulation paths proposed by Moore and Lackney (1994)



Source: Moore and Lackney, 1994, p. 52.

As a general idea, the main contribution of a flexible design approach within the spaces outside classrooms at schools is that the whole school environment is aimed to complement the learning processes rather than the viewing of classrooms as primarily instructional spaces.

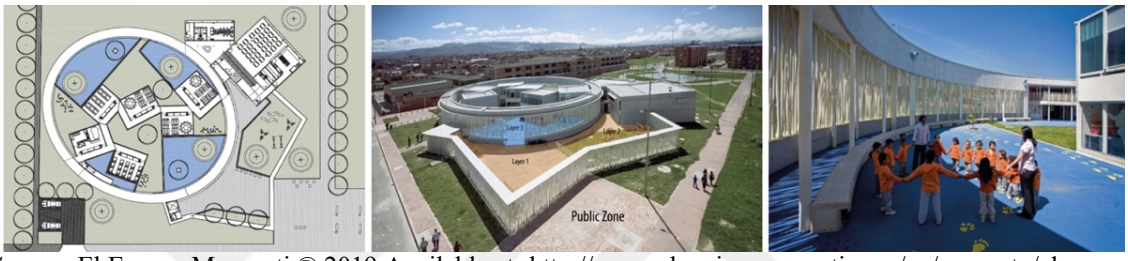
4.3.2 Indoor - Outdoor Relations to Allow Versatility and Fluidity

The setting of indoor-outdoor relations to extend the space for learning at schools and the design of versatile and dynamic outdoor spaces where children can choose, create, change and be in charge of their play environment have been proposed in many studies regarding flexibility. Formation of penetrable visual and physical boundaries between and within the indoor and outdoor spaces at schools to support fluidity in space in terms of movement and sight is also a common feature mentioned by many sources regarding flexible design.

Providing children opportunities to have contact with nature is mentioned to be vital to carry the learning activities to the outdoors through practice and observation. Besides, school surroundings together with school buildings and building systems may be useful resources and pedagogical tools for teaching and fostering inquiry-based learning (Heppell, et al. 2004). Moreover, as also suggested by Care and Chiles (2006) during the playtimes children usually use almost every part, corner and niche of the school grounds however without stimulating environments which urges them to explore, children's expression is limited. Moreover, sources have indicated that there is a positive relationship between physical activity and academic achievement where physical inactivity is often negatively associated with brain activity (Woodman 2016). Thus, physical human movement has been affirmed to be important for learning processes and academic achievement. Nair and Gehling (2010) emphasize that if students are expected to move, play and socialize in the outside, then there should be spaces such as places to sit and chat and eat in small groups, sheltered areas if the climate requires that support social development. Creating internal and external informal learning spaces at schools and allowing direct access to these spaces from classrooms are associated with higher flexibility to cater dynamics in education (Pereira, Kowaltowski and Deliberador 2018). Regarding these concerns, Genevro (1990), for instance, points out that a layout in which the classrooms are situated to open both to each other and the indoor and outdoor play areas may increase flexibility.

The guidelines provided by RIBA emphasizes that giving place to extendable linear cloisters and learning clusters (clusters of classes), including indoor courtyards and outdoor classrooms to extend the spaces for learning activities are prominent methods of supporting flexibility (Heppell, et al. 2004). Evans (2015) gives the example of the Jardin El Porvenir Kindergarten's layout which creates a variety of landscapes with different material features for play on both sides of its closed boundaries as shown in Figure 4.19. The multi-layered perimeter walls of the school constitute permeable boundaries between varying zones of functions and privacy while acting as security.

Figure 4.19: Site plan and photographs showing the formation of different zones in Jardin El Porvenir Kindergarten



Source: El Equipo Mazzanti ® 2019 Available at: http://www.elequipomazzanti.com/en/proyecto/el-porvenir-kindergarten/ (accessed 9 August 2019).

The design of the visual borders with clear viewing angles and transparency both inside and outside, and setting a visual interplay between these areas have also been discussed as an important aspect of flexible design approach (Day and Midbjer 2007, Karabey 2014, Sigurðardóttir and Hjartarson 2011). Taylor (2009) claims that classrooms should be opened up through fenestration and semi-open plans so that children can make visual connections between different learning activities and see how their actions impact others, reinforcing personal responsibility and self-reliance.

Care (2015) underlines that the blurring of boundaries may also reinforce broadening the learning to the landscape beyond. In many studies, it is widely recognized that outdoor experiences have a great significance to children. Providing students opportunities to have contact with nature becomes beneficial to introduce children learning through practice and observation in the outdoors. The formation of penetrable boundaries has a role at this point which may be achieved through various ways such as placing open or semi-closed courtyards to the plan according to the climatic conditions, giving direct access to the outdoor landscape from each separate classroom or providing transparency with large openings. Nair and Fielding (2005) claim that the outdoor spaces and interior

courtyards should become natural extensions of indoor learning and inside-outside connections should be strong and seamless. Hertzberger (2008) points out that the surface areas of schools have been usually and invariably kept to an absolute minimum and most of the green space around them stay as just largely inaccessible visual greenery. The school grounds, in fact, can provide a valuable learning environment and set of learning experiences which can support all areas of the curriculum as well as contributing to the social development and health of children (Harrison and Hutton 2014). Day and Midjber (2007) also point out the importance of introducing children with nature and giving responsibilities in gardening activities to change children's attitude towards nature change from the user to appreciator.

4.3.3 Flexibility in Mobile Building Components and Furniture Scale

Ensuring flexibility through incorporation of mobile components such as movable walls, folding partitions, lightweight furniture and equipment which can be quickly re-organized to fit in different spaces for different purposes is a common strategy cited by many studies. To achieve this aim, learning spaces are constructed to be capable of quick reconfiguration to support different kinds of approaches and uses at schools (Dudek 2007, Loeffelman 2007, Oblinger and Lippincott 2006). This type of flexibility mostly allows users to change the space themselves or the design of the space allows users a variety of learning methods and activities (Nair and Fielding 2005).

Much of the literature focuses on furniture design and several classroom settings seeking to find ideal patterns and designs characterized by flexibility and mobility of structures, the grouping of desks, computer pods and display boards to facilitate multimodal pedagogies that accommodate individual learner's needs, and personalization of space (Blackmore, et al. 2011). The different types of configurations to be accommodated by learning spaces may include linear (lecture, presentation), horizontal (class discussion), cluster (small group discussion and activities), and networks for decentralized instruction (Neill and Etheridge 2008).

Utilization of movable, modular, operable space dividers and partitions in response to short-term and long-term changes has been cited by numerous studies emphasizing its positive contribution to modifiability and adaptability (Karabey 2014, Kemp 2015, Nair

and Fielding 2005, Neill and Etheridge 2008, Sigurðardóttir and Hjartarson 2011, Woodman 2016). Sliding screens are typically used to subdivide large multi-purpose spaces across their width into smaller units to meet a demand for flexible space. According to Neill and Etheridge (2008), a flexible learning space needs to facilitate a physical space shift from fixed seating where furniture can sometimes be repositioned to change the configuration for diverse learning activities. The reorganizability of furniture layout has also been mentioned to be important because it has the potential to communicate the intensity of interaction between teacher and students and among learners (Sztejnbergand Finch, 2006). The empirical study conducted by Sztejnberg and Finch (2006) proves that there is an intimate relationship between teaching style, learning style, and the adaptive use of space as well as the preferences for different learning environments. Regarding the issue, taking the advantage of using adjustable furniture to enhance flexibility and to increase comfort and wellbeing are mentioned in different studies (Neill and Etheridge 2008). Holder (2015) remarks that furniture can work to divide larger spaces and create a hierarchy of uses or experiences within an open plan as well as making spaces feel distinct. The author (2015) also mentions the potential variety in how a piece of particular furniture is used giving the example of storage units used as working desks at the same time. Woolner (2010) discusses flexibility in terms of teachers' abilities to rearrange the furniture which may be time-consuming during or before the lessons. As an alternative proposal, the author (2010) gives the example of a different model for primary school classrooms in which most of the furniture is moved out and a carpet floor space with mats and cushions is created at the center, so that different educational activities may be performed within the space.

4.4 FLEXIBLE DESIGN FEATURES TO RESPOND LONG-TERM CHANGES

Demographic changes at schools due to increases in population rates, the influx of immigrants into urban centers, and ever-changing patterns of human migration between communities usually lead to difficulties in making long-term enrolment projections (Hutchison 2004). Changes in the curriculum or the whole educational system are some of the other reasons for the need for significant transformations in school buildings. Thus, planning the school structure to maintain future expandability and to cope with other changes become critical concerns. Moreover, increasing flexibility for long-term change is also linked with achieving sustainability.

Flexible design approaches in response to long-term sources of changes often include strategies that allow future building alterations. Convertibility, transformability, adaptability, and scalability, which usually refer to the capacity of physical adjustments in buildings to meet changing circumstances, are the common strategies to serve long-term changes. Adapting educational spaces for new uses and planning of school buildings with the recognition of their possible transformation along with the changing requirements may be listed as some of the common aims of long-term flexibility (Monahan 2002, Oblinger and Lippincott 2006, Shabha 1993, Woodman 2016).
In an earlier study, Castaldi (1994) defines the term flexibility as the feature of a school facility which allows extensive changes in the space and the size of the instructional areas without threatening the structural system of the building. Also, OECD suggests that a certain degree of flexibility should be provided in all construction methods to allow changes in the configuration of learning spaces for daily school activities, and to accommodate future operational and pedagogical changes (Heppell, et al. 2004). Dudek (2007) asserts that long- term flexibility may be achieved through clear planning hierarchies allowing future expansion, generous space standards and robust construction.

Planning of the building structure to enhance different teaching programs and philosophies, loose-fit buildings and independence of structural components (Heppell, et al. 2004, Shabha 1993), minimizing fixed partitions and fittings (Nair 2011, Nair and Fielding 2005), building of units with a modular approach to be added or removed according to changes in student enrollments, categorization of fixed and semi-fixed components of learning spaces in relation to mobility and density connected with the amount of space per learner (Martin 2005) and providing technical facilities with an awareness of evolving technology (Benade 2017) are some other approaches and methods mentioned to enhance long-term flexibility.

Shabha (1993) claims that by designing a loose-fit school building, it is very likely that the problems of both predictable and unforeseeable change can be resolved more effectively without the need for rebuilding. The author (1993) claims that independence of structural building elements is an influential variable to promote flexibility through the addition and removal of partitions in order to provide the required degree of variety and to modify the spatial layout of school buildings as the need arises. As a general idea, flexible design strategies to respond to long-term requirements primarily aim to deal with

functional obsolescence while maintaining ease in alterations to cope with changing conditions.

4.5 CATEGORIZATION OF THEMES RELATED TO FLEXIBLE DESIGN IN EDUCATIONAL SPACES

As it may be inferred from the examples in the literature, the term 'flexible learning space' does not necessarily specify a particular spatial typology, but instead refers to the changeable, adaptable nature of the physical spaces. The methods and strategies for flexibility within the context of learning space design are intended to support the adaptable delivery of the current and future needs of educational practices.

According to the review of the literature, flexible design methods and solutions may be grouped under the four themes determined as; flexible spatial layout and configuration, permeable and active indoor-outdoor spatial relations, modifiability and flexibility in mobile building components and furniture scale, and the design of the educational structures for future expandability and alterations as presented in Table 4.2.
It should be emphasized that in addition to the themes presented in the table, there is another social dimension of flexibility regarding users' interaction with the educational spaces and personalization. Following an extensive exploration of a new environment, individuals tend to manipulate or adapt the designed spaces to suit their needs (Woodman 2016). Burke and Grosvenor (2008) claim that schools are the products of social behavior and they should not be viewed merely as capsules in which education is located, but also as designed spaces that project a system of values. As also stated by Kuuskorpi and González (2011), change cannot occur without input from the primary groups of users at schools, which consists of teachers and students. Meaning and significance can be applied to a place through the adaptation of an environment to satisfy the specific needs; consequently, the ways in which the buildings are used and experienced give them meaning. Moreover, the theoretical concept of what makes a good school building may not always be matching up with the users' experiences and expectations.

The following phase of the study also constructs an analysis and discussion of the flexible approaches for state primary level schools in Turkey, specifying the subject to a local context in line with the main themes determined and presented as shown in the table below.

Table 4.2: The juxtaposition of the time-based categorization and flexible design strategies and solutions grouped under four primary themes

TIME-BASED CATEGORIZATION	THEMES	FLEXIBLE DESIGN STRATEGIES AND SOLUTIONS	REFERENCES
SHORT-TERM (in response to changes in use patterns and movement) Versatility Polyvalence Modifiability Customization Fluidity	**Flexible Spatial Layout and Configuration**	Modified open plan approaches providing a variety of well-defined activity pockets	Dovey and Fisher 2014, Moore and Lackney 1994, Nair 2014, Perkins 2001
		Increasing openness with children's age	Fisher 2007
		Creating spaces in varying sizes	Chiles 2015a, Genevro 1990, Nair 2014
		Creating spaces in varying enclosure and types	Chiles 2015a, Ehrenkrantz 1999, Genevro 1990, Nair 2014, Perkins 2001
		Articulated classroom, L-shaped learning studio, different activity pockets within classrooms	Hertzberger 2008, Lippman 2004, Moore and Lackney 1994, Nair dand Fielding 2005.
		Grade unit method	Nair and Fielding 2005
		Learning streets, utilizing circulation zones to extend spaces for learning activities, controllable circulation zones	Chiles 2015b, Hertzberger 2008, Moore and Lackney 1994, Nair and Gehling 2010, Shabha 1993
		Creating informal multi-purpose settings and informal learning clusters	Doveyand Fisher 2014, Heppell, et al., 2004, Hertzberger 2008, Sigur›ardóttir and Hjartarson 2011
		Multi-functional stairs	Hertzberger 2008, Kemp 2015
		Multi-functional atrium	Kemp 2015, Sigurardóttirand Hjartarson 2011
		Flexible design to accommodate new technologies, Technology-enabled, active learning environments	Bannister 2017, Fisher 2007, Kuuskorpiand González 2011, Loeffelman 2007, Neilland Etheridge 2008
	Permeable and Strong Indoor - Outdoor Spatial Relations	Setting up permeable physical boundaries, providing easy access between spaces	Genevro 1990, Nair and Fielding 2005, Sigurðardóttir and Hjartarson 2011, Taylor 2009
		Setting up permeable visual boundaries	Day and Midbjer 2007, Sigurðardóttir and Hjartarson 2011, Taylor 2009
		Providing variance of learning settings, play areas outside	Heppell, et al., 2004, Nair and Gehling 2010, Pereira, Kowaltowski and Deliberador 2018
		Extending the learning activities to the outdoors and interior courtyards, giving access to nature	Heppell, et al., 2004, Day and Midbjer 2007, Harrison and Hutton 2013, Hertzberger, 2008, Nair andFielding 2005,
	Modifiable Learning Spaces: Flexibility in Mobile Building Components and Furniture Scale	Use of movable partitions, space dividers	Karabey 2004, Kemp 2015, Nair and Fielding 2005, Neill and Etheridge 2008, Sigurðardóttir and Hjartarson 2011, Woodman 2016
		Use of mobile and lightweight furniture, adjustable furniture and fixtures, modifiable furniture	Holder 2015, Neill and Etheridge 2008; Sztejnberg and Finch 2006, Wall 2016, Woolner, 2010
		Shape of the separate spaces to allow reorganization	Dudek 2007, Woolner 2010
LONG-TERM (time and space) Convertibility Transformability Adaptability Scaleability	**Design for Future Expandability and Alterations**	Loose-fit school buildings Independence of structural components/ minimizing fixed partitions and fittings	Benade 2017, Martin 2002, Heppell, et al. 2004, Shabha 1993, Nair and Fielding 2005

5. ANALYSIS OF THE SPATIAL USE PATTERNS AND THE SOURCES OF CHANGE: A STUDY IN BAYRAMPAŞA PRIMARY SCHOOLS

Prior research and evidence suggest that there is a close relation of educational practices with the design of the built environment, which accommodates them (Barrett, et al. 2015, Heppell, et al. 2004, Leiringer and Cardellino 2011, Martin 2005). It is also emphasized in many sources that flexibility as an architectural means to support educational activities may only be successful if it overlaps with the spatial requirements of the pedagogical methods and learning practices it serves for (Moore and Lackney 1994, Neill and Etheridge 2008, Wood 2018). It means that the underlying specific needs of local contexts and educational systems may have a role in how the priorities are defined. The educators' and students' interaction with the environment has also been pointed out as critical aspects of the optimization of learning spaces in terms of flexible design (Shabha 1993, Wood 2018).

Thus, an examination of the relations between educational methods, learning activities, and the physical space emerges as a necessity to come up with the appropriate suggestions regarding flexibility. In order to provide design solutions it is needed to first understand the requirements of the learning processes and primary sources of change in short and long-term periods at schools. Learning about first-hand experiences about the spatial use patterns at schools would bring valuable insights into the formation of efficient strategies to achieve flexibility.

Searching for complying methods to provide flexibility for primary school buildings in Turkey constitutes the main focus of this thesis study. Accordingly, identification of the sources of changes in spatial requirements regarding time, use, and movement, as well as the comprehension of the spatial use patterns, were determined as the initial steps. An exploratory, two-phased, mixed- methods research process was adopted to collect the required information. The following sections within the chapter explain the methodology of the research.

The first phase of the field study aimed to collect the opinions of teachers who are one of the main user groups at state governed primary schools located in Istanbul, which were designed through a prototype-based approach similar to most of the public schools in

Turkey. The interpretations of teaching staff who take the legitimized decisive role in coordinating educational activities at schools can contribute with valuable data about the spatial needs and requirements at schools. Besides their legitimate power to control educational activities, findings of some studies show that teachers often have the chance to readily action for many factors regarding the environment and spatial use at schools (Barrett, et al. 2015). Thus, within the first phase, a survey was conducted with the teachers to gather information about the sources that lead to changes in spatial requirements. Teachers were asked about the current use patterns at schools in terms of relations between the educational activities conducted according to the curriculum, extracurricular studies, recess period activities, and space.

The second phase of the study included the analysis of the school buildings through the documentation of the functional changes in spaces, spatial alterations made by the users, and current use patterns during the school visits. Additional required data, including some technical drawings, statistical information, regulations about school design defined by the related authorities were provided from the sources of official institutions. This second phase of the study aimed to compare and evaluate the data obtained from the first strand from a designer's point of view.

The results of the two phases obtained through the analyses were then interpreted and taken as a reference in the formation of alternative design strategies for primary schools within a flexible design framework in the final part of the thesis study.

5.1 METHODOLOGY OF THE RESEARCH

The following section explains the methodology followed through the two phases of the study and presents the research questions, data collection procedures, sampling strategies, and gives information about the typology of the schools visited within the study.

The first phase of the research focuses on users' opinions about current issues regarding spatial use. The second phase includes the interpretation of the data obtained through observations, photography, and examination of the technical documents. Research questions, data collection procedures, selection of the research site, sampling strategies, and data analysis procedures are presented in detail throughout the section.

5.1.1 Data Collection Procedures

The inquiry followed an exploratory and mixed-method research approach, which involved collecting and integrating both quantitative and qualitative forms of data. Thus, the process included multiple ways of text analysis and statistical techniques. Many researchers have recognized the benefits of using qualitative and quantitative methods together in the same study. Tashakkori and Teddlie (2009), for instance, point out the flexibility to use both qualitative and quantitative approaches allowing research questions in the most effective manner. According to Krathwohl (1998), the combination of multiple research methods through employing a hybrid, with different aspects of each, has a significant role in strengthening a study and compensating limitations and faults that may result from choosing one method over other.

Similarly, Cresswell (1994) emphasizes that to have a better understanding of the concept being tested or explored, it is beneficial to combine methods and to integrate the paradigms at several phases of the research process. Multi-method strategies may enter into one or multiple stages of the research process (Brannen 2005). For this study, also, various methods were employed in data collection, analysis of data, as well as interpretation and contextualization.

5.1.1.1 Survey Among the Teaching Staff

The first phase of the study included a survey conducted with the teachers. The regulations of the Ministry allow questions to be responded only in a written format; therefore, the required permissions were obtained accordingly. In order to not limit the respondents' articulation of their comments or skip ideas and remarks, they were expected to answer open-ended questions with their own words in most parts of the survey. The benefits of similar processes have been mentioned in some earlier studies (Brannen 2005).

The aim of the first part of the field study was to understand the sources of change in spatial requirements, and the relations between the educational activities and space within the present educational system. Accordingly, the first research question intended to be responded to within the scope of the first phase of the field study was, "What are the primary sources of the need for spatial changes at primary schools ?". The question aimed to identify whether the sources of the need for spatial changes are caused by time, use, or

movement-related issues and which types of situations become prominent to require spatial changes according to the opinions of the educators.

The second research question was, “How do educational activities and learning processes relate to the spatial features of the existing physical environment at primary schools?”. To answer this question, teachers were asked about the methods they use to conduct the lessons, the features of their classroom in terms of their ability to support educational activities, the changes they make regarding spatial use, the spaces they prefer to conduct the educational activities, and outdoor space use during the lessons.

The third research question was, “Which positive spatial features do the qualified learning spaces possess according to teachers’ interpretations?” Within the survey, teachers were asked to describe the positive features of a physical learning environment based on their past experiences and observations in learning settings, which they think are qualified in terms of supporting educational activities and respond to children’s needs.

The fourth research question was, " How do the children's activities during the recess and free times relate to spatial features of the physical environment at primary schools?". Adopting the viewpoint suggesting that recess periods may also benefit the learning processes (Waite-Stupiansky and Findlay 2002), the research aimed to understand the nature of children's activities and social interaction to make further interpretations of the spatial requirements of these activities. Teachers were asked to describe the students' actions during the recess periods based on their observations.

The fifth and the final research question aimed to be answered through the survey was, “Is there a relationship between the design qualities of the physical environment and academic motivation, according to teacher’s opinions?”. Accordingly, teachers were asked to describe their opinions about the impact of spatial design features on both children’s academic motivation and interest, as well as their own motivation.

5.1.1.2 Observations During School Visits and Examination of School Projects

For the second phase of the study, the information about the physical alterations, additions, and other functional changes conducted in the school buildings has been gained

from the administrative staff and marked on plans drawings. The spaces currently available for use and access of the students have also been marked on the plan drawings. The non-standard areas offered, organized, or built by the school administration to support informal learning and out of classroom activities have also been recorded through photographs.

5.1.2 Research Area: Bayrampaşa

The official statistics show that Istanbul, in parallel with its population, has the most significant number of primary schools and the highest rates of student enrollments in Turkey. School construction processes are highly active in the city in which new school buildings have been added, and many existing ones have been rebuilt or refurbished, especially during the last twenty years. The thesis aimed to focus on schools that are located in crowded urban centers and often subjected to rebuilding or modifications due to the changes in the system and complying with the high enrollment rates. It was also assumed that the most challenging cases were the schools built in dense, central urban districts with high population rates to serve large numbers of students within narrow spaces.

For the school visits, it was also aimed to reach a diverse sample of schools in terms of typology, which were constructed according to the prototype projects produced, or approved by the Ministry and located in the same area, in Istanbul. Another concern of the sampling was, including a selection of more recent examples of prototype-based school projects, preferably applied several times in other areas of the city. Bayrampaşa district has emerged as a proper example to respond to the concerns for sampling. Accordingly, the required permissions from the Ministry of National Education were obtained to conduct the study in the district.

Bayrampaşa is one of the relatively old urban settlements located near the city center. According to the sources, the residential population started increasing in the district after the opening of many factories during the 1950s, along with the settlement of migrants who came from Anatolia for work opportunities. The region had also been a common area for the settlement of Balkan migrants during different periods. The current population of the district is 270.000, and the number of primary school students is

approximately 18.000, according to the official data[21]. The statistical data regarding the the number of students attending each state school is over one thousand in most cases, which indicates the density of the schools[22].

5.1.3 School Building Typologies

Bayrampaşa accommodates a variety of primary school building types, complying with the concerns of the sampling strategy. The 15 out of a total number of 16 primary schools are state-governed, purpose-built institutions. The schools which have been constructed according to the prototype-based projects constitute a significant part of the educational building stock in Turkey. Recognizing the fact that the construction of privately owned primary schools is developed and financed through different mechanisms, this research has focused on state-governed primary schools and all of the fifteen state schools were visited during the field study.

The primary schools included in the sample have been built or rebuilt according to earthquake regulations after the year 2000, which became a milestone for the need and increase of new prototype-based school project proposals. The buildings had physically distinct sites with clear boundary conditions as well as dedicated outdoor and indoor facilities. The sample included seven different types of school projects approved by the Ministry, and some of them have been frequently applied in the other regions of the city and the country. Three of the fifteen school buildings were specially designed projects within the scope of the ISMEP.

The prototype-based school projects produced by the Ministry are generally described and named referring to the number of classrooms they include within. Despite some modest differences, the plan layouts were almost similar with double-loaded corridors with conventionally designed identical rectangular-shaped classrooms and administrative

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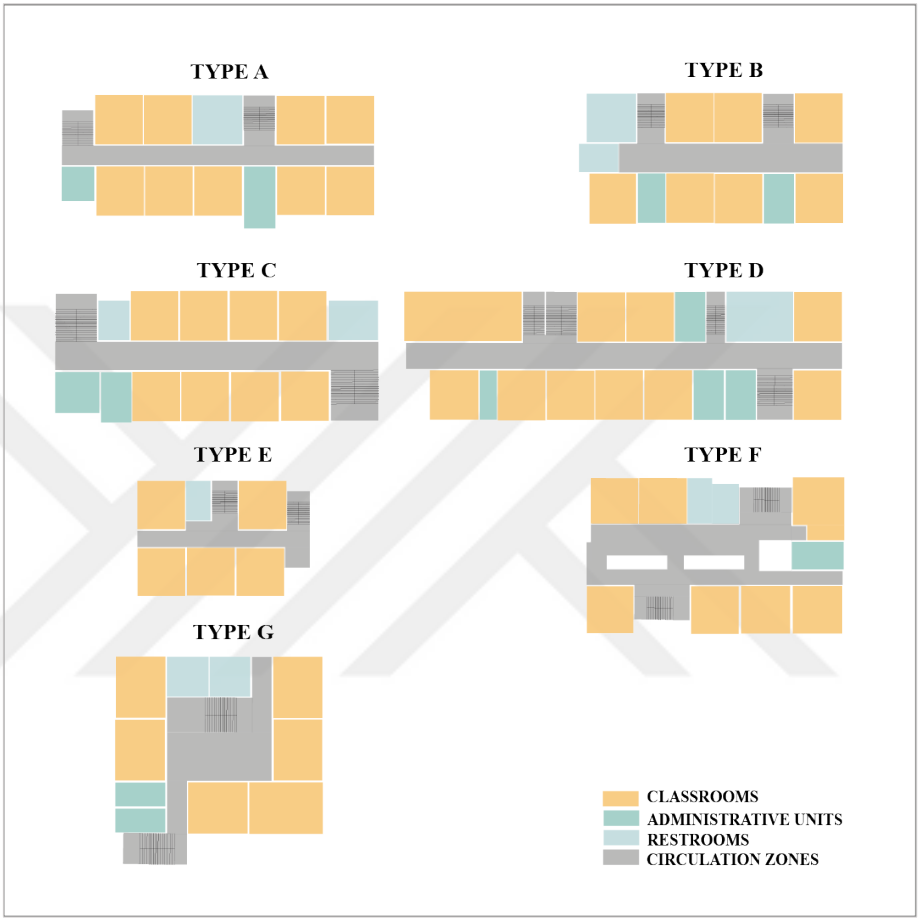
[21] Bayrampaşa İlçe Milli Eğitim Müdürlüğü, 2015. *Bayrampaşa İlçe Milli Eğitim Müdürlüğü Stratejik Planı* 2015-2019. Available at: https://bayrampasa.meb.gov.tr/meb_iys_dosyalar/2015_12/16113723_pl.pdf (accessed 22 September 2019).

[22] The number of students attending each school are presented in Appendix 9.

spaces on either side as presented in Figure 5.1. In Type A, B, C, D projects, it may be noted that the minor differences are the changes in the number of classrooms, and locations of other supporting units between the rows of classroom units in the typical floor plan layout.

Figure 5.1: Diagrams showing of the typical floor layouts of the schools



The dimensions of all the regular classrooms were similar, with areas approximately 49-meter squares in size (width= 7 meters, length= 7 meters). The medium-height buildings consist of two to a maximum of four floors. Indeed, the Ministry of National Education offers a similar design approach in the latest catalog of the prototype school projects[23]. Therefore, for the inquiry, it was assumed that the schools in the selected area were also quite representative of the current approach to school building projects located in high-density urban centers in Turkey.

[23] Milli Eğitim Bakanlığı, 2016b.

5.1.4 Sampling Strategy

All of the primary schools located in the district have been visited, and 144 of a total number of 370 primary school teachers agreed to participate in the survey phase of the study. The full list of the school types, project years and the number of participants from each school are given in Appendix A.1. The teachers were first asked to specify their years of experience in teaching and years of working in their current school and the number of students in their current classroom to be used for further analysis. For each individual case, it was ensured that the respondent had experience as a primary school teacher, and had worked in the same institution for more than one year to have time to observe the use patterns at each visited school.

5.1.5 Survey Questions and Data Analysis Procedures for the Survey Part

The survey conducted with the teaching staff included a few number of multiple-choice and Likert-scale questions in addition to open-ended questions which constituted the main part as presented in Appendix A.2. In line to the research questions presented in the prior section 5.1.1.1, the questions were grouped under five main titles according to issues they aim to address. The main titles under which the questions were grouped emerged as:

i. Opinions regarding the sources of change in spatial requirements,
ii. Assessments on the spatial features of qualified learning spaces,
iii. Information regarding the spatial use patterns during the lessons,
iv. Details regarding the activity patterns during the recess periods,
v. Opinions about the impact of spatial design quality on academic motivation.

As the main data analysis method for the survey part, Fuzzy Analytic Hierarchical Process (F-AHP) has been utilized for the analysis of the responses to the open-ended questions; Descriptive statistics, multiple response analysis, and t-tests have been applied for the interpretations of the answers to the other questions.

The analysis of the responses to the open-ended questions constituted a critical part of the survey outputs. These questions focused on the primary concerns of the thesis to explore the sources of the need for spatial change at schools and to determine teachers' descriptions of the features of the qualified learning spaces. This type of data is often

evaluated through frequency and content analyses in which the information is summarized and interpreted according to the pre-determined theme sets. In this case, a more accurate method had been sought to define the factors derived from the written answers in a detailed order according to their significance by converting the qualitative data to quantitative. As a result, an alternative criteria decision-making method based on the fuzzy-set theory, Fuzzy Analytic Hierarchy Process (F-AHP) was found to be appropriate for the determination of factors, and understanding of the hierarchical order between the themes and categories under each item.

Analytic Hierarchy Process (AHP) may be basically defined as a multi-criteria decision-making method that helps to make decisions facing a complex problem with multiple conflicting and subjective criteria. It is usually used to derive ratio scales from paired comparisons in multilevel hierarchic structures, and the method has been successfully applied within the research in social sciences to quantify and obtain measurements for intangibles (Saaty and Vargas 2012). In other words, it is designed to cope with both the rational and the intuitive to select the best from a number of alternatives evaluated with respect to several criteria. In this study, the Fuzzy Analytic Hierarchy method was used. The advantage of following this method became the increasing of the reliability of the analysis through determining the individual impact of each factor for all valid responses separately, rather than coding the answers with only "1-mentioned" or "0-not mentioned" numbers to calculate frequencies.

As a first step, to analyze the responses to the open-ended questions, the answers of the teachers were assigned into categories under themes in a parallel approach to the similar categorizations given in the relevant literature on school design considerations. As a second step, each respondent's answers were coded under the defined categories, and a set of data showing the frequencies for each category was obtained. This type of data sets is defined as crisp sets, in which an element is either a member of a set or not. F-AHP process was applied to the analysis of the open-ended responses to questions 5, 6, 12,16. The answers that teachers gave to the open-ended questions, and attained codes to each response are presented in Appendix A.3 Table 1, Appendix A.4 Table 1, Appendix A.5 Table 5, and Appendix A.6 Table 2.

Within the third step, fuzzy sets from the responses were produced. As defined by Zadeh (1965), a fuzzy set is "a class of objects with a continuum of grades of membership." Fuzzy-sets are extensions of the classical crisp-sets; however, they differ from the crisp sets by including elements with degrees of membership. In crisp sets, an element has only two options that it either belongs or does not belong to a particular set. For example, an answer to a question having only two options such as "yes" or "no" could be qualified as a member of a crisp set because it is either a member of a "yes" set or a member of "no" set. Differently, in fuzzy-sets, an element belongs to a set for a certain degree, which is specified by the fuzzy membership function. This function defines the membership degrees from the real unit interval so that an element may belong to a set at a degree from the [0, 1] range. For instance, a person at age 40 could be a member of young people set with a fuzzy degree of 0.7 and also could be a member of older adults set with a fuzzy degree of 0.3. If crisp-sets are used instead, this person either should be a member of young people or a member of older people, which may lead to some information loss about this person's age situation.

To derive the fuzzy-set in the case of teachers' responses, first, the linguistic terms were scaled according to the level of importance determined according to their frequencies. The scales used were defined as just equal, equally important, weakly more important and strongly more important. Analytic Hierarchy Process (AHP) realizes pair-wise comparisons between categories which are affecting a decision. However, usually, categories in an AHP have some interval judgments instead of fixed value judgments due to the fuzzy nature of the data input (Demirel, Demirel and Kahraman 2008). Chang (1996) uses triangular fuzzy numbers for pair-wise comparisons of AHP to deal with this fuzziness. Teachers' responses with written expressions became suitable for Fuzzy- AHP method because they had fuzziness at some extent. For this reason, Chang's (1996) F-AHP methodology was applied to the data, and the hierarchical order between the themes and categories was obtained. The same methodology was used for the responses to other open-ended questions with a similar structure. The method allowed putting the relevant issues obtained from teachers' open responses in an accurate hierarchical order according to their significance.

5.2 RESULTS AND INTERPRETATION OF THE SURVEY DATA

The results obtained from the analysis of the survey responses and their interpretations categorized under the main titles of question groups are presented within the below sections.

5.2.1 Opinions Regarding the Sources of Change in Spatial Requirements

The first part of the analysis was conducted to comprehend the teachers' opinions about the common sources that lead to changes in spatial requirements at primary schools and to classify these sources according to their significance. Teachers were asked "What do you think are the most important issues that constitute the sources of the need for spatial changes in the short or long term at school?". 144 valid written claims were obtained in response to the question. Each respondent's answer was then coded under categories, and the crisp set was obtained through the count of frequencies of responses. The order of categories obtained from the crisp-set is presented in Table 5.1. The defined categories were summarized under seven themes. The results are also expressed by the packed-bubble graph as given in Figure 5.2, in which the dominant factors are shown in larger circular areas in proportion to their frequencies. The group of categories emerged under each theme are depicted through the use of same color code in the graphic representation. The table and the packed-bubble graph express the response frequency of each category before the F-AHP process was applied.

Table 5.1: The order of 7 themes and 36 categories according to the frequencies of responses

DESCRIPTION AND ORDER OF THE THEMES *

Sources leading the changes in spatial requirements in relation to ...

- **A.** Supporting different spatial needs of educational activities and methods
- **B.** Providing space for informal learning and engaging recess period activities
- **C.** Supporting children's development and academic motivation
- **D.** Requirements caused by spatial dimensions and qualities
- **E.** Increasing numbers of students and density
- **F.** Concerns for indoor environmental quality and other technical qualities
- **G.** Changes in the educational system, curriculum and safety concerns

ORDER OF CATEGORIES ACCORDING TO RESPONSE FREQUENCY

- **1.** Providing space for sports and physical activities
- **2.** Changes in the number of students enrolled
- **3.** Need for using other spaces at school during lessons according to the course subjects
- **4.** Providing space for play and movement needs
- **5.** Needs related to outdoor space and school garden use
- **6.** Need for space/a laboratory for science lessons
- **7.** Providing space for plastic arts lessons
- **8.** Providing space for social activities and additional courses
- **9.** Improving the design of spaces to allow different educational activities and methods
- **10.** Providing space for music lessons
- **11.** Allowing changes in furniture layout and classroom organization
- **12.** Providing space for reading and individual studies
- **13.** Improvement of spatial design to increase children's attention and motivation
- **14.** Inadequate number of standard classrooms
- **15.** Inadequate sizes of standard classrooms and learning spaces
- **16.** Improving the selection of color choices in learning spaces
- **17.** Need for a multi-purpose space with a stage for drama activities
- **18.** Improving the social areas, common informal spaces for break-out times
- **19.** Creating opportunities to conduct the lessons outside the school
- **20.** Providing greenery and natural elements in outdoor environment
- **21.** Improving the school design according to age and classroom-level differences
- **22.** Need for changes emerged due to the conversion of half-day education to full-day period
- **23.** Quality of the overall design according to children's needs
- **24.** Need for a computer laboratory
- **25.** Need for space for foreign language lessons
- **26.** Providing variety of spaces for educational activities
- **27.** Providing space for the exhibition of student works
- **28.** Improving heating, cooling, ventilation
- **29.** Providing space for children's self-expression needs
- **30.** Providing general accessibility
- **31.** Improving lighting qualities
- **32.** Providing space for observation and experimentation
- **33.** Need of changes in response to safety needs
- **34.** Providing comfort
- **35.** Improving acoustic qualities and noise control
- **36.** Improving the accessibility of technological features and equipment

*The themes have been defined according to the answers of 144 primary school teachers.
N number (542) is greater than the sampling size. Each theme and the categories under that theme are represented through the same color.
Theme A: Theme B: Theme C: Theme D: Theme E: Theme F: Theme G:

Figure 5.2: Packed bubble diagram developed according to the frequencies of the Responses

* The themes have been defined according to the answers of 144 primary school teachers. The packed bubble graph expresses the response frequencies of each category. N number (542) is greater than the sampling size.

The main themes regarding the emergence of spatial requirements obtained from the teachers' responses and ordered according to their significance emerged as;

a. Supporting different spatial needs of educational activities and methods,
b. Providing space for informal learning, engaging recess periods, and socialization,

c. Supporting children's psychological, cognitive and physical development and academic motivation,
d. Requirements emerging due to the inadequacy of spatial dimensions and qualities,
e. Requirements brought by the increasing number of students and crowdedness,
f. Requirements related to indoor environmental quality and other technical qualities,
g. Requirements caused by the adjustments in the educational system, changes in the curriculum and safety concerns.

To derive the fuzzy-set in the case of teachers' responses, the linguistic terms were scaled according to the level of importance determined in line with their frequencies. The scales used were defined as just equal, equally important, weakly more important and strongly more important. Table 5.2 shows the hierarchical order between the main themes according to their weights obtained by the application of Chang's (1996) Fuzzy-AHP methodology to the data. Through the use of Fuzzy-AHP method, it became possible to obtain a more accurate hierarchy between the factors, where the differences between responses which point out multiple categories and the ones which emphasize a single category are included within the analysis.

Table 5.2: Hierarchical order between the main themes (According to the F- AHP Process Results)

Themes	Fuzzy AHP Weight
A. Spatial changes required to accommodate various educational activities and methods	0,1723
B Spatial changes required to accommodate social activities, common spaces for informal learning and spending time during recess periods	0,1629
C. Spatial needs of children's development and academic motivation	0,1549
D. Need for spatial changes in relation to spatial dimensions and qualities	0,1533
E. Spatial requirements emerged due to demographic changes/ increasing student numbers	0,1342
F. Spatial requirements emerge in relation to indoor environmental quality and technical qualities	0,1164
G. Needs emerged due to operational and managemental concerns (changes in the educational system, safety concerns)	0,1060

The application of Fuzzy-AHP process has provided similar results to the frequency analysis. The weights of the first four themes (A, B, C, D) appeared as closer to each

other and higher than the rest. This means that according to the teachers' opinions, demographic factors, requirements related to indoor environmental quality and changes in the system are less significant sources that lead the need for changes in spatial design. On the other hand, the sources directly related to supporting educational activities became more significant. Through the use of the same method, the hierarchical order between the categories were obtained under each main theme as shown in Tables 5.3, 5.4, 5.5, .5.6, 5.7 and 5.8.

Table 5.3: Theme A- Categories

Sources of change in relation to educational activities and methods	Fuzzy AHP Weight
Providing space for physical activities and sports	**0,1753**
Need for subject-specific, devoted spaces for lessons	**0,1598**
Need for science laboratories	**0,1533**
Providing space for music lessons	**0,1501**
Providing space for plastic arts lessons	
Creating opportunities to conduct the lessons outside the school	**0,1242**
Need of space for foreign language lessons	**0,119**
Need of a computer laboratory	
Improving the design of spaces to allow the use of different educational methods	**0,1183**

Table 5.4: Theme B- Categories

Spatial changes required in relation to informal learning and recess time activities	Fuzzy AHP Weight
Needs related to outdoor space use	0,1633
Providing space for socio-cultural activities and additional courses	0,1579
Providing space for reading and individual studies	0,1548
Improving the social areas, common informal spaces for break-out times	0,1369
Need for a multi-purpose space with a stage for drama activities	0,1362
Providing natural elements in outdoor environment	0,1309
Providing space for the exhibition of student works	0,12

Table 5.5: Theme C- Categories

Spatial needs of children's psychological , physical development and academic motivation	Fuzzy AHP Weight
Providing space for play and movement needs	0,1993
Increasing children's' attention and motivation during the lessons	0,1883
Quality of the overall design according to children's needs	0,1638
Improving the school design according to age and classroom-level differences between students	0,1637
Providing space for observation and experimentation	0,148
Providing space for children's self-expression needs	0,137

Table 5.6: Theme D- Categories

Sources of change in relation to spatial dimensions and qualities	Fuzzy AHP Weight
Allowing changes in classroom layout and organization	0,1936
Inadequate number of standard classrooms	0,1874
Inadequate size of the standard classrooms and learning spaces	0,1852
Providing variety of spaces for educational activities	0,1741
Providing general accessibility	0,1406
Providing comfort	0,1191

Table 5.7: Theme F – Categories

Need for spatial change related to indoor environmental quality and other technical qualities	Fuzzy AHP Weight
Improving the selection of color choices in school spaces	0,2542
Improving heating, cooling, ventilation	0,2107
Improving lighting qualities	0,1983
Improving the accessibility of technological features and equipment	0,1714
Improving acoustic qualities and noise control	0,1654

Table 5.8: Theme G – Categories

Needs emerged due to organizational and managerial concerns	Fuzzy AHP Weight
Need of changes emerged due to the conversion of half-day education to full-day education	0,6249
Need of changes in response to safety needs	0,3751

Since the title only included one category about the changing numbers of students, a hierarchical order was not applied for the Theme E, regarding the demographic changes. Despite some minor differences, analysis through the use of Fuzzy- AHP and the packed bubble diagram developed according to the frequencies of the responses indicated a parallel tendency.

The analysis showed that differing spatial needs of educational activities conducted during the lessons on a short-term or daily basis were emphasized as a primary source that requires spatial changes. Under this title, the need for subject-specific, devoted spaces or zones for lessons and providing space for physical activities and sports emerge as essential concerns. Regarding the first theme, the second primary concern emerged as the sources of the need for spatial change to provide qualified spaces to stage social activities

and informal learning through interaction and individual study as well as spending efficient time during the recess periods.

Outdoor space use, enriched outdoor spaces with natural elements and accessible, qualified meeting zones for children's performances, and other gatherings are mentioned as essential needs by the teachers. The analyses showed that teachers appreciate the role of space on children's academic motivation as well as physical and psychological development. The need for space to encourage movement and play is again emphasized under this theme. However, the teachers' comments also indicated that the spaces currently provided at schools cannot support this need due to the insufficiency of the spaces devoted for play and exercise.

The teachers were highly aware of the experience and observation-based learning, and they also underlined the factor of age and level differences, which emerges different spatial needs. Inadequateness of the size of standard classrooms and other gathering zones at schools to allow changes in layout and organization in line with the activities became the fourth theme claimed by the teachers. However, it should be noted that this theme was strongly related to the difficulties related to crowdedness mentioned as the fifth theme.

Teachers cited the long-term sources of spatial change, such as changes in the curriculum, safety concerns, and indoor environmental quality and technical qualities as other themes of the causes of the changes in spatial requirements at schools. As a general idea, although the shortage of spaces to accommodate the increasing number of students is a significant problem, the short-term spatial requirements such as the need for providing differentiated environments for curriculum activities, informal learning, and socialization are evaluated as prioritized factors by the teachers.

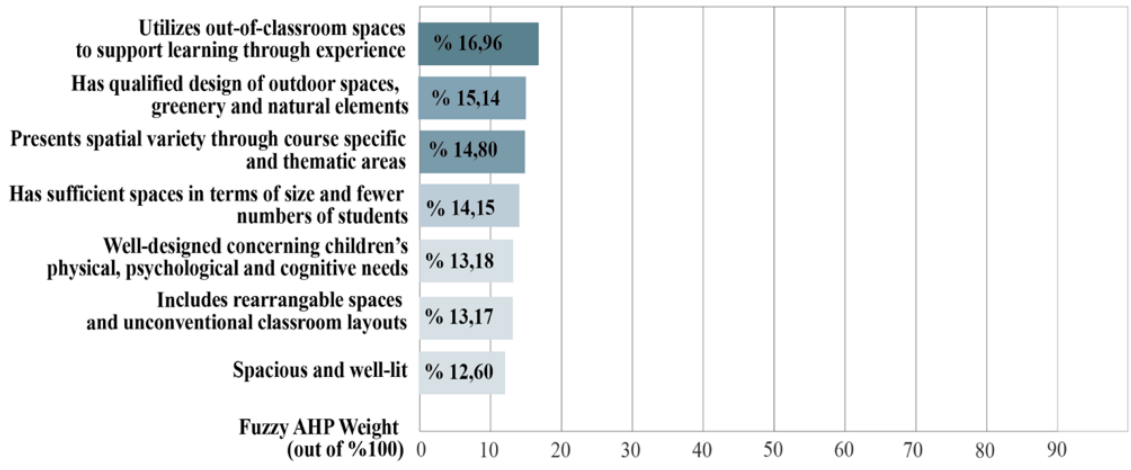
5.2.2 Assessments on the Spatial Features of Qualified Learning Spaces

In order to explore opinions about the features of qualified learning spaces from the educators' perspective, teachers were asked to describe the positive spatial characteristics of a learning space which they have seen or experienced before. The respondents were asked, "Where was the most qualified learning space you've ever seen or experienced? In terms of which spatial design features do you think this space is successful?" The

question aimed to direct the respondents to contextualize their assessment and descriptions through an actual physical learning setting.

F- AHP method was again used for the analysis. The significant positive aspects which emerged according to the answers were the efficient utilization of out-of-classroom spaces to support learning by doing and learning through experience, qualified design of outdoor spaces with vegetation and natural elements, spatial variety through course-specific and thematic zones to support learning processes, sufficient amount of spaces in size with fewer number of students, appropriately designed spaces compatible with the children's physical, psychological and cognitive needs, inclusion of re-arrangeable spaces with unconventional layouts different from the traditional rows and desks type of organizations and spaciousness. The bar graph presented in Figure 5.3 depicts the hierarchical order between the themes according to their Fuzzy-AHP weights.

Figure 5.3: Hierarchical order between the themes regarding positive spatial features of the qualified learning spaces ordered according to their Fuzzy-AHP weights

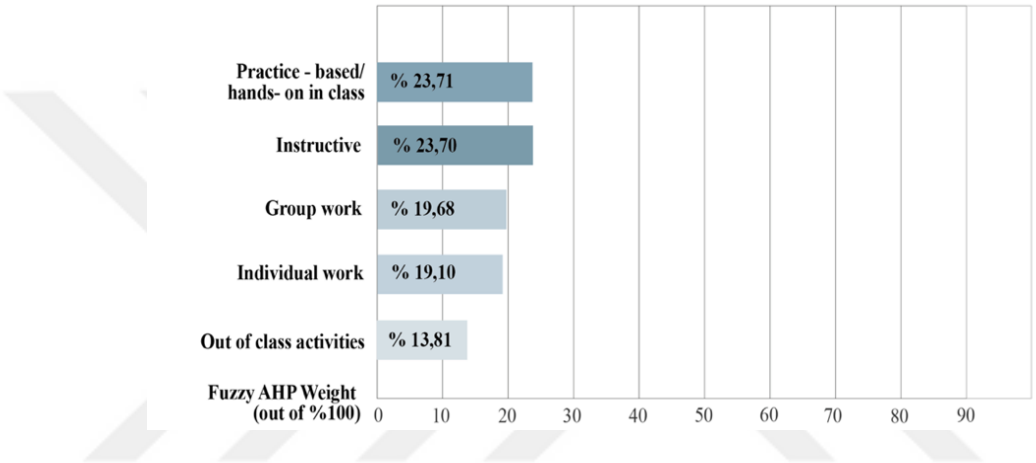


When compared to the themes derived from the responses to the first question, a tendency may be recognized in the favor of having subject-specific or thematic learning zones at schools besides the traditionally designed standard classrooms in teachers' descriptions of qualified learning spaces. The design of outdoor spaces with natural elements is also emphasized as an important point by the teachers in a similar manner to the themes emerged regarding the first question.

5.2.3 Spatial Use Patterns During the Lessons

To understand the relations between the spatial layout and educational practices inside the classrooms, teachers were asked about the teaching methods they often apply during the lessons. The results obtained from Fuzzy- AHP analysis indicated that the lessons are mostly conducted in practice based or instructive methods as presented through the chart given in Figure 5.4. However, some teachers mentioned group studies and out-of-classroom activities in addition to individual tasks.

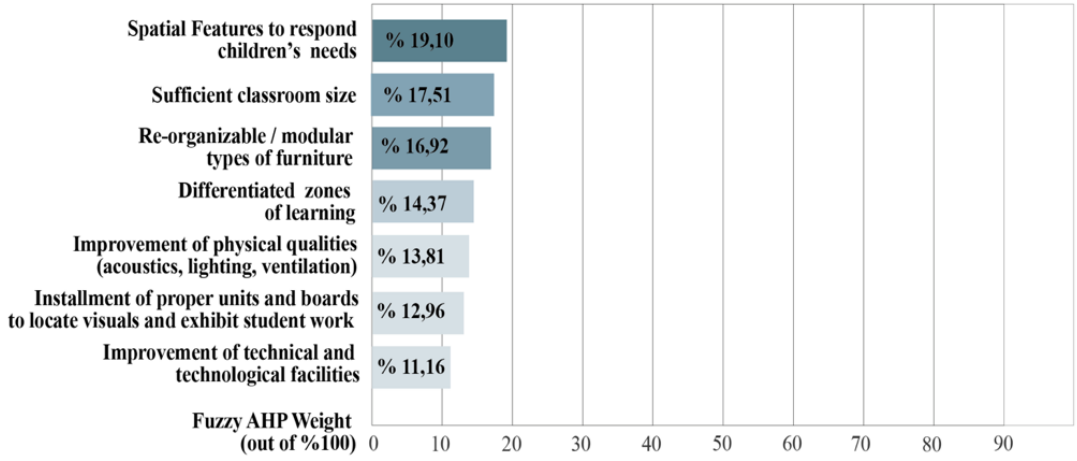
Figure 5.4: Bar chart showing the hierarchical order between the themes regarding the structure of the course sessions ordered



The multiple-response analysis was conducted on the answers to the question aimed to find out which courses or activities the teachers think that may be beneficial to be conducted in other spaces besides the classroom. The results indicated that teachers think it would be more beneficial for students if subject related courses, especially the practice-based ones such as visual arts and crafts, music or science lessons are conducted in other spaces besides the classroom in addition to physical exercise and play sessions. They also mentioned some activities such as reading sessions to be performed in other spaces rather than the classroom to increase children interest and attention. The bar chart presented in Appendix A.5, Table 1, and Figure 1 show the detailed multiple-response analyses and percentages of the responses. Related to the prior question, the teachers were also asked about their opinions on which other spaces inside the school besides the classroom do they think may contribute and support the educational activities. Multiple response analysis of answers indicates that school garden is regarded as the most prominent space which may stage educational activities, which is followed by the library or informal study space and multi-purpose gathering area as seen in Appendix A.5, Table 2.

According to the teachers' comments, spatial changes that are often needed to support educational activities during the day or week are listed as; the need for conducting the lesson out of the classroom, need for changes in the furniture or seating layout, need for larger spaces to conduct the courses and bringing visual materials or other technological equipment to the classroom as given in Appendix A.5, Table 3. Teachers' evaluations of the sufficiency of their classrooms in supporting different educational methods indicate that more than half of the teachers think the spatial features of their classrooms do not enable the educational practices sufficiently, as presented through the chart in Appendix A.5, Figure 2, and Table 4. The most prominent spatial features preferred to be changed in the standard classrooms are defined as the need for the whole design to be reconsidered according to children's needs, the need for sufficient classroom size to accommodate the current number of students, reorganizable modular types of furniture and the creation of differentiated areas of learning inside classroom as given in the bar chart shown in Figure 5.5. All the written responses of the teachers are presented in Appendix A.5, Table 5.

Figure 5.5: Alterations needed to be done in the standard classrooms ordered according to their Fuzzy-AHP weights



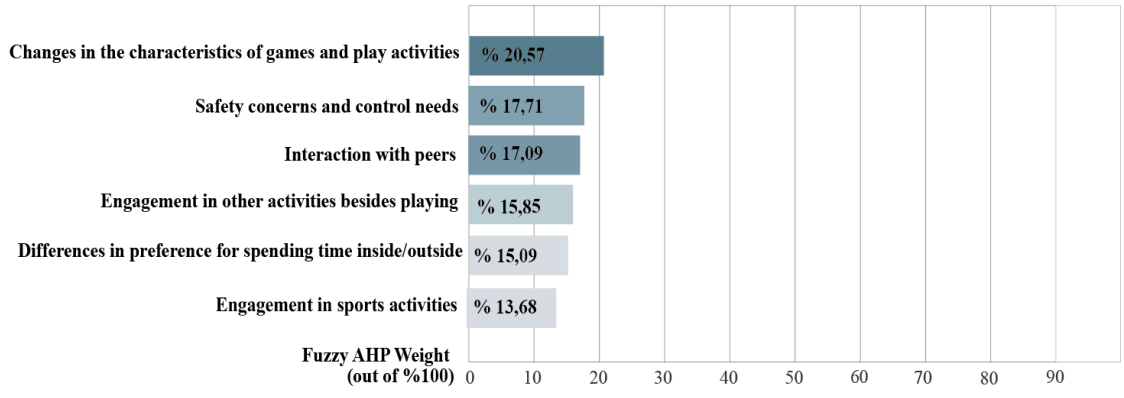
A prominent common issue mentioned by the teachers is the need for spatial variety at schools to provide alternative zones of learning besides the standard classrooms. Another theme that emerged in relation to the prior one is the need for spatial differentiation inside the classroom through the use of appropriately designed furniture according to children's needs. The teachers' comments are also centered around providing spatial variety for practice and experiment-based lessons as well as physical exercise and playing sessions. Teachers' responses also affirmed that children are provided the opportunity to personalize the learning spaces only through hanging their various work on the exhibition boards provided inside the classrooms or other common areas.

The analysis of responses to the question regarding activities that are performed in the exterior areas or school garden showed that these spaces are mainly used for physical exercise courses and as free-time spaces for children during the recess, as given in Appendix A.5, Figure 2. However, the research showed that outdoor spaces are not utilized for other educational activities except during ceremonies or other special days and events.

5.2.4 Information Regarding the Use Patterns During the Recess Periods

A highly significant percentage of the teachers' responses indicated that children usually prefer to spend the recess times in the schoolyard by playing chase and ball games or running as presented through Appendix A.6, Table 1. This situation underlines the importance of the design of the open spaces to support children's movement and playing needs. The analyses indicated that a significant number, 69 percent of teachers think that age distinctions between children influence the type of activities they engage during the recess periods. The participants underlined the differences between the characteristics of children's playing patterns and games for different age groups. The need for safety and control over younger children's activities, supporting children's interaction with their peers, and their engagement in other activities besides playing came out as some of the critical issues mentioned by the participants as presented through the chart given below in Figure 5.6. The written answers to the open-ended question are presented in Appendix A.6, Table 2.

Figure 5.6: Differences in the characteristics of recess period activities of different age group children ordered according to their Fuzzy- AHP weights



5.2.5 The Impact of Spatial Design Quality on Academic Motivation

In the final part of the survey, teachers were asked questions about their ideas on the overall effects of spatial design on motivation for performing educational activities. The responses indicate that they strongly agree on the effects of spatial quality on motivation;

however, they assure that students' motivation is more affected. A paired-samples t-test was conducted to evaluate the teachers' ratings about the impact of the spatial design qualities on students' academic motivation in comparison to teachers' motivation on a 1-7 scale (Cronbach's Alpha =.775). There was a statistically significant difference in variables where students' motivation (M = 6.43 SD =.866) was found to be affected more by spatial qualities in comparison to teachers' motivation (M = 6.13, SD = 1.164), t (143) =4.170, p < .001 (two-tailed) according to teachers' evaluations as presented in Appendix A.7, Table 1. The mean decrease in scores was 0. with a 95% confidence interval ranging from .161 to .450. The eta squared statistic (.01) indicated a moderate effect size.

It may be implied from the responses that the teachers are quite aware of the significance of the impact of spatial design on learning processes. The awareness of the teaching staff may be interpreted as a positive attitude that points out their potential contributions to the development of design strategies and utilizing the physical space in the utmost efficiency during teaching practices.

5.3 EXAMINATION OF FUNCTIONAL ALTERATIONS AND OUTDOOR SPACE USE

As a second phase of the research, the visited school buildings were analyzed through the documentation of the functional changes in spaces, spatial alterations made by the users, and current use patterns. In addition to the visual data obtained during the visits, statistical information, technical drawings of the school buildings, Ministry's regulations about school design has also been received and utilized for the interpretations. The information gained through the second phase was then juxtaposed with the findings of the first phase of the study, which was conducted with the educators. Within the following sections 6.2.1 and 6.2.2, the information derived from the second phase of the research has been compiled under two main titles as the functional changes and alterations inside the school buildings, and observations on outdoor space use.

5.3.1 Functional Changes and Alterations Inside the School Buildings

As also confirmed by many teachers, children spend almost all their time inside their classrooms or in the school garden during the course hours as well as the recess times. There are no additional defined spaces to play, sit, rest, or to have the course-related

activities outside the standard classrooms. The analysis of the functional changes indicates that there have been some similar situations that have been experienced in the way how educational spaces are utilized, and common modifications have been made in all school buildings along with the changes in the educational system.

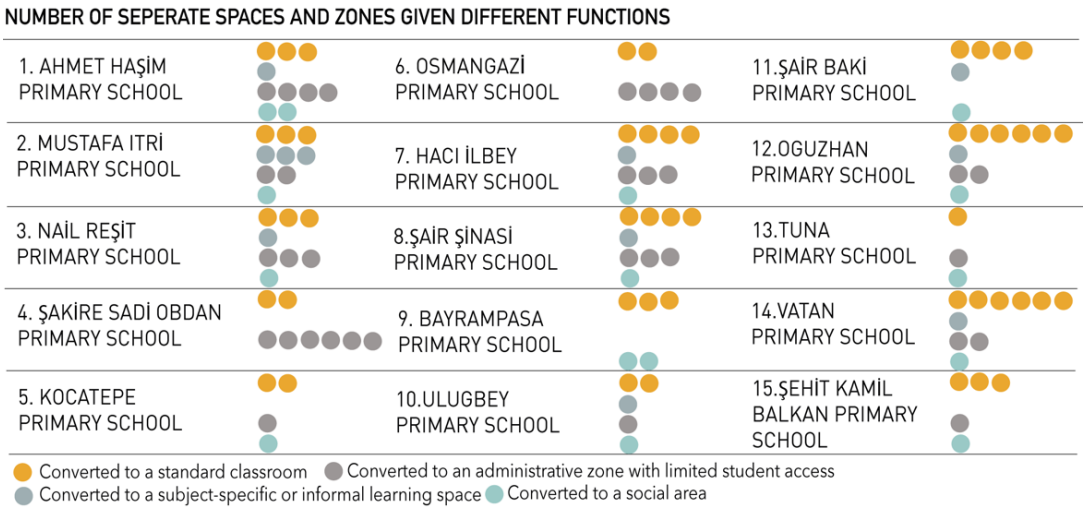
One of the primary issues is the number of students enrolled in primary schools that has increased in the last years with the conversion of many primary schools to secondary schools after the establishment of a 4+4+4 system. The attempts to change the half-day education system in which a school day is divided into two periods, the morning and afternoon sessions to a single whole day duration, has also increased the number of students in each class. The manual issued by the Ministry describes the standard classrooms as rectangular-shaped rooms with a minimum area of 1.60-meter squares per student, which would be almost acceptable in parallel to the findings of the literature. Considering the classroom areas, which are approximately 50-meter squares, each standard classroom is expected to accommodate 30 students at most. However, the average number of students per classroom at the visited schools within the study found was significantly higher than the standard, reaching up to 42 students in some cases, which means that area per student even decreases to 1.20-meter squares. According to the review of Moore (1996), the spaces which have an area less than 1.70-meter squares per child are associated with more aggressive behavior, less constructive interaction, and less quiet environment. The comparison of the amounts demonstrates the density inside the classrooms and its possible consequences. The responses of teachers also highlighted the crowdedness of the classrooms, restricting learning processes as an urgent issue to be solved.

As a consequence of the demand for additional standard classrooms to accommodate the growing numbers of enrolled students, a tendency seems to be emerged to transform all the spaces that have been initially designed and built in the original projects as subject-oriented areas such as art classes, science laboratories, computer classrooms and other social areas into standard classroom settings. The examination of the school plans regarding functional changes indicates a contradictory position to the need for spatial variation in terms of differentiated, thematic learning zones, as emphasized by the teachers during the survey phase. The number of separate spaces converted to standard classrooms became almost four times more than the zones converted to subject-specific

or other informal learning spaces in the visited schools, as demonstrated in Table 5.9, and Appendix A.8.

Some of the subject-specific spaces are given new locations in the basement floors; however, they have mostly become abandoned or not used efficiently due to insufficient lighting and ventilation. Extending the children's duration of stay at school to a full-day has also risen the need for additional spaces for extracurricular activities such as art, drama, chess courses, dining halls, and areas for students to play or socialize during more extended recess periods. However, in most of the schools due to various reasons, these shared spaces are lacking, the planned areas are used for some auxiliary functions, or they are similarly given place in the basement floors, which makes them inefficient to be utilized. Moreover, almost all of the available zones inside the school building, including some parts of the circulation and mostly corridor endings, are separated with dividers and given supporting functions such as storage rooms, stationary rooms, or small offices. These interventions seem to have negatively affected the spatial qualities of the common areas and circulation in terms of lighting and natural ventilation besides the actual amount of space available for the use of students.

Table 5.9: The number of separate spaces given different functions in each school



In some of the schools, additional informal spaces and zones for learning such as reading areas, room for mind games have been created with the efforts of the administration with usually limited sources. The design and building of some of these spaces have also been supported by the Ministry projects, as seen in Figure 5.7. The responses of the teachers

showed that these kinds of areas are highly welcomed and used by the students both during the lessons and free times.

Figure 5.7: Z-type libraries supported by the ministry (top), and a reading area created by the school administration located on the unused staircase (bottom)

Regarding the classroom activities teachers responses within the survey indicated that the lessons are mostly conducted in practice based or instructive manner. The aim of learning about the ways how the lessons conducted was making inferences about the relations of these activities with the design and arrangement of the classrooms as well as determining the need for additional spaces for the lessons. It may be implied from the observations in the standard classrooms that the instructive activities and individual studies had been supported by the traditional shape and settlement of furniture. On the other hand, it was seen that in most of the cases the rows of desks were hardly fitted into the classroom, and it was not possible to make other arrangements due to the high numbers of students. The seating units located in all of the schools are also designed to be shared by two students, which makes them more static and not easy to move or make arrangements. In these terms, the current situation does not provide any flexibility to make changes in the arrangements. Yet, there are not any strict regulations about the classroom layout, and in parallel to the responses emphasizing the need for re-organizability of the classroom,

some of the teachers have preferred to make changes in the furniture layout in some cases as seen in Figure 5.8.

Figure 5.8: Classroom with a traditional layout (left) and two other classrooms organized in u-type seating layouts in the same school

In summary, the main issues which contribute to the functional changes and alterations as well as affecting the current use patterns emerge as follows:

i. lack of alternative spaces to the standard classrooms or school garden which may be utilized during the lessons or recess times,
ii. tendency to transform all the available spaces into standard classrooms due to the demand for additional spaces to accommodate large numbers of students,
iii. abandoned or inaccessible subject-specific learning spaces and social areas in the basement floors and the inefficient utilization of these areas,
iv. problems regarding the re-organizability of the classrooms to comply with the needs of different educational methods.

5.3.2 Observations and Findings on Outdoor Space Use

Many studies recognize the significant role of physical activity and outdoor experiences, and the teachers' responses unsurprisingly indicated a parallel need. The need for both outdoor and indoor spaces to allow play, physical activity, and movement for children became one of the distinctly underlined issues during the first phase of the study. Physical exercise and playing sessions cover 15 percent of the total mandatory course hours according to the primary school curriculum, which may be regarded as a significant amount[24]. Moreover, movement is mentioned as an essential factor for learning processes and academic achievement where a positive relationship was found between physical

[24] Milli Eğitim Bakanlığı, 2018.

activity and brain activity for children (Woodman 2016). Besides, considerable evidence from prior studies has shown that the outdoor environment is a rich source of stimulation for the cognitive development of children and that the outdoor environment can also be thought of as a classroom (Moore 1987), where it has a serious potential to enhance children's learning experiences[25] (Evans 2015). However, in parallel to the information gathered from the teachers in the first phase, the observations on school sites and the examination of the outdoor use patterns indicate that outdoor spaces have not been utilized efficiently in most of the schools. The contribution of these areas to learning processes, socializing, and physical exercise remains quite limited.

The guidelines of the Ministry suggests that the schoolyard should be easily controllable for security reasons, and must include a proper ceremony area and at least one basketball or volleyball court in appropriate dimensions[26]. There are no particular rules for primary schools within the document; however, it is advised that the outer space may include defined spaces for children's play, amphitheaters, walking paths, cultivation areas, and vegetation. Some proposals regarding landscape design for different climatic conditions and material use recommendations have also been mentioned in the manual. Although there is a lack of detail in the standards to comply with the specific spatial needs of primary school education methods and children's needs, it may be concluded that a certain amount of design options are provided within the current regulations.

One of the main issues which may also be recognized through the plan drawings is that the outdoor environment is treated as a totally separate zone from the remaining part of the school even in the most recent schools, as seen in Appendix A. 9, Table 1. Most of the rectangular blocks are located on the side edges of the irregular-shaped building sites. The situation creates narrow, dark areas between the building blocks and the site borders, which are usually converted to storage spaces or left-out dangerous zones for children. Thus, some parts of the school grounds become abandoned and not accessible for use. In fact, the current school standards do not dictate a single-block, multiple-floors building

[25] OECD, 2006a.
[26] Milli Eğitim Bakanlığı, 2015.

typology with standard classroom floors with double-loaded long corridors. However, this approach has been widely implemented as a convenient and practical way of arranging rectangular same-size classrooms with the least amounts of building footprints. A common alteration performed in all the schools was that some part of the garden has been separated physically and visually and reserved later for the use of pre-school children. These separate areas were not included to the demonstration of accessible zones within the diagrams.

Another critical issue related to the prior one regarding access to the outdoor spaces was that the only physical connection for the flow of student movement provided between the interior and exterior area had been the main entrance doors. None of the prototypical project-based school buildings visited during the research had a supporting spatial set up to make the schoolyard more accessible to be utilized during the lessons. Although the school grounds are separated from the external conditions through the use of walls, fences, and vegetation, none of them had clearly defined safe and accessible spaces that were only open to serving children without distractions during the school hours. For instance, it was observed that some parts of the outdoor spaces were open for vehicle access and parking, which makes the amount of accessible area even more narrow and might cause accidents, especially during break periods.

There is not a strict rule or regulation defined by the Ministry about the amount of available outdoor space per student in meter squares within the guidelines. However, it is recommended that the amount of this area should be at least equal or greater than 1.5 meter squares[27]. The outdoor spaces at schools should cover a minimum of 50 per cent and maximum of 65 per cent amount of the total building site area according to the same manual. Except the five of the fifteen cases, sufficient amounts of accessible outdoor areas within the recommended limits have been founded as provided among the school yards visited within the scope of the study as given in Appendix A.10, Table 1.

[27] Milli Eğitim Bakanlığı, 2015.

Although sizes of most of the school grounds still seem to be compatible with the standards, a primary issue which has been both mentioned by the teachers and observed during the study is that neither the indoor spaces beside the classrooms nor the outdoor areas provide supportive environments for children's movement and playing needs in terms of spatial variety. Moreover, similarly in all of the visited schools, it was observed that the types of flooring materials preferred to be used were mostly asphalt, concrete, concrete plaque stone in ceremonial areas and sports fields, interlocking concrete paving stone and bricks in pedestrian roads. In most cases the ground was totally covered with asphalt without very little or no vegetation and any other materials. Some game areas had been created through painted markings on the ground to define areas for traditional child games such as hopscotch and puss in the corner as seen in Figure 5.9.

Figure 5.9: The play areas created through the painted markings on the floor in Hacı İlbey (left) and Vatan (right) Primary Schools

However, these areas still do not seem to be sufficient to fulfill the needs as also affirmed through the teachers comments. In other words, no playgrounds nor other defined activity areas with proper material and equipment for students to spend engaging time during the lessons and break times have been provided in most of the schools, as seen in Figure 5.10. The only exception were the sports and exercise grounds built to be used during the lessons in four out of the fifteen schools. School grounds, indeed, also have a high potential to contribute more to other educational practices besides being a stage for physical exercise and play through including various activity areas to serve for different functions.

Figure 5.10: Exterior views of the visited school buildings

In line to the information gathered through the second phase of study the main issues which contribute to the outdoor space use emerge as follows:

i. The absence of particular rules regarding outdoor space use for primary schools within the official standards which focuses on the developmental and learning needs of primary school children,

ii. Inaccessibility of the school ground caused by the existence of unused or unsafe areas due to the shape of the building site and allocation of the building within site,

iii. Weak physical relations between the interior and exterior to support the utilization of outdoor areas,

iv. Lack of spatial variety and well-defined activity areas through the use of appropriate material and equipment,

v. Lack of natural elements and vegetation.

6. EVALUATIONS AND CONCLUSION

The review of the literature demonstrates that design of learning spaces affect both children's development and learning experiences. The prior experiences in practice and studies also indicate that flexibility includes many different facets, which have the potential to contribute to the solutions of contemporary concerns of educational space design. In order to achieve successful outcomes, the pedagogical methods and educational practices are required to go hand-in-hand with the spatial design. Regarding its relationship with the student-centered approach to learning, utilizing the physical environment as a tool for education may be regarded as one of the main contributions of flexible design. At this point, the opinions of the teachers who have the responsibility to conduct the educational activities as well as the examination of the school buildings in terms of the functional changes undertaken and current use patterns bring useful insights to the discussion of what can flexibility provide in the case of primary schools.

The architecture of schools are expected to comply with a series of rules and pre-determined projects produced by the Ministry. The examination of the design manuals, and examples of prototype-based projects which draw the framework for the design of public schools in Turkey indicate that flexibility as a design feature is not included or supported by the current approaches. The findings of the research in the case of Bayrampaşa schools have also pointed out that the educational structures designed within the framework of the existing official directives are lacking the utilization of the potential of physical spatial features to support educational activities from some aspects. The requirements of the changing approaches to education, including student-centered pedagogies and experience-based methods, as well as other user needs, had been often neglected. Although it had been underlined as an essential feature in the official design manuals, flexibility had not been adopted in many cases. Considering the situation in which most of the state primary schools are designed and built according to the same regulations as prototype-based projects all around the country, it may be possible to generalize the scope of the problem within the context of the whole approach to school design in Turkey.

Through an evaluation of the research findings including both the opinions of the educators who have the first-hand experiences and the examination of the functional

changes and use patterns at schools, some of the prominent problems related to spatial design may be summarized as:

i. Problems caused by crowdedness and inadequacy of the amount of space,
ii. Inability of the spaces to support different educational methods and subjects,
iii. The inadequacy of spatial variety both inside and the exterior areas to support educational activities performed in line with the curriculum as well as informal learning, hands-on experiences and socialization,
iv. Lack of spatial variety to support physical exercise, movement and play,
v. Inefficient utilization of school ground to contribute educational activities and socialization,
vi. The inadequacy of opportunities created for students to personalize the school environment.

In line with the categorization and subtitles determined by the review of literature, the following sections 6.1, 6.2, 6.3, and 6.4 search for strategies to be integrated to primary school design standards in Turkey to address the above-listed issues from a flexible design perspective. The first three sections focus on ideas to respond to short-term sources of change, and the final part discusses strategies that may be applied to accommodate long-term causes of change. The information extracted from the research has been taken as a basis to bring insights from the opinions and experiences of the educators as well as the information derived from the observations during the school visits. Recognizing that flexibility can contribute to different aspects, levels, and scales of design (Heppell et al. 2004), suggestions were primarily made for existing school buildings; however, most of the features and ideas mentioned below can contribute to the planning phases of the schools to be built in the future.

At the end of each section, a table of suggestions for additional design features that are considered to become useful if they are specified within the school design standards manuals to take advantage of the benefits of a flexible design approach at schools is presented. The tables include the main concerns and issues reached as an outcome of the research part, ideas to improve current manuals from a flexible design perspective in response to the determined matters, and flexible design aspects within which these ideas are assessed.

6.1. FLEXIBILITY IN CORE LEARNING SPACES

Review of the literature gives hints about the questioning of the concept of the classroom itself as a separate physical room by the substantial shift from teacher-centered to student-centered learning, and new ideas in school design. Nevertheless, although their definition in terms of form and openness might change in time, the need for clearly defined core learning units seems to remain unless drastic changes occur in teaching methods in primary schools in Turkey. Moreover, children's having separate, private space inside the school is demonstrated to develop a sense of belonging and sense of being through personalization in many studies, thus keeping and defining these private zones can have positive aspects. It may be possible to address some of the issues which were highlighted through the findings of the field study inside the classrooms from a flexible design perspective. The most prominent issues and needs derived from the study may be summarized as:

i. Crowdedness of classrooms, which affects both the conducting of educational methods and spatial layout,
ii. Providing learning spaces to respond to the changing needs of diverse teaching methods that need simple re-organization of furniture layout,
iii. The need for subject-specific areas such as reading corners inside the classrooms,
iv. The design of furniture and overall environment to comply with the psychological, physiological needs and abilities of the children who belong to the particular age group of primary school,
v. The need to provide alternative opportunities for students to personalize their learning settings and exhibit their work.

The current situation indicates that crowdedness is a massive problem, especially at primary schools located in the overpopulated city centers, as exemplified in the case of Bayrampaşa schools. The issue, indeed, has also long been recognized by the Ministry, and increasing the number of schools or expanding the existing ones has always been on the agenda to decrease the number of students per classroom to the optimum amounts. Regarding flexibility, in addition to the long-term strategies such as planning the

buildings for future extensions, it may be possible to propose creative solutions to adapt narrow spaces to be used to serve for large amounts of students more efficiently.

In terms of flexibility, crowdedness creates one of the massive obstacles in front of the application of different pedagogical methods and diverse learning activities aligned with learning spaces that allow variance. Teachers' responses showed that educational activities currently conducted in primary schools often follow instructive, or practice-based approaches mentored by the teacher. Group studies are also occasionally performed inside the classrooms. The traditional classroom organization with rows of desks has been considered to be appropriate for individual works of students. However, the basic classroom layouts can undergo just small amounts of change despite some attempts, and they cannot respond to the demands mentioned by the teachers for adapting space according to different modalities of learning, such as working in small teams, drama, and role-playing or educational games.

Multipurpose learning spaces are associated with allowing educators to teach in the way they want rather than addressing the room (Harrison and Hutton 2014). Moreover, giving space for multiple areas and niches which can stage different functions inside the classroom may also be considered as one of the primary flexible design strategies mentioned in many sources that have been applied in many contemporary schools. Nevertheless, carrying the idea into practice means being able to change the spatial arrangement, to propose different types of furniture, or to include functionally undefined zones for improvisation. Thus, this goal also emerges the need for careful consideration of the number of students planned to be accommodated in one core unit of learning. Dovey and Fisher (2014) present a typology of student-centered activities and optimum amounts of students to engage in each type of activity, as given in Table 6.1.

The table gives an idea about how spaces may be defined in terms of size and organization in accordance with the nature of the activities and size of student groups. According to this classification, it may be inferred that classroom design can be expected to at least support medium, creative, and small interactive methods in addition to individual studies. Thus, for the design of future schools, giving place for different activity zones for individual or group tasks and performance activities inside the classrooms may be developed as a code aligned with the curriculum and pedagogical methods. In some

earlier studies, it is also asserted that spaces that are too large and multi-purpose can lead to noise and confusion, where spaces that are too small can create heightened levels of stress and anxiety (Scott 2010). To optimize the situation, dividing the classroom into sub-spaces by the use of movable dividers, or space-defining materials and furniture may be assessed as practical solutions.

Table 6.1: Student-centered pedagogies classified according to Dovey and Fisher (2014)

PRESENTATION	**25-150 Students**	Students or teachers present to a large group whose size may vary.
LARGE INTERACTIVE	**25-75 Students**	Activities that move seamlessly from large to small sub-groups of 4-6 students.
MEDIUM INTERACTIVE	**10-25 Students**	Activities that move seamlessly from large to smaller sub-groups of 2-3 students usually with one teacher.
CREATIVE INTERACTIVE	**10-25 Students**	Interactive activities but at least with an emphasis on hands-on learning, access to a range of resources that may include art materials, laboratory and outdoors.
SMALL INTERACTIVE	**2-5 Students**	Problem based and peer-to-peer learning with small autonomous groups that can disperse and take responsibility for learning.
REFLECTION	**1 Student**	Singular activities that include reading, writing or hands-on research to meet learning objectives. .

The flexible use of a classroom itself or its relationship with another learning space may also contribute to its flexibility. As a common strategy, moving partitions between learning spaces may be utilized as standard applications by taking appropriate precautions to maintain optimum acoustical, lighting, and thermal standards. The spaces may be combined to be expanded following the needs of the educational activities. In order to achieve this idea in future schools, the spatial organization may be handled in a modular approach within a certain system, in which at least two separate classroom units are brought together to be combined in case of need. In a more radical way, the mobile partitions may even be used on more than one side of the spaces to divide larger spaces. For instance, a central atrium may be temporally converted to be a gathering area for occasional events, school plays, or ceremonies. The classrooms may be provided with

direct access to defined outdoor spaces to extend the learning through performative activities or hands-on practices.

The capacity of a classroom for quick and easy re-arrangement of the spatial settings, furniture, or technological equipment to respond to short-term changes is recognized as a critical feature of flexible learning environments. Besides, as claimed by Holder (2015), the ability to change and arrange spaces according to the requirements of different tasks also has the potential to give school users a sense of agency over their learning and teaching, and a feeling of ownership and comfort in their environment. Accordingly, it may be possible to utilize both the future and the existing classrooms for diverse modes of learning through the application of flexible design strategies in the scale of mobile building components and furniture. The classrooms may be designed to be easily re-organized through the use of modular, mobile, and lightweight furniture for varying activities. As a general principle, combining/dividing, mobility, addition/removal, and modularity strategies may be utilized to provide flexibility in furniture scale. A simple and easily applicable strategy may be the preference for single desks rather than the existing double desks to both allow adjustability while making re-arrangements easier inside the classrooms. The furniture and fittings can also be given different functions; for instance, a storage cabinet may also be designed and treated as a room divider.

It should also be noted that re-arrangement of the classroom layout, even with suitable furniture, needs teachers' efforts in limited time resources. As also explained in the previous chapters, primary school students developmentally belong to an age group in which they recognize the factors related to their physical environment but cannot make accurate decisions or interventions. Thus, adopting an approach in parallel to the building of polyvalent core spaces of learning, which are divided into learning zones with fewer numbers of students as also proposed by Hertzberger (2005), Nair and Fielding (2005) and Lippman (2004) may constitute a more optimal solution for primary schools.

In addition to other spatial interventions, a flexible design approach can contribute to accommodating a more extensive range of individual preferences and abilities of users, and increasing opportunities for children to personalize their learning environment within both the existing schools and the future ones. The field study conducted with the teachers indicated a demand for appropriate furniture which is designed by considering children's

physical and psychological development. The standards may be improved to provide adjustable tables and seating units which are suitable for the physical dimensions and ergonomic requirements of the children.

The boundaries of classrooms, both in a physical and visual sense, can be reconsidered to be more permeable to extend the learning activities outside. More personalized learning environments may communicate student involvement and ownership over space. Teachers' responses showed that children are provided limited opportunities to personalize their learning environment through exhibiting their work in the classroom, which is proved to have a significant influence on the development of self-esteem in primary school children (Maxwell and Chmielewski 2008). Besides, a sense of belonging in children may be increased through personalization by displaying the products of group work for the view of the rest of the school community. Hertzberger (2005) claims that a schoolroom, conceived as the domain of a group, can show its own identity to the rest of the school if it is allowed to make a display of the things which children have made in class to outside. The options and opportunities for personalization may be increased. Each of the surfaces inside the learning spaces may be thought of in such a way that they can become part of educational activities in different ways for communication, exhibition, presentation, projection, making personal arrangements. The use of larger transparent dividers may be encouraged between the classrooms and circulation areas to let the rest of the school community have an idea of what other groups are doing. Besides, these permeable surfaces may support lighting in circulation zones while acting as a means of visual communication.

Accessibility of technological facilities is also considered an important issue in terms of flexibility. As also observed during the school visits, interactive boards seem to be a dominant and widely used element located in the classrooms. However, the ongoing changes in technology indicate different trends that aim to give students more active roles and engage in activities by bringing their own devices. Besides, the use of other new equipment such as STEM training sets, 3D printers, different presentation devices is expected to become more widespread in future learning spaces. From the spatial design point of view, the possible changes to be brought by these developments should be recognized, and the infrastructure should be planned accordingly for future schools. Table 6.2 summarizes the ideas regarding flexibility inside separate learning units.

Table 6.2: Suggestions to enhance flexible design inside core learning spaces

FLEXIBILITY INSIDE THE CLASSROOM		
Main Concerns	**Ideas to Improve Current Manuals From a Flexible Design Perspective**	**Flexible Design Aspects**
• Providing learning spaces that can accommodate the changing needs of diverse educational activities. • Responding to a wider range of individual preferences and abilities of users. • Increasing options for children to personalize their learning environment	• The use of mobile, modular, lightweight furniture to perform quick changes in spatial organization and to create different activity zones for individual or group tasks • Utilizing furniture and fixtures for space defining purposes • Improvement of the standards to provide adjustable tables and seating units which are suitable for the physical dimensions and ergonomic requirements of the children. • Single desks may be preferred rather than the existing double desks to both allow adjustability and re-arrangements • Utilizing mobile/movable building components and furniture for making temporary changes in the size, shape , enclosure of the learning spaces according to the needs of activities • Allowing students to personalize their environment through engaging with the space, exhibiting their work • Allowing an amount of visual permeability or transparency between the classroom and outside to the rest of school community • Planning an agile technical infrastructure to accommodate the needs brought by technological developments	Modifiability Versatility Variance Fluidity Customization Permeability

6.2 ALTERNATIVE SPACES FOR LEARNING INSIDE THE SCHOOL

According to the information gathered through the research, primary school teachers agree on the need for alternative spaces to carry the educational activities outside the classroom. The teachers have also underlined the necessity of subject-specific or thematic areas, which they believe can support learning processes and increase children's attention. In addition to some courses in the curriculum such as language, arts, music, science lessons, it is emphasized through the research that many other activities such as reading sessions, drama activities can be conducted more efficiently outside the classroom. The teachers associate this demand primarily with increasing children's attention and awareness during the lessons. Beyond this, the literature suggests that out-of-classroom activities mainly support learning by doing and learning through experience. The design of common social areas, gathering spaces, informal study areas, dining halls, circulation,

and all the in-between zones beyond the classrooms may be accounted for learning settings.

Apart from these, earlier studies point out that recess times may also benefit the learning processes. The physical activity performed by children during the recess periods was found to contribute to both brain development and health. Play and social interaction have an essential role in socio-emotional adjustment while helping to increase attention during the classroom sessions (Waite-Stupiansky and Findlay 2002). The design of out-of-classroom learning settings gains more importance considering that children usually spend recess time in these environments. The critical concerns derived from the research may be summarized as follows:

i. Creating alternative spaces for curricular educational activities and informal learning settings at schools,
ii. Building alternative spaces for recess time activities and socialization,
iii. Adaptation of the under-utilized, abandoned areas to re-contribute to the educational activities,
iv. Extending the learning practices to whole school environment.

As also explained in the prior sections, crowdedness constitutes the source of many problems related to space use at schools. It was derived from both phases of the research that the crowdedness causes the planning of building programs by giving the primary attention to increasing the number of standard classrooms in school buildings. The over-crowdedness and inadequacy of space in the existing schools, especially the ones located in dense neighborhoods similar to Bayrampaşa, cause these educational institutions to be static spaces consisting of the same type of rooms. From another aspect, the uniformity of the interior implies the message that everyone is treated as part of a mass group contrary to the idea of individualization, which is given utmost importance for the design of contemporary schools. The spaces inside the building beyond the classrooms, which indeed have a high potential to contribute to learning processes as well as socializing, have been neglected or under-utilized.

Flexible learning environments are expected to provide teachers and students with options to make agile decisions about where and how they want to achieve learning along with

the curricula. Recognition of children's ability to learn outside the traditional classroom or other formal teaching spaces in school has appeared as a critical feature of innovative approaches to school design (Chiles 2015b). Besides, creating spaces that support necessary activities, optional studies and social activities, and designing for varying levels of contact are also asserted as critical inputs to improve learning processes (Gehl 2011). Accordingly, each area at school can contribute to inspiring children to learn and provoke ideas. Considering the lack of space as one of the significant issues and the need for thematic zones of learning mentioned by the teachers, the inclusion of 'learning commons' as explained by Dovey and Fisher (2014) can be a proper solution in the case of primary schools. The authors (2014) define the 'commons space' as a semi-enclosed learning area which provides a range of settings for group tasks, individual study, and quiet work. These informal learning areas are suggested to be larger than 40 meter-squares, and they should be separated from the main circulation route to allow human traffic. The commons spaces can be scattered throughout the building and combined with clusters of learning spaces (Dovey and Fisher 2014). Besides, to respond to the demands for including more subject-specific or thematic spaces to support lessons, cluster areas may be assigned to changing themes such as arts or reading or constitute alternative zones for play activities inside the school. Alternatively, they may be kept as neutral zones with appropriate furniture to allow polyvalence. In the existing schools, suitable spaces may be utilized by building these types of informal learning zones. As a general idea for future schools, the guidelines may be improved to allow variance in the use of other spaces than the classrooms such as dining halls, social areas, circulation zones to maximize their contribution to the learning activities.

The study showed that many of the teachers agreed on the need for specially designed, quiet spaces at schools for reading sessions. This need becomes more prominent in primary schools where children may be encouraged to gain lifetime reading habits. As it was also seen in two of the visited schools, there had been attempts to build accessible reading spaces within the scope of the 'Z-Libraries' project of the Ministry. According to the information given on the project website, these spaces should be planned as social activity areas that allow children to access information, learn and relax at schools with

the support of qualified design in an aesthetic and ergonomic sense [28]. The comments of the teachers point out that in terms of initiating an alternative approach to school libraries, the building of Z-Libraries has been a positive development. Similar types of spaces may be given place inside the schools. However, there is still a need to improve the requirements defined for libraries in the guidelines to meet the specific abilities as well as the ergonomic and psychological needs of primary school children. These places may be approached as more active areas for studying, and they may be planned to become more accessible by using permeable visual and physical boundaries. Reading or informal studying activities may be extended to other common areas through the use of appropriate furniture and equipment. The technological equipment can be integrated and made more available for the use of students. The building of outdoor libraries and reading areas may also be considered as additional solutions.

It was observed in most of the visited schools that the circulation was consisting of long, dark corridors. These areas are the only spaces where children can spend recess periods inside the school, especially in cold weather conditions. The circulation zones can be utilized in a more efficient way in which children socialize and learn beyond allowing secure and easy movement. Corridor libraries and sitting- playing alcoves, thematic spaces for informal learning activities may be integrated into in-between areas in the existing schools. Utilizing the multi-purpose learning staircases which have been applied in many contemporary schools can be advised as a strategy to create additional settings for both formal and informal gatherings, various educational activities, drama lessons, presentations, and socializing for future schools.

Moreover, the spatial layout may be planned to allow fluidity in circulation zones both in visual and movement terms. For the under-utilized areas in the existing schools such as unused subject-specific classrooms due to obsolescence and other empty spaces,

[28] Milli Eğitim Bakanlığı, 2019. Z-Kütüphane. Available at: http://z-kutuphane.meb.gov.tr/Home/Index (accessed 19 September 2019).

especially located in the basement floors, the standards may be improved to provide sufficient lighting and ventilation. These spaces may be reconsidered in functional terms to be integrated into educational or social activities.

The shaping of the spatial standards goes along with the developments in the official curriculum. For instance, developing a room for robotics may be meaningless with the absence of the qualified educating staff who can facilitate learning in such areas. However, the future needs of these kinds of spaces may be pre-considered during the school design processes to accommodate possible spatial changes. The following Table 6.3 summarizes the suggestions to enhance out-of-classroom activities regarding flexible design. A diagrammatic representation of suggestions to enhance flexibility in the existing schools is also presented in Appendix A.11. The interpretation of the suggestions would change according to specific condition of each building in terms of its structural features, scale, layout and location.

Table 6.3: Suggestions to enhance flexible design for out-of-classroom activities

CREATING ALTERNATIVE SPACES FOR LEARNING INSIDE THE SCHOOL		
Main Concerns	**Ideas to Improve Current Guidelines From a Flexible Design Perspective**	**Flexible Design Aspects**
• Creating alternative spaces for formal educational activities and informal learning settings at schools • Creating alternative spaces for recess time activities and socialization • Adaptation of the under-utilized, abandoned areas to re-contribute to the educational activities • Extending the learning practices to whole school environment	• Design of polyvalent informal learning spaces, learning commons which may be reconfigured according to the needs of different activities • Integrating informal study and playing alcoves to main circulation routes • Integrating break-out, socialization alcoves with soft seating to the main circulation routes • Utilizing multi-functional, learning staircases for gatherings, drama lessons and other learning activities at schools • Including accessible, quiet spaces for reading sessions and independent studies	Multi-Usability Polyvalence Adaptability

6.3 FLEXIBILITY IN OUTDOOR SPACE USE

The information gathered through the research demonstrated that teachers recognize the efficient use of outdoor spaces as a significant factor that positively affects children's psychological and physiological development as well as academic motivation. Moreover, their descriptions and examples of qualified learning environments showed that the school ground is regarded as the most prominent space to support learning practices and given value as an essential feature of appreciated learning environments. Despite the teachers' acknowledgment of the benefits of outdoor space use, the examination of use patterns in outdoor spaces during the second phase of the study showed that in most cases, school grounds of prototype-based schools solely fulfill the fundamental standards with a few functions. Although most of the school gardens except some irregular cases provide an acceptable area in meter-squares per student according to the regulations, the actual amount of area which is actively used or accessed by the students in practice seems lower.

As a general idea, the absence of a particular design attitude that recognizes the potential of outer space as part of the overall learning processes and experiences seems to be a primary deficiency. Moreover, there is a need for specified descriptions to comply with the requirements of students who belong to the primary school age group within the guidelines of the standards regarding outdoor space use for primary schools. Under the light of the findings of the research, the significant concerns and problems regarding outdoor space use may be summarized as follows:

i. Increasing the actual amount of accessible outdoor areas for students,
ii. Providing spatial variety to accommodate physical movement and play needs of primary school children,
iii. Taking age differences into account to provide a more democratic environment for play and exercise for each group of student.

In response to these issues, it is proposed that a flexible design approach may contribute to the efficient use of outdoor spaces through different strategies grouped under two main titles which are providing spatial variety for play, exercise, other activities and setting up more permeable relations between the interior and exterior spaces.

6.3.1 Variety of Play, Exercise and Other Activity Areas

The research has shown that schoolyards are currently used as proper areas for ceremonies, playing during breaks, or sports activities during the physical exercise lessons in a fairly conventional way. Moreover, it was seen during the study that, excluding some cases with very narrow outside areas, school buildings had sufficient amounts of outside space, which in fact can be utilized more efficiently and enriched with various functions.

In many of the primary schools, the sports hall has not given space inside due to various reasons. Therefore, as also mentioned by the teachers, play and physical exercise sessions are often conducted in school gardens during appropriate weather conditions. Children also tend to spend most of their recess times in the school garden, because they do not have the option of staying inside since there are not any suitable areas for them to play indoors. The extension of school hours from half-day to a full-day schedule also led to more extended recess periods, and relatively more time is spent on the outside. As also pointed out by Rigolon and Alloway (2011), large grounds with no defined activities leave children bored and uninterested in engaging in anything other than a break from academics. It means that better-defined and multi-purpose playing and exercise areas should be created to enable children to spend their time engaging with a wide variety of outdoor activities and promote physical activity.

Primary schools are expected to provide places for children to develop physical skills, and spatial elements to encourage different interpretative ways of getting around, from rolling and crawling to running and skipping (Rigolon and Alloway 2011). Empty and large grounds covered with a single-type hard flooring material in almost all of the schools visited during the field study can accommodate ceremonial gatherings. However, they do not offer alternative options for outdoor play activities or sports due to the absence of defined spaces and equipment. As mentioned by the teachers, younger children need to be provided soft grounds and equipment to play safely and freely while the older ones demand wide playing zones for their creative and regulated games. The children also need to be provided with semi-enclosed spaces, sheltered activity areas to spend time outdoors in different weather conditions. A variety of activities in the outdoor space can be supported, and different zones may also be defined by the use of appropriate surface materials on the ground. For example, the use of harder ground surfaces for active games

and the use of soft surfaces, especially in younger children's play areas and resting zones, can be specified and recommended within the manuals.

Another issue that needs to be considered is, as understood from teachers' responses, age differences between children play a significant role in children's playing habits. The comments indicate that older children tend to play more social games with rules and sports activities, while younger ones usually tend to lose track of rules, so they need supervision and different equipment. Besides, children develop physically at different rates, during primary school (Rigolon and Alloway 2011). Thus, taking age differences under consideration may be beneficial to create more democratic outdoor play and activity areas where children can challenge themselves in safe ways.

Scott (2010) asserts that utilizing landscape elements to provide tools for diverse ways that children play may be useful at schools. The author (2010) classifies the types of play as social, imaginative, constructive, experimental, and challenging. According to Scott's (2010) proposal, for instance, the creation of spaces for collective activities and private areas, different types of circulation links, interaction games area, somewhere just to run may be appropriate for social play. Multi-use venues with equipment that can be customized according to different scenarios can support imaginative play while involving physical and mental challenges can enhance challenging types of play at primary schools (Scott 2010). Accordingly, in addition to the standard sports courts, playing areas, playgrounds with equipment, multiple-use lawns, and other small activity areas such as chess grounds, traffic education areas may be added to the school ground design. Besides, opportunities brought by natural landscape design elements and topography may be utilized in the playgrounds.

The search for alternative spaces to conduct the courses and other educational activities outside the classroom has also been mentioned as an important source of the need for spatial change at the schools during the field study. Previous research has also proved that outdoor learning can add value to everyday learning experiences in the classroom (Dillon, et al. 2006, Woolner 2010). Activity areas such as shaded and outdoor classrooms, small gathering areas with seating units for drama activities may be included in the design in response to this idea. These additional areas may also act as extensions of the interior learning settings.

The need for including more vegetation and natural elements is also another issue underlined by the teachers. Giving a place for natural elements and planning of lawn areas are recommended within the guidelines prepared by the Ministry. Nonetheless, in practice, most of the schools had little or no green spaces on their grounds. For the design of future schools, these recommendations may be articulated through more solid standards, setting guiding principles for the design of the landscape. The natural elements may be integrated to constitute parts of playing, relaxation, or activity zones. Creating cultivation areas, vegetable gardens, or locating pots to grow plants may also be other ways of engaging children with nature to contribute their learning practices, as mentioned both in the literature and by the teachers participated in the study. Especially primary school children are enriched by gardening, growing food, and the behaviors acquired through such work (Dillon, et al. 2006). There have been some projects conducted by private schools to build truck farms at schools. These ideas may also be more widespread and efficient among state-funded institutions. For school buildings that are planned to be built in the future in dense urban areas, roof gardens with appropriate safety precautions may also provide suitable spaces for gardening activities. Students may be provided extra educational spaces for hands-on gardening activities at the rooftops.

Another critical issue regarding the planning for future schools may be the creation of separate, vehicle-free courtyards, which are only accessible for children. This approach can also facilitate freedom in design by eliminating safety factors, and reducing the concerns for safety and controllability mentioned by many teachers.

6.3.2 Interior- Exterior Relations

Designing dynamic outdoor spaces at schools to extend the learning activities to outdoors, and the construction of physically and visually linked, permeable inside-outside relations are recognized as crucial attitudes regarding flexible design. During the field study, it was observed that the outdoor environment is approached as a totally separate zone from the remaining parts of the schools. One of the many consequences of this situation is that children's contact with the outside environment and nature becomes restricted. From a flexible design perspective, fluidity in terms of both vision and movement also becomes limited.

Setting up a relation between the natural ground and the indoor spaces usually becomes more feasible in single-level building designs, which allow easy, direct access to the

outside, even from each separate learning unit. It may be still applicable in multi-leveled buildings through placing open or semi-closed courtyards to the plans, verandas and providing transparency with larger openings. There are many examples in which sheltered or semi-open extensions of the interior constitute transitional areas between the inside and the outside, allowing children to spend time outside apart from the weather conditions. The design of mediating spaces between inside and outside can help to enrich the nature of activities. As a more inclusive idea for the design of future schools, the building shell itself may be designed in a manner that includes natural elements integrated into different layers and transitional areas with various openness levels. Movable facade elements may be utilized to provide immediate access to outdoors in the ground floor level learning spaces. The ideas to enhance flexibility in outdoor space use at schools are summarized in Table 6.4.

Table 6.4: Suggestions to enhance flexible design in outdoor spaces at schools

FLEXIBILITY IN OUTDOOR SPACE USE		
Main Concerns	**Ideas to Improve Current Guidelines From a Flexible Design Perspective**	**Flexible Design Aspects**
• Extending learning activities to outdoor environment and designing the schoolyard accordingly • Providing accessible spaces for play and physical exercise • Setting of permeable relations between inside-outside to achieve fluidity in visual and physical terms	• Providing a variety of playing zones with appropriate equipment and furniture to support different types of play. • Providing a variety of well-defined sports/exercise areas through the use of appropriate materials and equipment. • Providing a variety informal learning zones with appropriate equipment and furniture such as small activity and gathering areas. • Design of semi-sheltered, semi-closed extensions of learning spaces outside, outdoor classrooms with appropriate equipment and furniture. • Providing a variety of open and sheltered social areas with seating units. • Providing vehicle-free outdoor areas which are separated for the access of students and the educating staff to encourage freedom of play and exploration. • Providing greenery and natural elements integrated with social zones and play areas. • Creating cultivation gardens, truck farms • Utilizing rooftop school gardens where enough space could not be obtained in dense urban areas. • All areas should be arranged to allow multiple uses • Play tools and sports equipment should be selected for different age groups. • Providing visual transparency to observe outside from inside	Versatility Variance Fluidity Permeability

6.4 FLEXIBLE DESIGN SUGGESTIONS FOR LONG-TERM CHANGES

In the case of educational institutions, due to the evolving nature of education, the long-term future is often not easily predictable. It is possible that even the school facilities as the way they are known today might become obsolete and not exist. However, the continuing trends in Turkey for now and for the foreseeable future are the increasing enrollments, the need for more educational facilities to accommodate these large numbers of students, and periodic changes in the educational system which emerge different spatial needs at schools. The study with teachers also showed that these two factors are regarded as the prominent sources determining the need for spatial change at schools in the long-term. Along with these concerns, the issues that may be approached through a flexible design perspective may be listed as:

i. School facilities should have sufficient land size and growth flexibility to respond to future expansions and changes,
ii. The building components should be planned and included to allow future changes,
iii. The whole school should be designed to constitute a means for learning,
iv. Opportunities should be provided to make the school buildings to be utilized multi-functionally to contribute to community involvement.

Especially in crowded and dense cities, it becomes more challenging to find suitable building plots. Regulations requiring the implementation of pre-determined, same standard projects on every location stands as an obstacle in front of the development of innovative design solutions for the schools which need to be built on narrow, irregular shaped pilots. For the design of future schools, determination of the building location and planning of the structure to allow future expansions and alterations seem to emerge as primary steps regarding flexibility to maintain the spatial qualities of both the existing parts and added spaces. The ease of adapting educational space for new uses along with the changing systems can also be achieved by expanding the use of lightweight partitions and modular building elements inside the buildings while taking the necessary precautions to prevent noise. One of the main benefits of flexibility as an architectural means is its ability to keep the built environment relevant and useful as time goes on. Using building components to withstand changes brought by the technological advances through time also emerges as a long-term concern regarding flexibility.

Regarding the idea of extending learning activities to the whole school environment, the school building can be recommended to be designed as a tool for learning itself. For instance, it may be interesting to explore the expression of green building practice in forms that are legible to children, and how environmental sustainability can be incorporated in buildings in a way that has a positive impact on the primary school students for future schools.

Another issue as reminded by Shabha (1993) is that there is a shift in the perception of schools, where they can no longer be considered solely as formalized institutions within the urban environment, but they need to be approached as resources of the community and linked to the locality they are situated within. Community involvement is an important way to make the school part of the community and maximize the use of facilities. In a broader sense, the school may also act as a community learning center, which can influence the planning approach. Some spaces at schools have been used for weekend or evening courses, and the children utilize the school grounds after school hours. These activities may be diversified, and the parts of the building and the school ground to be opened for community use may be determined from the beginning. Thus, the structure may be designed to facilitate community involvement to be multi-functionally used. Table 6.5 summarizes the suggestions to respond to long-term sources of change.

Table 6.5: Suggestions to enhance flexible design in response to requirements caused by long-term sources

FLEXIBLE DESIGN SUGGESTIONS FOR LONG-TERM CHANGES		
Main Concerns	**Ideas to Improve Current Guidelines From a Flexible Design Perspective**	**Flexible Design Aspects**
• Need for adequate space at schools to accommodate the increasing numbers of students • Dealing with the functional changes brought by the changes in the educational system	• Selecting and planning the school site to allow for future expansions • Use of lightweight partitions and modular building elements inside the buildings to provide the ease of adaptations • Designing the whole structure to constitute a tool for learning • Planning the school to serve as an alternative facility for the community use	Versatility Variance Fluidity Permeability Multi-usability

6.5 CONCLUSION AND DIRECTIONS FOR FUTURE STUDIES

Change may be one of the most rapid and ubiquitous challenges in schooling practices. Flexibility has been a recurring theme throughout the history of school design. However, today it has started to gain more acceptance as an essential design feature of contemporary schools to deal with change at different scales and timescales, to allow for alternatives in use and development. Along with the shifts in the pedagogical approaches and advances in technology, flexibility has become even a more critical issue for twenty-first-century learners with its various dimensions. Based on the recognition of flexibility as a significant parameter of school design practices that deserves attention, the thesis has aimed to bring insights from the user opinions as well as an understanding of current use patterns for the development of flexible design strategies for primary schools in Turkey. The data both obtained from the review of the literature and two-phased field study conducted in primary schools was assessed to develop design strategies that may be included within the standards determined for existing schools and future schools that are planned to be built. There have been other studies concerning the development and improvement of school designs in Turkey. However, this inquiry, for the first time, searched for the educators' thoughts of learning spaces as a primary component together with the observations at school settings to assess solutions for flexible design in Turkish state governed primary schools, and the thesis is believed to contribute to the literature in this respect.

A specific, final definition of flexibility has been avoided throughout the study. Instead, different and similar aspects of the flexibility notions mentioned in the literature and applied in school projects were examined and discussed within the context of educational space design. The suggestions presented in the final part mainly revolve around some interlocking ideas of extending learning processes to the whole school environment, creation of spaces to comply with the needs of diverse subjects and methods, providing alternatives for different ergonomic needs and abilities of users, and responding to long-term requirements such as building expansions. In other words, the proposed design strategies are related to all of the four facets of flexibility, responding to requirements that occur in relation to time, space, use, and movement.

One of the key resolutions derived from the research had been the need for approaching the whole school environment holistically as a venue for learning processes in primary

schools. As also stated by Duthilleul, et al. (2018), there had been a change in the use of language to describe the physical environment in terms of learning spaces rather than classrooms, to capture the notion that all of the spaces within a school building can be used for learning (Duthilleul, et al. 2018). Even this change may be accepted as a critical indicator of the need for change in the traditional way of planning schools in which education is expected to happen only in identical classrooms. For the determination of new codes and standards manual, this viewpoint may be emphasized to remind the designers or planners that each space at schools can contribute to learning processes.

There is a wide range of methods and strategies regarding the design of learning spaces with a flexible design attitude. However, the importance of consistency between the pedagogical approach and the design of the learning environment is mentioned both by educators and design professionals as a fundamental factor to achieve the educational aims (Lippman 2010, Moore and Lackney 1994, Neill and Etheridge 2008). At the other end of the discussions, there is the power of spatial design to affect the ways how educational practices are performed. As also stated by Oblinger and Lippincott (2006), spaces themselves are the agents of change, and changed spaces may change the practice. On the other hand, teachers constitute one of the main user groups with their legitimized role to guide and control the educational activities. While interpreting the analysis of the data gathered from their study with Finnish teachers, Duthilleul, et al. (2018) conclude that teachers do not always have the required knowledge on the pedagogic potential of utilizing physical educational environment since the subject is rarely covered in teacher training programs. There might be a similar situation in Turkey, which appears to be an interesting subject for further research. Beyond that, the teachers' interpretations of the sources of changing spatial requirements at schools were highly relevant to the expectations of flexibility in learning spaces. Teachers may be informed about the role of utilizing the opportunities provided by the qualified design of the physical environment in learning processes through professional development activities. The educating staff may be encouraged to search for economically and practically accessible solutions that can make any positive contributions to the efficient use of space. A slow evolution process may be performed through pilot studies at schools to apply efficient design strategies and to increase an awareness in both teachers and students about the potential of the designed physical environment to support education. The reforms in the

educational system may also consider and recognize the utilization of spatial environment for educational practices as an important parameter which deserves more attention.

The primary user groups of schools consist of students and educators. They are followed by the tertiary groups of users, including the general public and community, parents, family, and other student support systems. Further studies may search for appropriate methods to involve future users, especially the students in the design processes at different levels. Future research may also investigate students' opinions and perceptions to determine the spatial requirements.

It is believed that maintaining and controlling the spatial standards at schools may still be possible through the development of different mechanisms rather than utilizing prototypical school projects for all schools. Both designers and related official institutions should share the responsibility of improving the quality and standards of design of future learning environments.

The research on the physical environment's influence on learning practices at schools has been given less attention in comparison to the other pedagogical, psychological, and social variables. This thesis is thought to contribute the literature as a new source for research on school design and flexibility, presenting insights from the users' perspective to designers, researchers, and educators, as well as official and private practitioners. It is also considered that the suggested ideas regarding flexibility can contribute to the development of strategies for the planning processes of future schools or interventions to the existing primary school buildings. The outcomes of the study are also believed to contain factors that may be useful for the generation of data in the field of education-research and be applicable in other educational settings for children in addition to primary schools.

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APPENDICES

Appendix A.1: Visited Schools and Distribution of the Respondents

Table 1: List of the visited schools and number of respondents participated in the study

Name of the School		Project Year	School Type	Total Number of Teachers	Number of Participants
1	Ahmet Haşim Primary School	2001	**Type A**	21	11
2	Mustafa Itri Primary School	2001	**Type A**	26	15
3	Nail Reşit Primary School	2003	**Type A**	20	11
4	Şakire Sadi Obdan Primary School	1995/2013 *	**Type A**	36	13
5	Kocatepe Primary School	2000	**Type A**	27	7
6	Osmangazi Primary School	1989/2011 *	**Type A**	20	9
7	Hacı İlbey Primary School	1994/2009 *	**Type A**	24	10
8	Şair Sinasi Primary School	2005	**Type B**	30	11
9	Bayrampaşa Primary School	2006	**Type B**	15	8
10	Uluğbey Primary School	2005	**Type C**	18	12
11	Şair Baki Primary School	2017*	**Type C**	36	8
12	Oğuzhan Primary School	2015	**Type D (Private company-ISMEP)**	36	8
13	Tuna Primary School	1988/2005 *	**Type E**	20	6
14	Vatan Primary School	2013*	**Type F (Private company-ISMEP)**	24	6
15	Şehit Kamil Balkan Primary School	2013*	**Type G Special Project - (Private company-ISMEP)**	19	9

(*) The year in which the building has been refurbished or rebuilt.

Appendix A.2: Survey Questions

A. Participant's Occupational Status and Experience

1. For how many years have you been working as a primary school teacher?
2. For how many years have you been working as a primary school teacher in this school?
3. Which grade of students are you responsible of tutoring currently? (1-2-3-4)
4. How many students are there in your classroom?

B. Opinions Regarding the Sources of Change in Spatial Requirements

5. What do you think are the most important issues that are the source of the need for spatial changes in the short or long term at school?

C. Assessments on the Spatial Features of Qualified Learning Spaces

6. Where was the most qualified learning space you've ever seen or experienced? In terms of which spatial design features do you think this space is successful?

D. Information Regarding the Spatial Use Patterns During the Lessons

7. Through which methods are the lessons usually carried out?
   Instructive/Practice Based-Hands on Activities/Group Work/Individual Work/Out of Class/Other (please specify)
8. For which courses or activities do you think it may be beneficial to be conducted in other spaces besides the classroom?
9. Which other spaces inside the school besides the classroom do you think may contribute and support the educational activities?
   Outdoor space-school garden/Informal Study Areas/Library/Conference Room /Circulation Zones/Plastic Arts and Crafts Room/Music Class/Laboratories/Computer-Robotics Lab/Cafeteria/Other (please specify)
10. What type of spatial changes are needed to support in class educational activities during the day or week?
    Conducting the course outside the classroom in another subject-related space/ Changes in the seating layout/The need for a larger space- additional room/Other (please specify)
11. Do you think that the spatial features of your classroom support the educational activities? (Scale: 1= Strongly Disagree, 7= Strongly Agree)
12. Which spatial features of your classroom would you prefer to be changed or developed?

13. a. Are the children allowed to personalize the learning spaces with the work they have produced? Y/N b. What kind of spatial opportunities are they provided to exhibit their work or personalize their environment?

14. Which activities are performed in the outside/school garden in addition to the ceremonies? How often?

Physical Exercise Courses/ Other Course Related Activities/Social Activities/Other (please specify) (Scale: 1= Never, 7= Always)

E. Information Regarding the Use Patterns during the Recess Periods

15. Which activities do the student engage in during the recess periods?

16. a. Do the age differences lead to changes in the type of activities that children perform during the recess periods? Yes/No b. How?

F. Opinions About the Impact of Spatial Design Quality on Academic Motivation

17. How do you evaluate the design quality of an educational space in terms of its impact on students' interest and academic motivation? (Scale: 1:Not Important 7: Very Important)

18. How do you evaluate the design quality of an educational space in terms of its impact on teachers' interest and motivation? (Scale: 1:Not Important 7: Very Important)

Appendix A.3: Opinions About The Sources of Change in Spatial Requirements

Table 1: The list of codes given to the written responses to the Question 5.

Response Codes

A1 : Changes in the number of students (increases), B1 : Number of Classrooms, B2 : Inadequate Classroom Size, B3 : Providing variety of spaces for educational activities, B4 : Allowing changes in classroom layout and organization B5 : Providing comfort , B6 : Providing general accessibility, C1 : Improving the selection of color choices in school spaces, C2 : Improving heating, cooling, ventilation, C3 : Improving acoustic qualities and noise control, C4 : Improving lighting qualities, C5 : Improving the accessibility of technological features and equipment, D1 : Need for subject-specific, devoted spaces for lessons, D2 : Need for being at the spaces outside the school during lessons according to the course subjects, D3 : Providing space for music lessons, D4 : Providing space for plastic arts lessons, D5 : Providing space for physical activities and sports, D6 : Need for science laboratories , D7 : Need of space for foreign language lessons , D8 : Need of a computer laboratory, D9 : Improving the design of spaces to allow the use of different educational methods, E1: Need for a multi-purpose space with a stage for drama activities E2 : Providing space for the exhibition of student works, E3 : Providing space for social-cultural activities and additional courses, E4 : Needs related to outdoor space use, E5 : Providing greenery in outdoor environment, E6 : Providing space for reading and individual studies, E7 : Improving the social areas, common informal spaces for break-out times, F1 : Providing space for children's self-expression needs, F2 : Providing space for play and movement needs, F3 :Providing space for observation and experimentation, F4 : Increasing children's' attention and motivation during the lessons, F5 : Improving the school design according to age and classroom-level differences between students, F6: Improvement of the overall design according to children's needs G1 : Need of changes emerged due to the conversion of half-day education to full-day education, G2 : Security Concerns

No	Written responses to the question "What do you think are the most important issues that are the source of the need for spatial changes in the short or long term at school?"	Response Encoding
1	Her zaman okulda çalışma olmamalı farklı mekanlarda ders işlenmeli. Sınıflar büyüdükçe sıralar değişmeli. Küçük (yaşça) sınıflarda daha küçük sıralar olmalıdır. Okul içinde değişik sınıf ortamları olmalıdır. Müzik ortamı, beden eğitimi ortamı, resim atölyesi ortamı gibi. Öğrenci sayısına göre daha çok sınıf olmalıdır.	A1, B4, D2, D3, D4, D5, F5
2	Sınıf panolarındaki çalışmaların değişikliği, öğrenci işlerinin sergilenmesi. Kapıların, koridorların canlı renklere boyanması, sınıf sayısının artması.	A1, C1, E2
3	Sosyal kulüpler için ayrı faaliyet alanı, derslikler gerekiyor. İlkokul ve ortaokul dersliklerinin ayrı binalarda olması gerekir, öğrenci sayısının artışı.	A1, E3, G1
4	Spor aktiviteleri, her türlü spor aktivitesi için mekanların olması, varolan mekanları eğitim öğretime uygun hale getirmek.	D5, G1
5	Okullarda mekan değişikliği sosyal faaliyetlere, ders dışı aktivitelere bağlı olarak meydana geliyor. Ancak okullardaki derslik yetersizliğine bağlı olarak gerçekleştirilemiyor. Bence okullara fen laboratuarı kurulmalı ve öğrenciler dersi bu ortamda işlemeli. Beden eğitimi için kapalı ve donanımlı spor salonları yapılmalı. Müzik derslerine yine müzik aletiyle donatılmış derslikler tasarlanmalı. Drama salonu olmalı ve öğrenciler için sunum yapma ortamı bulunmalı.	B1, D1, D3, D5, D6, E1, E3, F1
6	Çocukların hareketleri her mevsim iç mekanla sınırlı, bahçeye çıkma ihtiyacı oluyor. Mevsim geçişlerini bile gözlemleyemiyoruz.	E4, F2, F3
7	Oyun alanı eksik. Öğrenci sayısı çok, derslik sayısı az. Sosyal çalışmalar için birim yetersiz. Plansızlık, tekli öğretime geçiş. Eskiden içinde bulunduğum okulda her olanak vardı, şimdi yok.	A1, B1, E3, F2, G1
8	Sınıfların darlığı, geniş sınıf ihtiyacı. Derslere göre özel sınıflar olmalı. Matematik dersi, fen bilgisi, İngilizce (kulaklıklı)	B2, D1, D6, D7
9	Derslikler küçük olduğu için mekan değişikliği sorunları çözmüyor. Bahçe ve oyun alanı yeterli değil.	E4, F2
10	Öğrencileri alışık olduğu uyarıcılardan uzaklaştırmak, dikkatlerini toplamak (gürültü vs). Çocukarın dikkat dağınıklığına kanal oluşturmak adına değişiklik mantıklı ama alışık olmadıkları mekanlardan uzak durulmalı. İngilizce dersi için dil sınıfı imkanı sağlanmalı.	D7, F4
11	Oyun alanları, kitap okuma alanları, dinlenme alanları, resim ve uygulama atölyeleri, donanımlı konferas-tiyatro salonu. Fiziki şartlara göre donanımı artırılabilir.	E6, F2
12	Okulun tüm mekanları küçük olduğu için dersleri farklı mekanlarda yapmak öğrenci sayısının çok oluşu sorununu çözmemektedir. Geniş bir bahçe, havalandırılabilen bir spor salonu, Işık ve hava girmesi için koridorlarda cam olması…	A1, B2, C2, C4, D5, E4

13	İstediğimiz ders saatinde beden eğitimi yapamıyoruz. Kütüphanemiz olmadığından çocuklar mahrum kalıyor, istedikleri zaman istedikleri kitaplara ulaşamıyorlar. Bahçemiz çok küçük olduğu için çocuklar oyun oynayamıyor.	D5, E4, E6
14	Laboratuar yok, spor salonuna ihtiyacımız olduğunda diğer sınıflarla ortak kullanmak zorundayız, rahat kullanamıyoruz.	B1, D5, D6
15	Öğrencilerin sınıf içindeki oturma düzenlerinde ve sosyal etkinlikleri farklı mekanlarda gerçekleştirme ihtiyacı oluyor. Çocukların oyun alanlarında değişiklik yapılması ihtiyacı, daha büyük olabilir daha uygun olabilir, oyuncaklar yumuşak zemin olabilir. Kütüphane, laboratuar, spor salonu gerekiyor.	B4, D1, D5, D6, E3, F2, F6
16	Özellikle küçük yaş gruplarında mekan değişikliği çok önemli. Kendilerini özgürce ifade edebilecekleri bir resim atölyesi olabilir, şarkı söyleyebileceği bir oda olabilir, enerjisini atabileceği bir beden eğitimi salonu olabilir. Sürekli sınıfta ders yapmamak başarıyı artırmak için önemli bir konu, farklı aktivite odalarına ihtiyaç var.	D1, D3, D4, D5, E3, F1, F5, F6
17	Panolar değişiyor. Okul ve sınıfların daha renkli olması ihtiyacı. Kapalı spor salonu ve kütüphane ihtiyacı	C1, D5, E2, E6
18	Okulların çocukların ilgisini çekecek şekilde düzenlenmesi, renklendirilmesi, duvarların, yerlerin, panoların bilgilendirme amaçlı kullanılması kütüphane, laboratuar ve spor salonu ihtiyacı	C1, D5, D6, E2, E6, F6
19	Okul ve sınıflar. Kütüphane, laboratuar ve spor salonu ihtiyacı. Genel olarak çocuklara hitab eden bir ortam oluşturulması ihtiyacı	B4, D5, F6
20	Birçok mekanda değişiklik yapmak gerekiyor. Öğrenci sayısı fazla. Kütüphane ve bilgisayar sınıfları ihtiyacı, öğretmenler odası	A1, D8, E6
21	Sınıfların küçüklüğü, öğrenci sayısının fazlalığı. Kütüphane, laboratuar, bilgisayar odası, spor salonu	A1, B2, D5, D6, D8, E6
22	Sportif faaliyetler için bahçenin düzenlenmesi, beceri dersleri için sınıflar, geniş mekanlar, renkli mekanlar için okulun boyanması, sınıfların genişletilmesi, kapalı spor salonu, kütüphane	B2, C1, D5, E4, E6
23	Sportif faaliyetler, teknoloji eğitimi, daha büyük alanların çok bölümlü olarak düzenlenmesi	B4, D5, D8
24	Mekan değişikliği yaparak çocukların motivasyonunu artırmak. Branş dersliklerinin olması, okul gezileri	D1, D2, F4
25	Öğrenci ve öğretmenlerin ara sıra değişik faaliyetlerde bulunabildiği farklı etkinlik alanları olabilir. Oyun alanları, sosyalleşme, sosyal faaliyetler ve dinlenme alanı ihtiyacı. Gün geçtikçe artan strese ve soğuk havada kapalı mekanda olma durumuna karşı öğrenci ve öğretmenlerin motivasyonunu artırcı faaliyet alanları ihtiyacı.	E3, E7, F2, F4
26	Okulların çoğunda spor salonu yok, fen derslerinde kullanılabilecek bir laboratuar yok.	D5, D6
27	Resim, müzik gibi etkinliklerde farklı mekanların kullanılması bu derslerin daha verimli kılacağına inanıyorum. Aynı ders ortamından öğrenciler kurtarılmalı. Bir spor salonu mutlaka olmalı.	D1, D3, D4, D5, F4
28	Çocuklara daha fazla hitab eden somut nesneler, daha fazla duyu organına hitab eden mekanlar	F3, F6
29	Okulun spor salonunun olmaması en büyük eksikliktir. Ayrıca destek eğitimi (kurslar, klüpler) için derslikler yetersiz kalmaktadır.) Uzun vadede okulun yeniden yapılandırılması gerekiyor bence. Yıkılıp yeniden inşa edilmeli. Öğrenci sayısına göre daha çok ve daha geniş sınıflar olmalı. Malzemesi, rengi ile ortam çocuklara hitab etmeli. Bahçe oyun ve spor için yeniden düzenlenmeli.	A1, B1, B2, B3, B4, C1, D5, E3, E4, F2, F6
30	Laboratuvar ve salon (spor, sosyal etkinlik için çok amaçlı mekan) ihtiyaçları var. Bu mekanlar ulaşılabilir olmalı. Çocukların Yeşil alan ihtiyacı var, bahçe buna göre düzenlenmeli, çocukların doğa ile ilişkisi yok. Dışarda vakit geçiremiyorlar.	B6, D5, D6, E1, E3, E4, E5, F2,F6
31	Sınıf mevcutların kalabalık olması nedeniyle fiziksel ortam küçük geliyor. Oturma düzeni ya da farklı yöntemlerin kullanılması için hiçbir düzenleme yapılamıyor.	A1, B4, D9
32	Öğrenci sayısının fazlalığı. Bahçe alanının verimsiz kullanımı. Bahçeyi oyun ve spor saatlerinde dönüşümlü olarak kullanıyoruz oysa daha nitelikli bir ortam yaratılabilir, şubelere bölüştürülebilir, paylaşılabilir.	A1, E4
33	Görsel sanatlar dersi için atölye, beden eğitimi ve oyun için spor salonu olmalı ve bahçe alanı tüm ihtiyacı karşılayacak şekilde büyük olmalı. Bahçe derslerde çeşitli aktivitelere izin vermeli. Çocukların doğayı tanıyabilmesi için yeşil alan olmalı.	D1, D4, D5, D9, E3, E4, E5, F2, F3
34	Sınıf mevcutlarına göre sınıflar çok küçük kalıyor.	A1, B2
35	Ders konularına göre farklı mekanlarda, farklı biçimlerde gerçekleştirilebilir. Yer değiştirme öğrencilerin ilgisini, motivasyonunu arttırır. Spor salonu , kütüphane, resim, müzik odası olabilir.	D1, D3, D4, D5, D9, E6, F4
36	Spor yapılabilecek bir mekanın olmaması beden eğitimi derslerini olumsuz etkiliyor. Kışın çocuklar hiç hareket edemiyor. Kütüphane, akıl oyunları sınıfı, müzik ve resim atölyesi gibi ek sınıflara ihtiyaç duyuluyor.	D4, D5, E3, E6
37	Sınıf içi daha rahat, eğlenceli ve renkli olmalı. Ders materyalleri ulaşılabilir ve bol olmalı. Teknolojik eğitim materyalinde sorun yaşanmamalı. Mekanlar mümkün olduğunca daha geniş olmalı, farklı etkinliklere, grup çalışmalarına izin vermeli.	B2, B3, B4, B5, B6, C1, D9
38	Spor salonu, laboratuvar, asansör ihtiyaçları. Tüm mekanlar her çocuk için erişilebilir olmalı. Çocukların hareket edebilmesi için spor salonuna ihtiyaç var.	B6, D5, D6

39	Fiziksel hareketler ve oyun için yeterli mekan olmalı. Tam kütüphane gibi değil ama okuma köşeleri olabilir.	E6, F2
40	Ders içeriğinin, konusunun ihtiyacı. İhtiyaç duyulan konulara göre oyun ve sanatsal etkinlik, müzik, resim, sosyal etkinlikler, drama) alanları oluşturulmalı.	D1, D3, D4, E3, F2
41	Ders içeriği, ders işleyişidir. Sınıfta veya okulda konulara dair afişler olmalı. Mekanlar günün veya haftanın önemine göre değişikliğe gidebilir. Uzun vadede yaş farklılığıdır bence. Çünkü öğrenci her yıl biraz daha büyüyor ve algısal olarak farklılaşıyor. Bu algı içeriği önemlidir, buna göre 160nlaştığ olarak bilgi algı ve görsel olarak değişikliğe gidilebilir.	D1, F5
42	Spor salonu, kütüphane ve laboratuvar eksiklikleri en önemli konulardır. Sınıf içine minik kitaplıklar ve fen köşeleri yapılabilir. Ancak sınıflarda boyut, alan çok kısıtlı. Okulda bahçe yetersiz, spor faaliyetleri için yer yok. Uzun vadede öğrenci sayısının azaltılarak dersliklerin bir kısmının sosyal aktivitelere ayrılması iyi olurdu. Tiyatro, drama çalışmaları için sahne gerekliliği oluyor.	A1, B2, D5, D6, E1, E3, E4, E6
43	Kütüphane, spor salonu ihtiyacı. Kütüphane için boş bir sınıf bile düzenlenebilir.	D5, E6
44	Şu anda sınıf mevcudum yeterli (25) o yüzden hiçbir sorunum yok ama okul bahçesi okul için çok küçük, zemini uygun değil. Asfalt okul bahçesi mi olur? Okulda spor salonu, kütüphane , laboratuvar ve bilgisayar sınıfı olmalı.	A1, D5, D6, D8, E4, E6
45	Bir İngilizce sınıfı olması gerekiyor ve okullar tam gün eğitime göre düzenlenmeli, şu anda çok kalabalık. Tam günü geçirecek şekilde yemekhane, sosyal alanlar yok.	A1, D7, E7, G1
46	Çocukların dikkatini derse toplamak, ders (branş) sınıflarının oluşması ile öğrenme sürecini hızlandırmak. Uzun vadede spor salonun, müzik, resim odalarının ve fen ve teknoloji sınıflarının oluşturulması ihtiyacı.	D3, D4, D5, D6, D8, F4
47	Mevcutları azaltıp en azından salon olmayan okullarda sınıf içerisinde farklı etkinlik yapabilme imkanı yaratılabilir. Özellikle ilkokul çocukları oyuna çok fazla gereksinim duyuyor. Ancak bahçe ve salonlar ilkokullarda düşünülmemiş durumda. Kalabalık sınıflarda durum çözümsüz ama mevcut 20 kişiden azsa sınıf içi etkinlikler yapılabilir.	A1, B2, B4, D5, E4, F2
48	Mekanın yürütülen çalışmalara olan katkısı yadsınamaz. Özellikle branş dersleri konusunda (resim, müzik, fen, matematik, spor) farklı, tam donanımlı mekanlar çocuğun ilgisine çekeceği için algısını da aynı oranda artıracaktır.	D1, D3, D4, D5, D6, D7, D8, F4
49	Sosyalleşme, kendini ifade etmek için sosyal-ortak mekanların olması ihtiyacı. Sınıfların çok kalabalık olması, sınıflara düşen öğrenci sayısının azalması için daha fazla sınıf olması.	A1, B1, E3, E7, F1
50	Genelde 160nlaştığ değişiklik yapmıyoruz ama böyle uygulamalar çok yararlı olabilir, öğrencilerin ilgi ve merakını artırmak için gerekebilir.	F4
51	Beden eğitimi derslerinde kapalı bir spor salonunun olması ihtiyacı, müzik ve görsel sanatlar derslerinde de ders araç gereçlerinin olduğu özel sınıflar olması öğrenme ve öğrencinin ilgisini toplama açısından olumlu olacaktır. Sınıf içinde öğrencilerin oturdukları sıraların değiştirilmesi, farklı öğrencilerle oturmaları ve uzun süre bir arada oturmalarından kaynaklı gürültü engellenebilir.	B4, D1, D3, D4, D5, F4
52	Çocuklar okuma saatinde kütüphane, spor vaktinde spor salonunda resim resim yapacağı zamanda atölyeye girseler daha keyifli ve verimli ders yapılabileceğini düşünüyorum.	D1, D4, D5, E6, F4
53	Dört duvar arasında 45 kişilik sınıflarda insanlar doğal olarak daha sakin, dinlendirici ortamlar istiyor. Sınıf içinin, koridorların daha ferah ve havadar olması gerekiyor. Bahçe ise küçük de olsa yeşil alanları içermeli. Bu her iş ortamı için geçerlidir, hep aynı ortamda çalışmak insanları sıkabilir. Dışarda olan işlere yönelmek isteyebilir. Yerinde görerek öğrenmek için geziler iyi bir fırsattır. Okulda da farklı etkinlik alanlarıyla bu sorun çözülebilir.	A1, B5, C2, D1, D2, D9, E3, E4, E5
54	Müzik dersi sınıfı, spor salonu, resim atölyesi ve laboratuvar ihtiyacının olması. İkili eğitim nedeniyle sınıfların yerinin değişmesi. Gürültü ve güneş nedeniyle bahçe tarafı tercih edilmiyor.	C2, C3, C4, D3, D4, D5, D6, G1
55	Yetenek gerektiren dersler için spor, resim, müzik, okul içinde değişikliklere ihtiyaç vardır. Çok amaçlı salonların daha tanımlı hale getirerek resim, müzik sınıflarına ya da spor salonuna dönüştürülmesi iyi olurdu.	D3, D4, D5, E1, E3
56	Öğrencilerin sınıf dışında da her alanda kendilerini ifade edebilmeleri için mekanlar oluşturulması gerekiyor. Çocukların okulu sevmeleri için sınıfların ve ortak kullanım alanlarının işlevsel ve ilgi çekici olması gerekiyor.	D1, E3, E7, F1, F4, F6
57	Ders dışı etkinlik alanları eksik, değişiklik yapmak mümkün olmuyor. Tören kutlama etkinliklerinde çok amaçlı salonla ilgili düzenlemeler yapılıyor.	D1, E1, E3
58	Kapalı spor salonu olmalı, satranç odası olmalı, İngilizce sınıfları olmalı, sınıf mevcutları düşürülmeli bunun için okulda değişiklik değil, okul yapılmalı.	A1, B3, D7, E3
59	Sınıfta oturma düzeni değişiklikleri, farklı konularda derslerin farklı ihtiyaçları	B4, D1
60	Beden dersi için kapalı spor salonu, müzik dersi yapılabilecek ses geçirmeyen oda gibi dil sınıfı gibi ihtiyaçlar	D3, D5, D7
61	Müzik, beden eğitimi ve görsel sanatlar derslerinin işlenmesi için mekan ihtiyacıdır. Okulda müzik odası, resim atölyesi, ve yağışlı havalarda kullanmak için kapalı spor salonu alanları olmalıdır.	D3, D4, D5
62	İngilizce sınıfına ihtiyaç duyuluyor. Çocukların derse gelip İngilizce materyallerle dolu olan sınıfta öğrenim görmeleri her zaman faydalı olacaktır.	D7
63	Farklı ders konularına göre değişen mekanlar, her dersin mekanı farklı olmalı.	D1
64	Sınıflar ve koridorlarda ders konusuna göre. Sergileme, öğrenci işlerinin asılması	E2
65	Sınıfların kalabalık olması yeni sınıfların gerekliliğine neden oluyor. Fiziksel şartlarla ilişkin değişiklik ihtiyacı oluyor. Isınma, aydınlık olması ihtiyacı gibi…	A1, B1, C2, C4

66	Derslerin daha verimli işlenmesi ve öğrenilmesi için öğrenme mekanlarının çeşitlendirilmesi gerekiyor. Laboratuar, kütüphane, atölyeler, resim, müzik odaları, spor salonları, aktivite alanları olması lazım.	B3, D3, D4, D5, E3
67	Okulun duvarlarının fazlasıyla renksiz olması hem öğrencileri hem bizleri olumsuz etkiliyor. Bu yüzden boya ihtiyacı çıktı. Merdiven korkulukların daha güvenli ve sağlam olması gerekiyor.	C1, G2
68	Çocuklar koşma istekleri ve enerjilerini atabilsinler diye hareket edebilecekleri, koşabilecekleri alan ihtiyacı doğuyor. Bahçenin daha büyük olması gerekiyor.	E4, F2
69	Sınıfların özellikle duvar yüzeylerinin öğrenme faaliyetleri için çocukların çalışmalarıyla, öğretici poster ve görsellerle daha verimli kullanılması gerekiyor. Sınıfların büyütülmesi ve ek mekanlar oluşturulması ihtiyacı çıkıyor, mevcut sınıflar öğrenci sayısını da düşününce düzenlemeye izin vermiyor.	A1, B1, B2, B4
70	Bahçe genişliği, kesintisiz internet ihtiyacı ve derslerde de çıkılabilecek geniş bir bahçe alanı ihtiyacı. Spor alanı ihtiyacı ve çocukların teneffüslerde vakit geçirdiği kantin ve tuvaletlerin daha iyi, ferah şekilde tasarlanması.	C5, D5, E4, E7
71	Okul içinde etkinlik sınıfları oluşturulmalı. Fiziksel etkinlik, iş teknik vs gibi.. Okul bahçesi de fiziksel etkinliklere göre bölünebilir çocuklar anlamsızca koşuyor.	D1, D4, E3, F2
72	Eğitim faaliyetlerini desteklemek ders ya da faaliyet konularına göre günü birlik veya haftalık mekânsal değişiklikler yapılabilir. Öğrencilerin ilgilerini toplayıp sıkılmalarını engellemeye yardımcı olur. Bunun dışında mekanlarda renk değişimi, sınıf içinde oturma düzeninin değişmesi de başka ihtiyaçlar	B4, C1, F4
73	Ders konularına göre değişiklikler, sıraların yerlerinin değişmesi, sergileme, drama sınıfı, bahçede oyun alanı olması gerekir. Spor faaliyeti yapabilecekleri yer gerekir. Öğrenci sayısı çok fazla, daha fazla derslik gerekiyor.	A1, B1, B4, D5, E1, E3, E4
74	Öğrencilerin oyun alanı ihtiyaçları. Bahçeye buna yönelik yaşlarına uygun spor ve oyun alanı gereçleri konulması daha iyi vakit geçirmelerini sağlayabilir.	E4, F2
75	Sınıfların daha geniş olması gerekir. Koridorlarda boşlukların (galeri boşluğundan bahsediliyor) olmaması ve güvenli olması gerekir. Daha renkli okullar olmalı, fiziksel aktivite için alanlar yaratılmalı.	B2, C1, F2, G2
76	Kütüphane olmalı, yemekhane olmalı, sınıfların kullanım alanları küçük, sırayla dolu. Resim, beden, müzik dersleri için alan olmalı. En önemlisi yeşil alan olmalı.	D3, D4, D5, E5, E6, E7
77	Daha fazla sınıf gerekiyor, mevcutlar çok fazla. Okulun hayat dolu olmasını sağlayabilmek için daha çeşitli ortam gerekiyor.	A1, B1, B3, G1
78	Gerekli sayıda sınıfın bulunmaması nedeniyle her mekan sınıfa dönüşüyor. Okul yapısı sisteme göre, eğitim-öğretime göre inşa edilmeli, değişikliğe uyum sağlayamıyor.	A1, B1
79	Derslerdeki konuların, müfredata göre özellikle serbest etkinlik ve beden eğitimi ve oyun derslerinde bahçe kullanımına, spor salonu kullanımına yönelik mekanların olması. Resim, müzik, fen sınıfları olmalıdır. Ders kazanımının miktarını mekanın kullanılabilirliği belirlemektedir. Mekanlar müfredatla uyumlu olarak planlanmalı. Ancak okullarda genel olarak öğrenci sayısı çok fazla olduğu için her mekan sınıfa dönüştürülmektedir. Temel sorun okul sayısının az öğrenci sayısının fazla olmasıdır.	A1, B1, D1, D3, D4, D5, D6
80	Deney amaçlı laboratuvar, kitap okuma ders çalışma için kütüphane ve spor salonu ihtiyacı. Gezi gözlem amaçlı okul dışında ders yapılabilmesi…	D2, D5, D6
81	Spor, deney yapma gibi ders konularına göre çeşitlenen mekanlar olması ihtiyacı. Tüm bu ihtiyaçlar için aynı mekan içinde de çözümler üretilebilir. Yemekhane ihtiyacı, çocukların yemek yiyebilecekleri bir yer yok.	D5, D6, E7
82	Fen bilimleri dersinde laboratuvar ihtiyacı oluyor. Sınıf içinde bir okuma köşesi de öğrencilerin motivasyonu için iyi olabilirdi. Tarih derslerinde geziler, müze gezileri ders konularının çocukların aklında kalmasını sağlıyor.	D2, D6
83	Beden eğitimi ve spor salonu ihtiyacı. Sosyal bilgiler ve fen bilimleri dersleri için mekan ihtiyaçları doğuyor. Etkileşimli tahta ile çocuklara farklı görseller sunarak bu ihtiyacı karşılıyoruz.	D5, D6
84	Özellikle fen ve teknoloji konuları laboratuvarda işlemek çok önemlidir. Türkçe okuma saatlerini kütüphanede gerçekleştirmek çocukların motivasyonunu artırabilirdi.	D6, D8, E6, F4
85	Gösteri ,tiyatro salonu , okuma alanı, satranç akıl oyunları sınıfı gibi kulüp etkinlikleri ve sosyal etkinlikler için mekan ihtiyacı doğuyor. Spor salonu ihtiyacı oluyor.	D5, E1, E3
86	Sınıfların küçük, mevcutların kalabalık olması nedeniyle çıkan ihtiyaçlar. Sosyal etkinlik alanları oluşturulmalı, beden eğitimi için gerekli alan olmalı, bunun dışında resim, müzik vs branş dersleri için özel ortamlar olmalı.	A1, B2, D3, D4, D5
87	Öğrencilere sosyal aktiviteler için salon sağlanması gerekiyor. Okul her yönden donanımlı olmalı. Mevcutlar kalabalık olduğu için daha çok derslik ve okul olmalı.	A1, B1, E3,
88	Güzel içeriğe sahip bir kütüphane ve kapalı spor salonu ihtiyacı. Öğrencilerin dikkati hep aynı yerde olunca dağılıyor.	D5, E6, F4
89	Bilim ve sanat uygulamaları için mekanlar, laboratuvar ve resim, müzik odaları gibi. Bedensel gelişim için bir spor salonu ve çocukların ilgisini çekebilecek çocuklara yönelik bir kütüphane-okuma alanı.	D3, D4, D5, D6, E6, F4
90	İlkokul öğrencilerinin yaşları itibariyle çok çabuk sıkılmaları, ilgilerinin çok çabuk dağılması nedeniyle derslerin konularına göre farklı mekanlarda yapılması dikkatlerini toplamaları açısından yararlı olabilir. Uzun dönem tekrar eden tüm alışkanlıkların mekan da dahil insanların üzerinde oluşturduğu sıkılma, yorulma, bıkma hissi iyi gelmiyor. Duvarların ve kapıların renkleri, sınıf için mobilyaların yaşa göre değişmesi ve panolarda öğrenci çalışmalarının sergilenmesi yapılan, yapılabilecek bazı değişiklikler…	C1, D1, D2, E2, F4, F5,
91	Öğrenci dolaplarının temin edilmesi, askılık kitaplıkların yapılması gerekiyor. Her gün tüm kitaplarını eşyalarını taşımasınlar, kaybolmasın diye böyle bir ihtiyaç var. Sınıflarını da böylece daha çok benimserler.	B4, F6
92	Koridor ve tuvaletlerin geniş olması. Çok amaçlı ve salonların, en önemlisi okul bahçesinin geniş olması. Tuvaletler çok az sayıda ve teneffüste öğrencilere yetmiyor.	E1, E3, E4, E7

93	Resim, müzik ve spor salonu gibi çalışma alanları ve aktivite alanları oluşturulmalı. Çocuklara okulu eğitim-öğretimi sevdiren çalışma ve değişiklikler yapılmalı. Mekanlar çocuklara göre olmalı, eşyalar, renkler…Devlet dairesi gibi olmamalı.	C1, D3, D4, D5, F6
94	Kitap okuma salonu ihtiyacı oluyor. Öğrencilerin var olan yeteneklerini kullanmalarına, geliştirmelerine olanak sağlayan araç-gereç, materyallerin olduğu salonlar olmalı. (spor,müzik, görsel,laboratuar)	D3, D4, D5, D6, E6
95	İşlik (resim) ve müzik odası olmalı, spor salonu olmalı.	D3, D4, D5
96	Okulda bir spor salonu olmalı.	
97	Dersin konusunda göre ders-araç gereçlerinin kullanılması ve uygulama alanlarının kullanılması (fen, teknoloji laboratuvarı)	D1, D6, D8
98	Görsel panoların kullanılması ve konuya göre ders araç-gereçlerinin kullanılması. Panolarda öğrenci çalışmaları sergileniyor. Teknolojik altyapının yenilenmesi. Spor salonu, laboratuvar, derslik mekanlarının yenilenmesi.	C5, D5, D6, E2
99	Ders ortamlarının daha havadar, ferah olması sağlanmalı. Çocuk psikolojisi düşünülerek mekanlar hayata geçirilebilir.	
100	Sınıf mevcutlarının kalabalıklığı, mekânsal darlık ve öğrenci mevcudunun çok olması. Bu konuda yeterli altyapının olmaması.	A1, B2
101	Öğrenci seviyesine yaşına göre yapılması gereken değişiklik ihtiyaçları oluyor. Sıralar, mekan, renkler… Her sınıfa göre farklı ihtiyaçlar oluyor.	B4, C1, F5
102	Farklı alanda bedensel faaliyet yapmak, kütüphane gibi ortamlarda okuma, araştırma yapmak, deney amaçlı laboratuvar kullanmak. Kullanılabilecek sportif ekipmanlar geliştirilmesi, zengin, geniş, ferah, okuma alanı düzenlenmesi, öğrenci düzey ve gelişimine uygun laboratuvar geliştirilmesi gerekir. Gezi gözlem amaçlı mekan değişikliği yapılabilir. Öğrenci yaş ve gelişimlerine uygun mekanların seçilip öğrenciler bilgilendirme gezisine dahil edilebilir.	D2, D6, E6, F2, F5
103	Fen bilimleri dersinde laboratuvar ortamı, müzik dersinde bir müzik odası, beden eğitimi için spor salonu, Türkçe kapsamında yer alan kitap okuma ve araştırma konularında kütüphane ortamı, gezi gözlem çalışmaları ve akıl oyunları odası ihtiyacı. Bahar döneminde de düzenlenmiş bir bahçe tercih edilebilir. Ders burada yapılabilir.	D1, D3, D6, E6
104	Sınıf camlarının açılabilir olması ve duvarların boyanması , renklendirilmesi ihtiyaçları	C1, C2
105	Yabancı dil öğretiminde özellikle dil laboratuvarının olmaması yabancı dil öğretmenleri için büyük handikap. Aynı sınıf içinde uzun vadede kalmak öğrencileri sıkıyor. Mekansal değişikliklere ihtiyaç duyuluyor. Farklı ortamlar öğrenmeyi olumlu etkiliyor.	D7, F4
106	Alanın yetersizliği, oturma düzeni değişikliği. Derslere uygun öğrenme alanları. Spor salonu, kütüphane, görsel sanatlar salonu gibi ek mekan ihtiyaçları.	B2, D4, D5, E6, F4
107	Sınıflardaki oturma düzeni değiştirilebilir. En arkadaki öğrenciyi görmek, ona ulaşmak çok zor olmakta. Sınıf düzenlemeleri öğrencilerin daha iyi odaklanabileceği şekilde düzenlenmeli.	B4
108	Öğrenciye uygun olmalı. Okula uygun olmalı. İlkokul öğrencilerine göre renkli, ulaşılabilir olmalı. Bahçede bir oyun alanı olmalı.	B6, C1, E4, F6
109	Sınıfların daha geniş, koridorların güvenlik açısından daha uygun, (düz, geniş) olması gerekmektedir. Okullarımız çocukların ruhsal gelişimine uygun boyanmalı, koridorlar çeşitli olan gelişimlerine uygun düzenlenmeli.	B2, C1, F6
110	Laboratuvar eksikliği, çok amaçlı salon eksikliği.	D6, E1, E3
111	Sınıflar aydınlık ama ortak alanlar çok karanlık, kasvetli. Koridorun biçimi güvenlik açısından uygun değil, kuytu köşeler var. Bahçemiz çok küçük. Çocuklara biraz yeşil alan, oyun alanı sağlanması teneffüste daha verimli zaman geçirmeyi sağlar. Derslerde de bahçe kullanılabilir. Bitki yetiştirilebilir vs.	C4, D1, E4, E5, F2, G2
112	Öğrenci sayısı sınıf için fazla. Düzenleme yapmaya pek olanak olmuyor. Sınıfın daha büyük olması gerekir ya da sınıf sayısı artacak. Derslerde bahçeye çıkılamıyor ayrıca öğrenci sayısına göre küçük. Bahçede yapılacak bir şey yok, yeşil alan yok.	A1, B1, B2, B4, D1, E4, E5
113	Sınıfım çok kalabalık. En fazla 25 kişi olmalı ki oturma düzeni değiştirebileyim. Bazı arkadaşlar yapabiliyor. Dikkat, konsantrasyon açısından iyi oluyor. Bahçede ekip biçilecek yeşil alan olabilir.	A1, B4, E5, F4
114	Çocukların kışın da vakit geçirmesi için yer ihtiyacı. Kantin içerde olabilir, oyun alanı olabilir. Mevcut yüksek ve mekanlar dar. Bahçeye yeşil alan yapılması, oyun alanı olması. Çocuklar ne yapacaklarını bilmedikleri için koşuyorlar.	A1, E7, F2
115	Öğrenci sayısında göre derslik sayısının artması. Mevcutlar çok kalabalık. Derslerin konusunda göre farklı yerlerde işlenmesi. Branş öğretmenleri olmasa bile resim, müzik, spor ve diğer günlük hayatla ilgili dersler için mekan değiştirilmesi. Daha çok okul, daha çok sınıf ihtiyacı. Tekli sisteme göre ilkokul çocuklarının ihtiyacına göre fonksiyonel okullar yapılması.	A1, B1, D1, D3, D4, D5, G1
116	Branş derslerine ayrılan alanlar bile sınıfa çevrildi. Sınıflarda oturacak yer bulamıyoruz, çok küçük. Düzenleme(derse göre) yapılması çok yararlı, ilgiyi artırır ama mekan sıkıntısı nedeniyle yapamıyoruz. Dersliklerin sayıca artırılması, bahçenin oyun alanı ve oturma alanıyla zenginleştirilmesi, okul içinde vakit geçirecek mekan olması okuma, oyun köşeleri gibi…	B1, E4, E7, F2
117	Yıl içinde hazırlanan ünitelendirilmiş yıllık plan doğrultusunda belirli günlerle ilgili mekanlara geziler yapılmaktadır. Gerektiğinde sınıf içinde ve dışında konuları içeren konferans salonu, müzik odası, atölyeler, bilgisayar odaları vb. yapılır.	D2, E1
118	Konular doğrultusunda belirli günlerle ilgili okul dışında müzelere, doğal alanlara geziler yapılmaktadır. Gerektiğinde sınıf içinde ve dışında konuları içeren konferans salonu, müzik odası, atölyeler, İngilizce sınıfı, bilgisayar sınıfları yapılır.	D2, E1
119	Müfredat doğrultusunda belirli günlerle ilgili mekanlara geziler yapılmaktadır. Gerektiğinde sınıf içinde oturma düzeninde sınıfta yapılan aktiviteye göre değişiklik yapılır.	B4, D2, D9, E1
120	NA	F2, G1

121	NA	
122	NA	
123	Okullarda şu anda 163nlaştığ değişiklik gerektiren ana konu öğrenci sayılarının artmış olması. Daha çok derslik ve ortak alan gerekiyor. Çocukların oynaması için içerde ve dışarda alan ihtiyacı var. Bahçede ne yapacaklarını bilemiyorlar, daha çok oturma oyun alanı gerekiyor, tanımlı olması lazım. Derste çıkınca çok fazla gürültü oluyor. Değişen eğitim sistemine göre (ikili-tekli, ilkokula dönüşme) uygun mekanlar olmalı. Hem müfredat hem de öğrenci sayısına yanıt verecek şekilde.	A1, B1, C3, E4, E5, F2
124	Okulların çok katlı ve bahçelerin küçük olması öğrenciler için dezavantaj. Bahçelerin zeminin sert ve ağaçsız olması, küçük olması bahçede oyunla ve yeşil alan içinde nitelikli vakit geçirmelerine engel oluyor. Okul bahçesinin daha geniş olması ve çocukların yaşlarına göre oyun alanı ve yeşil alan oluşturulması eğitim faaliyetleri açısından büyük yarar sağlayabilir.	D5, E4, E5, F2, F5
125	Sınıf içinde sıra düzenin değiştirilerek U tipi ya da başka biçimde oluşturulması. Genelde ders esnasında farklı çalışmalar için düzen değişikliğine olanak sağlanması gerekiyor.	B4, D9
126	Fiziksel aktivitenin artırılması için içerde ve dışarda mekan ihtiyacı oluyor. Bunun dışında laboratuvar, branş odalarında ders yapılması gerekiyor.	D1, D6, F2
127	Çocukların bu yaşlarda öğrenmeye ilgisi daha yoğun oluyor. Fiziksel özellikleriyle dikkat çeken mekanlarda ders yapılması hem ilgilerini hem motivasyonlarını artırmada önem arz ediyor. Bunun için konulara göre özel sınıflar, alanlar olması derslerin farklı mekanlarda yapılması onlar için yararlı olacaktır. Mevcut koşullarda dersin bahçede yapılması bile zor oluyor. Daha farklı ve değişik öğrenme mekanları oluşturulmalı.	B3, E4, F4, F6
128	Sınıf içinde oturma sıra düzenini değiştirme ihtiyacı, spor faaliyetleri için mekan değişikliği kısa vadede gereken değişiklikler. Bunun dışında oyun alanı ve bahçe, derslerde ve 163nlaştığım vakit geçirmeleri için yeşil alan ihtiyacı var.	B4, D5, E4, E5, E7, F2
129	Oyun saatleri, drama ve satranç aktiviteleri için farklı mekanlara geçme ihtiyacı oluyor. Okul içinde hep aynı tip sınıflar var ve spor faaliyetleri, sanatsal aktiviteler için yer gerekse de bulunamıyor. Yani gün içinde mekan değişikliği ihtiyacı oluyor ama yer olmadığı için sınırlanıyor.	D1, D5
130	Derslik sayısı yetersiz. Oysa ki farklı dersler için konulara göre farklı sınıflar yapılabilir.	B1, D1
131	Okulda bir binada bu kadar çok derslik olunca başka aktiviteler için yer kalmıyor. Derslik sayısı yetersiz. Oysa ki farklı dersler için konulara göre farklı sınıflar yapılabilir.	B1, D1
132	Aynı katta çok sınıf var ve sınıflada öğrenci sayısı fazla. Genel olarak derslik sayısı yetersiz. Bu nedenle sürekli başka sınıf ekleniyor, varolan her alan sınıfa dönüştürülüyor.	A1, B1
133	Okulun genel yapısı değilen müfreadata ve sisteme, çağdaş eğitim yöntemlerine cevap vermeli. Ögrenci sayısının artması, müfredat-sistem değişiklikleri 163nlaştığ değişiklik ihtiyacı doğuruyor ama yapılamıyor.	A1, G1
134	Branş dersleri için ayrı sınıflar, mekanlar olması gerekiyor. Farklı, çeşitli konularda dersler var hepsi aynı sınıfta, aynı düzende gerçekleşiyor. Ögrencilerin yaş gruplarına göre, hem de derslerin konularına göre farklı mekanlar olması gerekiyor.	D1, F5
135	Genel olarak derslerde konulara göre 163nlaştığ değişiklik ihtiyacı oluyor. Hayat bilgisi ve beden eğitimi dersleri farklı mekanlarda, bahçede gerçekleştirilebilir. Bahçede buna uygun alanlar yaratılabilir. Sınıf büyüklüğü de ara ara ortaya çıkan yeniden düzenleme ihtiyacını karşılamıyor.	B2, D1, E4
136	Hem içerde hem dışarda, 163nlaştığım163n serbest zamanları ve beden eğitimi derslerini geçirebilecekleri oyun alanı ihtiyacı ortaya çıkıyor.	E7, F2
137	Sınıf mevcutları çok fazla, azlatılmalı. Sınıflarda, okulda okuma köşeleri oluşturulabilmeli Okul çift 163nlaştığı ve sınıflarda değişiklik yapmak zor. Sıra düzenini ara ara değiştirmek gerekiyor.	
138	Ögrenciler bu yaşlarda çok hareketli ve sürekli aynı sınıf içinde ders yapmaktan sıkılıyorlar. Oysa konulara göre farklı bir ortama girdiklerinde derse odaklanıp daha aktif oluyorlar.	D1, F5
139	Mekana alışmanın vermiş olduğu rehavet değişikliğe engel oluyor. Tebdili mekanda ferahlık vardır dedikleri gibi, mekan dersleri sınıf dışında başka mekanlarda da gerçekleştirmeyi denemeliyiz aslında.	D1
140	Spor salonu, fiziksel aktivite için 163nlaştığ ihtiyaçlar oluyor. Çocukların sanat, spor, zeka oyunları gibi farklı alanlarda yeteneklerini geliştirmelerine yönelik çeşitli mekanlar oluşturulması.	B3, D3, D4, D5, F2
141	Sınıflar klasik oturma düzeninden kurtarılmalı. Geçmişte kara tahta vardı şimdi akıllı tahta kullanıyoruz bir sürü farklı aktivite yapılabiliyor ama oturma düzeni değiştirmek zor oluyor. Branş derslerine göre sınıf değiştirme ihtiyacı çıkıyor ama olanak az. Okul bahçesi genişlemeli, oyun alanı ve spor alanı gerekli. Şu anda bahçeye çıkıyoruz ama verimli kullanılamıyor.	B4, D9
142	Bahçede futbol sahası, basketbol potalarının düzenlenmesi ve çocuk kullanımına uygun hale getirilmesi çok önemli. Bahçe kullanımı en önemli ihtiyaç konusu. Sınıf düzenini hiç değiştiremiyoruz oturma düzenini ara ara değiştirebilmek gerekiyor. Sıralar hantal ve uygun değil. Oysa bu da bir ihtiyaç. Özellikle kışın spor alanı ihtiyacı oluyor. İçerde bir salon yok ve dışarısı da soğuk oluyor.	B4, D5, F2
143	Çocukların enerjilerini atabilmeleri için her gün bir dersin mutlaka spor salonunda ya da bahçede olması gerekir. Bunun için öncelikle spor ve oyun alanlarının uygun hale getirilmesi gerekiyor.	D5, E4, F2
144	Çocuklara bahçede enerjilerini atabilecekleri oyun ve spor alanları gerekiyor.	D5, E4, F2

Appendix A.4: Assessments on Spatial Features of Qualified Learning Spaces

Table 1: The list of codes given to the written responses to the Question 6.

Response Codes

A1 : Spatial variety and thematic learning spaces, A2 : Rearrangeable spaces and unconventional classroom layout, A3 : Qualified design of outdoor spaces and including greenspaces/natural elements, A4 : Sufficient spaces in size and fewer students, A5 : Other informal areas of learning & spaces for through experience, A6: Designed according to children physical and cognitive needs, A7 : Spaciousness and well-lit spaces

Participant No	Written responses to the question "Where was the most qualified learning space you've ever seen or experienced? In terms of which spatial design features do you think this space is successful?"	Response Encoding
1	Bundan 12-13 yıl önce gördüğüm güzel, aydınlık bir resim atölyesi olan okul.	A7
2	Odunluktan bozma sınıfta da eğitim yaptığımız oldu, günümüzdeki okullarda da eğitim faaliyeti gerçekleştirdik. Çok fark görmedim. Önemli olan öğrencinin motivasyonu. Öğrenci sayısının fazla olmadığı okullar daha nitelikli.	A4
3	Farklı sosyal faaliyet sınıflarının, mekanların oluşturulduğu (satranç, piyano-müzik, tiyatro gibi) öğrencilerin yeteneklerine göre yerleştirildiği bir özel okulu nitelikli buldum.	A5
4	Aydınlık, geniş, ferah, yapısal uygunluğu standartları sağlayan eğitim mekanlarını beğeniyorum.	A4, A7
5	Sınıf bazlı bir okuldu (her ders için ayrı mekan). İngilizce dersliği vardı. Kütüphane vardı. Her dersi ilgili salonda yapabiliyorduk.	A1, A5
6	Beyoğlu Haliç İlkokulu'nun yıkılan eski binası. Çok geniş bir bahçesi ve bolca yeşil alanı vardı. Hem tören, kutlama etkinlikleri için iyi bir yer sağlıyordu hem de çocuklar yeşille doğayla içe içe olabiliyordu, bir şeyler ekiyorlardı. Küçük bir kümes bile vardı.	A3
7	Örneğin bu okulda daha önce bolca alan vardı, öğrenci sayısı nedeniyle hepsi sınıf oldu. Öğrenci sayısı çok fazla olunca hiç yer kalmıyor. Az öğrencili bol bol farklı, çeşitli mekanlara sahip okullar nitelikli. Öğrenciler hep aynı yerde oturmaktan çok sıkılıyor.	A1, A4
8	Yeni bina ve geniş sınıflara sahip tüm okulları nitelikli buluyorum.	A4
9	Nitelikli bulduğum devlet okulu yok. Genelde özel okullar farklı tipte dersliklerle, geniş bahçe ve spor alanlarıyla sağlayarak daha başarılı oluyor.	A1, A3, A4
10	İngilizce dersleri için dil sınıfı, drama sınıfı gibi özel alanlara sahip ve görsel olarak (renkler, mobilyalar, oyun alanları) çocukların ruhuna hitap edecek şekilde yapılan okulları beğeniyorum. Bir defa içeri girince okulun çocuklar için yapılan bir bina olduğu hissedilmeli.	A1, A6
11	Eğitimde iyi örnekleri konu alan yayınlardaki fotoğraflarda gördüğüm okullar var. Mekan eğitim-öğretim ve psiko-sosyal gelişim için çok önemli. İyi okullar çocuk ihtiyaçlarını karşılıyor, hem görsel olarak hem de boyutlar açısından onların ihtiyaçlarına, standartlarına göre yapılmış oluyor.	A4, A6
12	Eskişehir'de gördüğüm bir ilkokulu çok beğendim. Geniş bir bahçesi, yeşil alanları ve etkin kullanılan laboratuvar-deney alanları vardı. Sınıf mevcutları çok azdı, sınıflar daha rahat düzenlenebiliyordu.	A1, A2, A3, A4
13	Akasya Koleji. Havadar, ferah ve geniş sınıfları vardı. Özellikle konferans salonu çok nitelikliydi. Ses sistemi iyi bir havalandırması vardı.	A4, A5, A7
14	Sınıflarında farklı düzenlemeler yapılabilen ve konulara göre farklı sınıfları olan okulları nitelikli buluyorum. Örneğin u-düzeni, grup çalışmalarına göre yerleşim.	A2
15	İsveç'te yer alan, bir belgeselde gördüğüm ilkokul yapısıydı. Tek katlı binaydı ve yalnız belli birimleri iki katlıydı. Yeşille, doğayla iç içe bir bahçesi vardı. Ahşap güzel bir oyun alanı vardı. Renkleri, malzemeleri, görselliğiyle öğrencilerin duygularına yönelik hazırlanan bir yapıydı.	A3, A6
16	Şimdiye kadar hep devlet okullarındaydım, hiç özel okulda çalışmadım. Galiba sadece parası olanların gidebileceği özel okullarda bunlara dikkat ediliyor. Beğendiğim okullar aydınlık, ferah, az öğrencisi olan okullar. Dans, drama salonu gibi özel alanları oluyor. Bahçeleri, dış mekanları çocuklara yönelik oluyor.	A1, A3, A4, A5, A6, A7
17	Gördüğüm bir okulda yere kocaman bir dünya haritası konulmuştu. Merdivenlerden kapılara kadar her yere öğretici görseller konulmuştu bu açıdan gördüğüm okulu çok beğendim. Öğrenciler teneffüste, okula girip çıkarken de görerek öğreniyorlar, akıllarında yer ediyor. Hatta teneffüste haritada yer bulmaca oynuyorlardı, çok hoşuma gitti.	A5
18	Portekiz'de teknik gezi için gittiğimiz bir okulda her sınıfta lavabo vardı. Öğrenciler sıkışıklık yaşamadan kullanıyorlardı. Tabi o disiplini de kazanmışlar, mesela elmasını yiyecekse orada yıkıyordu. Sınıflarda az sayıda öğrenci vardı, ferahtı. Ayrı bir alanda toplanıp müzik dersi yapıyorlardı , resim sınıfları vardı. Sıraların boyutları, malzemeler onların kullanımına göre ayarlanmıştı.	A1, A2, A6, A7
19	Aydınlık, ferah ve donanım olarak farklı ders ihtiyaçlarına göre kaynak ve düzenlenmeye olanak sağlayan mekanlar nitelikli oluyor.	A1, A7
20	Dışarıdan seslerin sınıfa gelmediği, teknolojik ve tasarımsal açıdan eksiklerin olmadığı, materyallere ulaşımın ve materyal kullanımının uygun olduğu mekânlardır. Öğrencinin kendini güvende ve mutlu hissettiği, öğrenim eksiklerini giderebildiği mekânlardır.	A6
21	Kitaplık gibi dolap gibi öğretmenin öğrencinin çok kullandığı eşyalar sabitlenip kolay erişilebilir ve bir şekilde olmalı ilginç dizaynları olmalı mesela sosyal bilgiler dersi için ayrı bir sınıfta dünya gezegenler yıldızlar gibi karanlık bir sınıfta projeksiyonlu bir sınıf olmalı belki minderlerde işlenmeli ;bir yerde okumuştum öğrenciler sınıfta ayakkabılarını çıkararak ders yapıyor.	A1, A2, A5

22	Günümüzde en önemli konulardan biri teknoloji ve çocukların deneyerek öğrenmeleri. Bilgisayar tasarım laboratuvarları, robot atölyesi, video yapım atölyesi gibi özelliklere sahip çok iyi okullar olduğunu etrafımızda görüyoruz.	A1, A5
23	Nitelikli okullarda farklı tipte derslikler var sanat odası, bilgisayar laboratuvarı gibi. Hepsi aynı şekilde değil. Bizim durumumuzda çoğu kez yalnız akıllı tahta ile sınıfta ne aktivite yapabiliyorsak onu yapıyoruz. Çocuklar saatlerce sınıfta oturuyor.	A1
24	Branş dersliklerinin olduğu, bahçenin ferah olduğu az öğrenci sayısına sahip okullar. Bilfen Koleji örnek olabilir, genelde kolejler daha iyi oluyor.	A1, A3
25	Çok büyük olmayan, tek katlı, ferah ve geniş bir bahçesi ve oyun alanları olan okullar.	A3, A5
26	Böyle bir mekan deneyimlemedim.	
27	Bahçe içinde tek katlı okular, oyun alanı olan şehir gürültüsünden uzak olan	A3, A5
28	Sınırlayıcı olmayan, istediğim şekilde düzenleyebildim bir eğitim mekanının nitelikli olduğunu düşünürüm.	A2
29	Kaptan Ahmet Erdoğan İmam Hatip Lisesi'ni beğeniyorum. Spor salonu, konferans salonu ve okul bahçesinin büyüklüğü ideal, yeterli durumda. Genel olarak öğrenci sayısına göre geniş ve yeterli sayıda alan yaratılması okulun mekânsal niteliğini artırıyor.	A4, A5
30	Konuya göre özelleşmiş sınıflar- mekanlar oluşturulması, monotonluğun azalması.	A1, A2
31	Böyle bir mekan deneyimlemedim.	
32	Köy okullarını beğeniyorum. Az sayıda öğrenci ve bahçede, dışarda, doğada ders yapabildiğiniz okullar.	A4, A5
33	Kendi okuduğum ortaokulun binası çok güzeldi. Beceri derslerinin ayrı salonları vardı. Çok geniş ve güzel bir bahçede basketbol, futbol sahaları ayrı ayrı vardı bunun yanında tören kısmı ayrıydı.	A1, A3
34	Okulda yemekhane bile çocukların bir şeyler öğrenebileceği bir alan olabilir. Buna göre dizayn edilmelidir. Öğretmenler, öğrencilerin vakit geçirdiği böyle daha rahat mekanların da olduğu okullar başarılı oluyor.	A5
35	Her dersin dersliğinin bulunduğu okullar nitelikli oluyor. Malzeme-araç ve gereçler kendi sınıfında olduğu için daha verimli oluyor. Dekorasyon, mekan da ona göre oluyor. Örneğin amfi gibi bir toplanma alanı etrafında dersi yapılması, resim ve müzik sanat dersleri, kursları için ayrı sınıfların olduğu okullar nitelikli oluyor.	A1, A5
36	Değişik temalarda dersliklerin olduğu, öğrenci sayısı ve mekânsal ve teknolojik altyapının örtüştüğü mekanları beğeniyorum. Bir okulda örneğin planetaryum gibi bir alan görmüştüm. Çocuklar gezegenleri, uzayı bu sınıfta öğreniyorlardı.	A1, A5
37	Henüz çok donanımlı bir öğretim mekanı görmedim. Nitelikli okulda sıkışıklık olmaması , öğrenci sayısına göre mekanların olması birinci öncelik.	A4
38	Böyle bir mekan deneyimlemedim.	
39	Laboratuvarlarda, sınıflarda mekanın grup çalışmasına ve ders anlatılmasına göre düzenlemeye elverişli olduğu, araç gereçlerin yeterli olduğu okullar nitelikli oluyor. Bunun yanında gördüğüm en beğendiğim okul genelde köy okulları gibi küçük okullar oluyor. Bahçede, dışarda öğrenciler ders yapılabiliyor, görerek ve dokunarak öğreniyorlar.	A2, A3, A5
40	Açık hava sınıflarının olduğunu gördüğüm bir okul. Bahçede de ders yapılabiliyordu.	A3, A5
41	Nitelikli okullar genelde günümüz gerekliliklerine göre öğrencilere bilim teknoloji laboratuvarları, özel dil öğrenme sınıfları, sanat sınıfları gibi bir altyapı sunuyor. Baktığınızda içiniz açılıyor. Sınıflar aydınlık, geniş ve sıralar bölünebilir oluyor.	A1, A2, A5, A7
42	Böyle bir mekan deneyimlemedim.	
43	Hobi bahçesi, z kütüphane gibi uygulamaları olan okullar.	A5
44	Çalıştığım her yerde mutlaka eksiklik vardı. Ama iyi bulduğum okullarda az öğrenci var, her dersin kendi sınıfı var.	A1, A4
45	Klasik sınıf gibi değil, Montessori eğitimine göre düzenlenmiş sınıflar. O yaşta öğrencilerin ev ortamı gibi rahatça çalışabildikleri bir ortam. Boyu, ölçüleri, malzemeleri, renkleri onlara göre tasarlanmış eğitim ortamları.	A2, A6
46	Maalesef böyle bir şansım olmadı.	
47	Meslek liselerinde. İlkokulda da öğrencilerin el işi sınıfı , günümüzde artan robotik sınıfları olmalı. Deneyerek görerek öğrenmeliler.	A5
48	Kendi okuduğum okulların hepsi iyiydi. Devlet okullarının çoğu problemli. Özel okullarda çocukların her ilgi alanına göre mekanları var. Hem sosyal hem de dersler için mekanları var.	A5
49	Böyle bir mekan deneyimlemedim.	
50	Gittiğim özel okullardan birindeydi. Sınıfın farklı şekilde grup düzenlenişi, renkler, görsel araçların etkili kullanımı, sıraların eşyaların çocuklara uygun olması gibi	A2, A6
51	Genelde özel okullar daha nitelikli oluyor. Sınıflar daha ferah, geniş. Bahçede sosyal alanlar, oyun ve spor alanları bulunuyor. Renk ve malzemeler çocuklara uygun oluyor.	A3, A7
52	Yeni yapılar genelde daha nitelikli oluyor. Daha az öğrenci olursa branş sınıflarına yer verilebilir.	A4
53	Gördüğüm özel okullardan biriydi. Daha çok bahçe ve doğal alan, öğretmenlerin öğrenciler sıkılmadan farklı etkinlikler yapabilecekleri alanların olması nitelikli olmasını sağlamıştı.	A3
54	Genelde özel okullarda daha iyi olan temizlik, düzenlilik, öğrenci sayısının az olması ve mekanın öğrenci sayısına göre yeterli olması, farklı konulara ve etkinliklere yönelik mekanlar olması eğitim mekanının kalitesini artırır.	A4, A5
55	Çocukların kitaplarda okuduklarını, doğayla hayatla ilgili anlatılanları gün içinde biraz görebildikleri, yaşayarak öğrenebildikleri daha küçük ölçekli okullar ya da köy okulları.	A5
56	Böyle bir mekan deneyimlemedim.	
57	Van'da görev yaptığım Kayaboğazı İlkokulu en doğru mekanı sağlıyordu. Öğrenci sayısı azdı, çocuklarla istediğimiz gibi istediğimiz yerde ders yapabiliyorduk. Bahçesine çıkıyorduk. Mekanlar genişti.	A4, A5
58	İlkokul çocukları için hareket ve oyun olanağı en önemli konular. Bu nedenle buna olanak sağlayan bahçeleri, oyun ve spor alanları olan okulları beğeniyorum. Okul yalnızca sınıftan baret olmamalı.	A3, A5

59	Özel Akatlar Açı İlkokulu. Çok katlı değil, dış mekanında oyun ve spor alanları çok güzel. İçi ferah ve aydınlık renkleri ve malzemeleriyle çocuklara çok uygun. Hem içerde hem dışarda bir sürü nitelikli serbest vakit geçirme ve oyun alanı var.	A3, A5
60	Çocukların derslere motive olmaları için gereken konusuna göre mekanlar, dil sınıfları, sanat odaları, teknoloji sınıflarının bulunduğu okullar.	A1
61	Edirne'de stajım esnasında gittiğim bir okulda her olanak vardı. Resim müzik odaları olduğu gibi kendine ait bir serası bile vardı. Öğrenciler burada ufak tefek sebze yetişirken görüyorlardı.	A3, A5
62	Böyle bir mekan deneyimlemedim.	
63	Aralarda rahat, renkli ortak çalışma alanlarının bulunduğu okullar gözümde canlanıyor. Çocukların ilgisini sürekli yüksek tutmak zordur. Bu nedenle dört duvar sınıf dışına çıkıp ara sıra başka eğlenceli, rahat mekanlarda ders yapmak iyi olur.	A5, A6
64	Böyle bir mekan deneyimlemedim.	
65	Nitelikli okullarda laboratuvarlar gibi, teknoloji ve robot sınıfları gibi yeni çağdaş konulara göre oluşturulan mekanları çocuklar için yararlı buluyorum.	A1, A5
66	Hissiyat olarak çocukları cezbedebilecek renklerde, ferahlıkta, aydınlık okul yapılarını nitelikli buluyorum.	A6, A7
67	Böyle bir mekan deneyimlemedim.	
68	Koridorları, sınıfları karanlık ve dar olmayan, az öğrencili okulları nitelikli buluyorum.	A7
69	Böyle bir mekan deneyimlemedim.	
70	Böyle bir mekan deneyimlemedim.	
71	Farklı teknoloji, bilim ya da hayat bilgisi temalı mekanlar, robot atölyeleri ve dil sınıfı içeren okullar.	A5
72	Böyle bir mekan deneyimlemedim.	
73	Bodrum'da gördüğüm bir özel okulu çok nitelikli buldum. Japon evi gibi yapmaları, her sınıfın kendi oyun bahçesi özel alanı olması, yeşil alanla birlikte öğrencilerin doğayla iç içe olmaları açısından iyi bir okuldu.	A2, A3, A5
74	Adını hatırlayamadığım okul bahçesi geniş ve düzenli olan, çok amaçlı salonu güzel olan ve hemen karşısında büyük bir çocuk parkı olan bir okuldu.	A3
75	Daha az öğrenci sayısının olduğu, metrekare başına düşen öğrenci sayısının az olduğu okullarda mekanlar daha ferah ve yeterli oluyor. Bunların da çoğu özel okullar tabi ki.	A4
76	Fiziksel şartları iyi bir okulda çalışmadım.	
77	Düzenlediğim haliyle kendi sınıfım! Sınıfı boyadık, grup sıralarını düzenledik, çocuklar yorulmasın diye minderler aldık koyduk, bir kütüphane oluşturduk.	A5, A6
78	Şu ana kadar böyle bir mekan görmedim.	
79	Özel bir okuldaydı. Oyun alanı, yeşil alanı ile birlikte bahçe düzeni, ders ve konu bazlı sınıflar, laboratuvarlar özenle yapılmıştı. Bunun dışında öğretmenler odası, kantin kafeterya gibi mekanlar da hem öğrenci hem de öğretmen kullanımı açısından kaliteliydi. Merdivenleri az dolaşım kolaydı.	A1, A3, A5
80	Şu anda çalıştığım okul. Nispeten daha geniş yeterli sınıflar var. Onun dışında sınıf dışındaki sosyal alanların renkli, canlı olduğu okulların çocuklar açısından daha yararlı olduğunu düşünüyorum.	A4, A5
81	Londra Brighton'da gördüğüm tamamen küçük bir ev gibi dizayn edilen, öğrencilerin yalnız sıralarda değil başka tip düzenler içinde de eğitsel aktivitelere katıldıkları bir okuldu.	A2
82	Öğrencilerin fiziksel ve psikolojik ihtiyaçlarını ön plana çıkaran okullar. Birinci koşul güvenlik ve konfor olmalı. Öğrenci kendini rahat ve güvende hissediyorsa derse konsantre olabilir. Böyle okul yapıları niteliklidir.	A6
83	Finlandiya'daki okullardan bahsediliyor mesela onları takip ediyorum. Orada açık mekanlardan bahsediliyor ama çok az sayıda öğrenci var. Tabi ki okulları çok nitelikli. Az sayıda öğrenci ve ortak kullanıma açık farklı konulara göre düzenlenmiş mekanları olan okullar daha başarılı olur.	A4, A5
84	Kızımın devam ettiği Ataberk Koleji.Okul fiziksel olarak eğitim öğretimi motive edici şekilde düzenlenmiş. İfade ve beceri dersleri kendi atölyelerinde yapılıyor. Sebze ve meyve yetiştirebilecekleri hobi bahçeleri var, hayvan barınakları var. Çok faydalı olduğunu düşünüyorum.	A3, A5
85	Böyle bir mekan deneyimlemedim.	
86	Atatürk İlköğretim Okulu'nun önceki hali idi. Her etkinlik için eğitim alanları oluşturulmuştu. Yabancı dil sınıfı, laboratuvar, resim sınıfları aktif olarak kullanılıyordu.	A1, A5
87	Teknolojik olanakların en üst seviyede yararlanıldığı okulları nitelikli buluyorum. Sınıf dışında atölyeler ve teknolojik olanakların entegre olduğu özel sınıflar olmalı. Sınıflar bu olanaklara göre düzenlenebilir olmalı. Grup çalışmaları farklı aktivitelere uygun ve rahat olmalı. Artık zaten özeller genelde böyle.	A2, A5
88	İlkokullar için çok ilgili olmayabilir ama santral İstanbul-bilgi Üniversitesi. Açık, ferah, çeşitli alanları ve kendine özgü olmasını beğendim.	A1
89	Akran öğrencilerin bir araya geldiği köy okulları şu anki okullardan daha iyidir. Tek katlı, doğanın ortasında çocukların görerek öğrendiği okullar. Şehir içinde hepsi hapishanede gibi yeni bir şey görmüyorlar, derste anlatılan derste kalıyor. Bir tohum nasıl çıkar, güneş nereden doğar nereden batar onu bile algılayamıyorlar.	A3, A5
90	Mezunu olduğum Çapa Erkek Lisesi gibi tarihi, özgün yapılar ilgi uyandırıyor ve derse motivasyon sağlıyor. Eski bina ama ferah ve rahat.	A6, A7
91	Kalamış İlköğretim Okulu'nda aydınlık ve ferah bir ortam var. Öğrencilerin eşyalarını koyabilecekleri dolapları var.	A7
92	Beslenme, etüt ve sosyalleşme saatlerini verimli geçirmeye olanak sağlayan okullar. Düzenli oyun ve spor alanı olan bahçeler… Yıkılan Bayrampaşa Atatürk İlköğretim Okulu mekânsal açıdan iyiydi, yıkıldı.	A3, A5
93	Daha iyi okullarda bahçe ve dış mekan kullanımı düzenli oluyor. Çocuklar ne yapacaklarını biliyorlar anlamsızca koşmuyorlar. Oyun alanı, oturma alanı, masa tenisi ya da spor alanı gibi mekanlar var.	A3

94	Bir defa ferah ve aydınlık okulları nitelikli buluyorum. Baktığınız zaman çocuklara göre olmalı. Kapkaranlık koridorlarda çocuklar durmak bile istemiyor. Okul bahçesinde yeşil alanlar, oyun alanları olabilir. Dış mekanda sınıflar yapılabilir. Böyle örnekleri dünyada görüyoruz. Görsel sanatlar için atölyeler, spor alanları olmalı, bilgisayar ve dil sınıfları olmalı. Her ders aynı sınıfta olmamalı.	A1, A3, A5, A7
95	İlkokul seviyesinde çocuklara uygun , ilgi çekici mekanları olan modern okullar. Örneğin gittiğim bir kolejde çocukların yalnız laboratuvarda değil dersliklerde okul bahçesinde bitkilerle görerek öğrendiğini gördüm ve çok beğendim.	A5, A6
96	Böyle bir mekan deneyimlemedim.	
97	Nitelikli okulların en önemli özelliği kullanılabilen laboratuvarlar, derse özel sınıfları olması.	A1
98	Genelde özel okulların bazılarını başarılı buluyorum. Tasarım açısından çocuklara uygun mobilyalar, renkler içeriyorlar. Ayrıca bahçeleri daha düzenli. Derslerde bahçeyi de kullanıyorlar.	A3, A5, A6
99	Devlet okullarında zaten problemler aşağı yukarı aynı. Nitelikli okul binalarını özel okullarda görebiliyoruz. Sınıflar dışında her dersin kendi sınıfı, mekanı var. Bahçelerini etkin şekilde kullanıyorlar, hareket spor alanları ve yeşil alan var. Bunun dışında hobi atölyeleri mevcut, robot atölyesi, satranç gibi. Sosyal alanları daha keyifli ve güzel.	A1, A3, A5
100	Böyle bir mekan deneyimlemedim.	
101	Kağıthane Ziyapaşa İlkokulu'nu iyi buldum. Yeterince büyük, ferah. Orta kısımda güzel bir toplanma alanı (amfi var).	A4, A5, A7
102	Alan açısından geniş, ferah ve ders konusuyla ilişikli malzeme ve araç gerece sahip mekanlar. Mobilyaların sınıf düzeninin gerektiğinde kolektif çalışmaya, grup çalışmalarına uygun olmaları çok önemli.	A2, A7
103	Montessori sınıflarını başarılı buluyorum. Öğrenciler daha iyi konsantre olabilir. Dikte edici bir düzen yok , öğretmen herkesle ilgilenebiliyor. Derslerde bahçeyi başka mekanları da kullanıyorlar. Yerine göre yemekhane de bir öğrenme alanına dönüşüyor.	A3, A5, A6
104	Böyle bir mekan deneyimlemedim.	
105	Dil öğrenme konusu çok önemli. Dil laboratuvarında çocuklar hem rahat konsantre oluyorlar hem de iyi öğreniyorlar. Bunun dışında tek tip sınıf değil başka başka mekanlar kullanılarak ders yapılmalı.	A1, A5
106	Böyle bir mekan deneyimlemedim.	
107	Dairesel ya da u-biçimli oturma düzenine sahip sınıfların konsantrasyonu artırdığını düşünüyorum.	A2
108	Böyle bir mekan deneyimlemedim.	
109	Böyle bir mekan deneyimlemedim.	
110	Devlet okullarında olay sınıf ve sıradan ibaret. Oysa okul içinde hem sosyalleşme hem de farklı konuda dersler için çeşitli tematik alanlar olmalı. Böyle okulları nitelikli buluyorum.	A1, A5
111	Böyle bir mekan deneyimlemedim.	
112	Bizim okula benzer yüksek ama zemin katta güzel bahçesi üst katta da spor alanı olan bir okul dikkatimi çekmişti. Yani çok sayıda öğrenciyi aynı anda küçük mekanda barındırmak için böyle yöntemler düşünmek gerekiyor. Teneffüsler de en az ders saatleri kadar önemli. Çocukların vakit geçirmeleri için oyun alanına oturma alanların ihtiyaçları oluyor. Bunu karşılayan güzel okullar var.	A3, A5
113	Böyle bir mekan deneyimlemedim.	
114	Çocukların yaz-kış okulda sınıf dışında ders yapabilecekleri ve vakit geçirebilecekleri aktiviteler olmalı. Genelde başarılı bulduğum özel okullarda böyle olanaklar mevcut. Bahçede oyun ve spor alanları var, sanat odaları, atölyeleri var. Bu olanaklar hem derslerin işleyişi hem de çocukların heveslenmesi açısından çok önemli.	A3, A5
115	TED Acarkent Kampüsü'nü başarılı buluyorum. Geniş mekan, açık kapalı oyun alanları, gelenek dışı sınıf düzenleri çok başarılı.	A2, A4, A5
116	Öğrencilerin ders dışı etkinliklerini ve sosyal aktivitelerini, becerilerini de destekleyen mekanlara sahip okullar. Tiyatro salonu, oyun alanları, spor aktiviteleri alanları, dinlenme ve çalışma alanları gibi ara yerlere ihtiyaç oluyor. Genelde beğendiğim okullarda bu olanaklar mevcut.	A5
117	Çalıştığım okullardan birini nitelikli buluyordum. Sinema ve konferans salonu, müzik odası gibi mekanlar aktif kullanılıyordu. Şimdi var ama bodrum katta ve kullanıma uygun değil. Depo gibi.	A5
118	En iyi okullardan biri daha önce çalıştığım Atatük İlkokulu'ydu. Şimdi kapandı. Mesela tam donanımlı bir konferans salonu vardı, çocuklara filmler gösteriliyordu, dışardan tiyatro grupları geliyordu.	A5
119	Böyle bir mekan deneyimlemedim.	
120	Öğrenim gördüğüm Ankara'daki Beytepe ilkokulu. Okul bir barakadan ibaretti ama dışarı çıkar çıkmaz kendinizi geniş bir bahçede buluyordunuz. Çok güzel bir yeşil alanı vardı, biz de ağaç ekmiştik. O zamanın koşullarına göre güzel bir laboratuvarı vardı yaşımıza göre deneyler yapıyorduk.	A3, A5
121	Bahçesi betondan ibaret olmayan, çocuklara yönelik olduğunu hissettiren okulları nitelikli buluyorum. Genelde asfalt ve betondan ibaret yapılar görüyoruz. Çocukların koşmasına, oynamasına hiç uygun değil. Ayrıca ferah ve aydınlık mekanlara ihtiyaç var.	A3, A6, A7
122	Klasik sınıfların dışında farklı konularda tasarlanmış alanların olduğu okullar.	A1, A2
123	Şu anda akıllı tahtası teknolojik olanağı iyi olan her sınıf yeterli oluyor. Sınıf düzeninin, olanaklarının iyi olduğu, kalabalık olmayan okullar.	A4
124	İlkokuldaki 4 sene en kritik dönem tüm alışkanlıkları o zaman kazanıyor çocuklar. Nitelikli okullarda öğrencilerin ilerde edinecekleri günlük alışkanlıkları destekleyici bölümler olmalı. Okuma alanları, beceri atölyeleri, seralar gibi. Bunları yapan okulları takip ediyorum.	A5
125	Yurtdışında örneklerini gördüğümüz çocukların el becerilerine göre farklı atölyelerden yararlandıkları okullar. Yalnız sırada oturmayıp başka biçimlerde çalışmalarına izin veren alanlar.	A1, A5
126	Böyle bir mekan deneyimlemedim.	
127	Tek katlı binası ve büyük bahçe alanı olan okullar.	A3
128	Londra'da bulunan bir ilkokulda renkli sınıfların ve çocukların hareket edebileceği alanların geniş olduğu bir okul görmüştüm.	A4, A6
129	Böyle bir mekan deneyimlemedim.	

130	Klasik sınıfların dışında sanat ve el becerisi yeteneklerini geliştirebilecekleri mekanları içeren, buna göre düzenlenen okullar.	A5
131	Toki ve Emlakkent Okulları. Yeni oldukları için en azından biraz renkli ve çocukların ilgisini çekebilecek biçimde yapılmış. Bahçede biraz yeşil çim alan oluyor çocuklar yalnız beton bahçe dışında az da olsa oynayacak bir yer buluyorlar.	A3, A6
132	Böyle bir mekan deneyimlemedim.	
133	Nitelikli okullar müfredat dışında faaliyetleri de kulüplerle, başka sosyal çalışmalarla destekliyor. Mesela teknoloji sınıfları var çocuklar kodlama, bilgisayara giriş öğreniyorlar. Değişik atölyeleri var. Bizde mevcut atölyeler standart sınıfa dönüşüyor. Okul başına düşen öğrenci sayısı fazla, yer az.	A1, A4, A5
134	Çocuklar ilk olarak deneyerek öğrendikleri için onlara hem göze hem kulağa hem de diğer duyularına hitap eden mekanlar yaratılması gerekiyor. Yaşayarak öğrenmeye sadece sınıfın değil, bahçesinden yemekhanesine atölyelerine kadar her alanın dahil olduğu okullar niteliklidir.	A3, A5
135	İspanya'da gördüğüm bir ilkokulda öğrencilerin tüm eşyalarını koyabildikleri üniteler vardı. Sınıf dışında yerlere minderler koyup ders yapabildikleri alanlar da yaratılmıştı.	A2, A5
136	Köy okullarının tümü şehrin ortasındakilere göre daha iyi. Çocukların hayatla bağlantısı daha güçlü. Okullar küçük, öğrenci sayısı az. Çocuklar derste öğrendiklerini hemen dış ortamda, bahçede gözlemleyebiliyorlar.	A4, A5
137	Özel okullar bu açıdan daha şanslı. Alanları genelde daha fazla. Branş derslikleri, resim, müzik sınıfları, spor salonları iyi düzenlenmiş okulları görüyoruz.	A1, A4
138	Ara sıra reklamlarda gördüğüm daha büyük camlı, daha aydınlık, çocukların rahatça hareket edebildiği yüksek olmayan doğayla iç içe yapılar.	A3, A4, A7
139	Yaparak yaşayarak öğrenildiğine inanıyorum. O nedenle buna olanak veren okulların daha nitelikli olduğunu düşünüyorum. Yeşille, doğayla bir miktar ilişkiye olanak veren, bildiğimiz sıra ve tahtadan ibaret olmanın dışında tüm mekanları işin içine katan okullar nitelikli olur.	A2, A3, A5
140	Bir ilkokulda gördüğüm çocukların seviyesine göre araç-gereçle donatılmış, mobilyası görselleri her özelliğiyle o yaş grubu öğrencilerine hitap eden fen laboratuvarını çok beğendim. Okullar böyle mekanlar ile daha iyi hale getirilebilir.	A6
141	Gelenek dışına çıkan sınıfların olduğu, farklı çeşitli öğrenme alanlarını içeren okulları nitelikli buluyorum. Geleneksel sınıf ezberciliğe yönlendirir.	A1, A2
142	Kemerburgaz İlkokulu. Bir spor salonuna sahipler ama koridorlarda da örneğin masa tenisi gibi satranç gibi çeşitli oyun alanları var. Çocuklar aralarda da iyi vakit geçiriyor.	A5
143	Böyle bir mekan deneyimlemedim.	
144	Devlet okullarında gördüklerimin tümü neredeyse aynıydı. Ama bazı okulların bahçe kullanımı çok iyi mesela en çok bu dikkatimi çekiyor. Oyun ve spor alanları özenle yapılıyor.	A3

Appendix A.5: Data Regarding the Use Patterns During the Lessons

Table 1: Multiple choice analyses of responses given to the Question 8.

The courses or activities preferred to be conducted in other spaces besides the classroom

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
$OutofClassroom Courses[a]	133	92.4%	11	7.6%	144	100.0%

a. Group

$OutofClassroomCourses Frequencies

		Responses		Percent of Cases
		N	Percent	
OutofClassroomCourses[a]	Playing and Physical Exercises	91	20.7%	68.4%
	Visual Arts and Crafts	85	19.4%	63.9%
	Music Lessons	62	14.1%	46.6%
	Drama and Performance	28	6.4%	21.1%
	Mathematics	14	3.2%	10.5%
	Science	39	8.9%	29.3%
	Science of Life Lessons	30	6.8%	22.6%
	Reading Sessions	32	7.3%	24.1%
	Language Lessons	13	3.0%	9.8%
	Social Sciences	13	3.0%	9.8%
	Mind Games Sessions	13	3.0%	9.8%
	Computer Classes	13	3.0%	9.8%
	Official Ceremonies	6	1.4%	4.5%
Total		439	100.0%	330.1%

a. Group

Figure 1: Bar chart showing the distribution of responses
Courses or activities preferred to be conducted in other spaces besides the classroom according to the responses to Question 8.

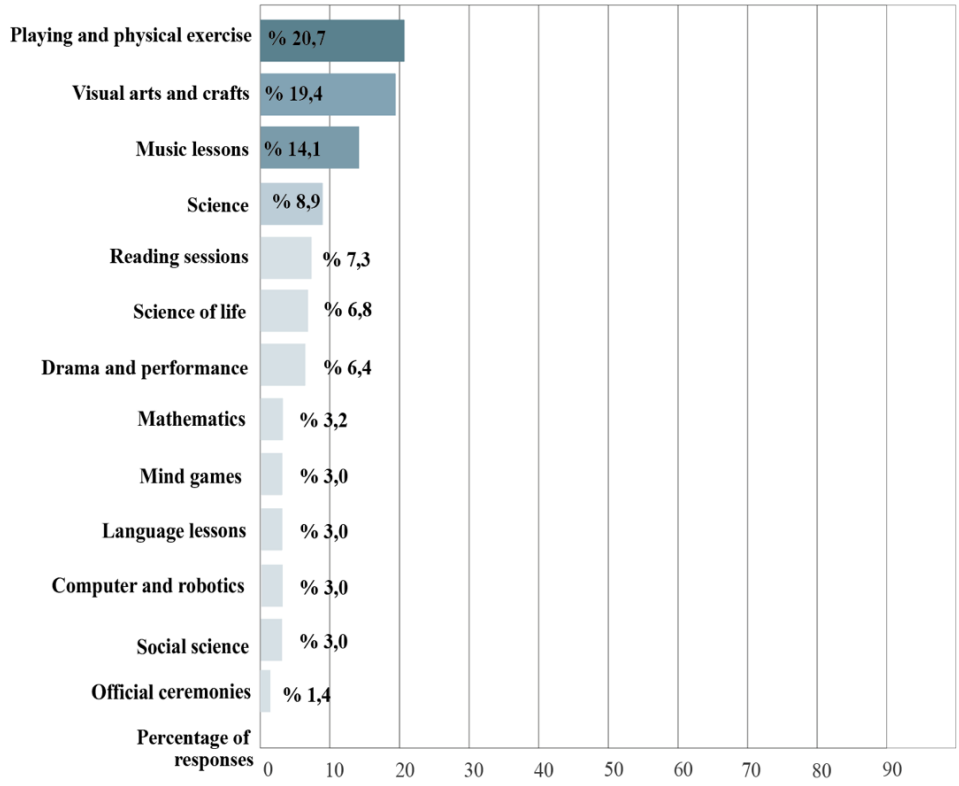


Table 2: Multiple choice analyses of responses given to the Question 9 regarding other spaces inside the school besides the classroom to contribute and support the educational activities.

Case Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
$Other_Spaces_Learning_Processes[a]	137	95.1%	7	4.9%	144	100.0%

a. Group

$Other_Spaces_Learning_Processes Frequencies

		Responses		Percent of Cases
		N	Percent	
Other Spaces & Learning Processes[a]	CirculationZones	46	7.1%	33.6%
	Garden	105	16.2%	76.6%
	Library	97	15.0%	70.8%
	InformalWorkingArea	74	11.4%	54.0%
	ConferenceRoom	97	15.0%	70.8%
	Cafeteria_Dining Hall	26	4.0%	19.0%
	SpaceforPlasticArtsandCrafts	87	13.4%	63.5%
	MusicRoom	81	12.5%	59.1%
	MultipurposeSpace	3	0.5%	2.2%
	SportsHall	22	3.4%	16.1%
	MindGamesRoom	2	0.3%	1.5%
	LanguageRoom	3	0.5%	2.2%
	TechnologyLab	4	0.6%	2.9%
Total		647	100.0%	472.3%

a. Group

Table 3: Multiple choice analyses of responses given to the Question 10 regarding type of spatial changes are needed to support in class educational activities during the day or week.

Case Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
$Shorttermchanges_classroom[a]	143	99.3%	1	0.7%	144	100.0%

a. Group

$Shorttermchanges_classroom Frequencies

		Responses		Percent of Cases
		N	Percent	
1[a]	conducting the course outside the classroom	91	45.5%	63.6%
	changes in the furniture or seating layout	75	37.5%	52.4%
	conducting the course in a larger space	31	15.5%	21.7%
	bringing other materials and equipment to the classroom	3	1.5%	2.1%
Total		200	100.0%	139.9%

a. Group

Figure 2: Graph showing percentages of responses given to the Question 11.

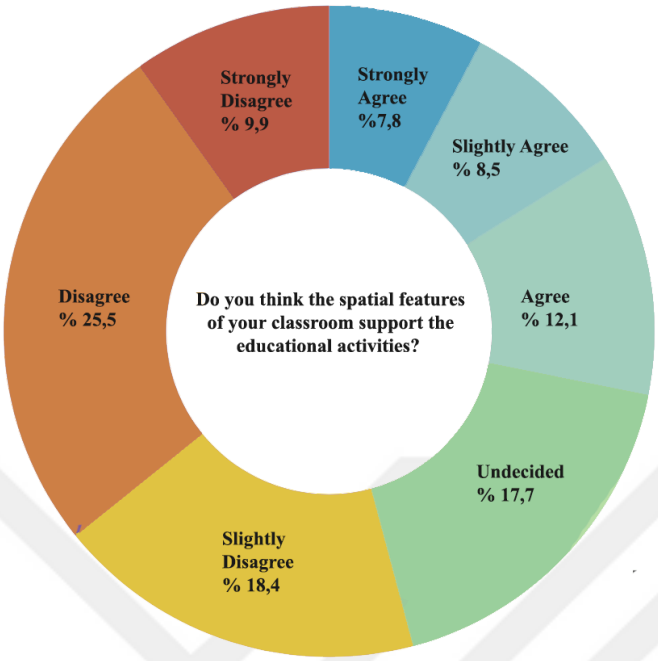


Table 4: The percentages of responses given to the Question 11.

Do you think the spatial features of your classroom supports the educational activities?

N	Valid	141
	Missing	3

Do you think the spatial features of your classroom supports the educational activities?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	14	9.7	9.9	9.9
	Disagree	36	25.0	25.5	35.5
	Slightly Disagree	26	18.1	18.4	53.9
	Undecided	25	17.4	17.7	71.6
	Slightly Agree	17	11.8	12.1	83.7
	Agree	12	8.3	8.5	92.2
	Strongly Agree	11	7.6	7.8	100.0
	Total	141	97.9	100.0	
Missing	System	3	2.1		
Total		144	100.0		

Table 5: The list of codes given to the written responses to the Question 12.

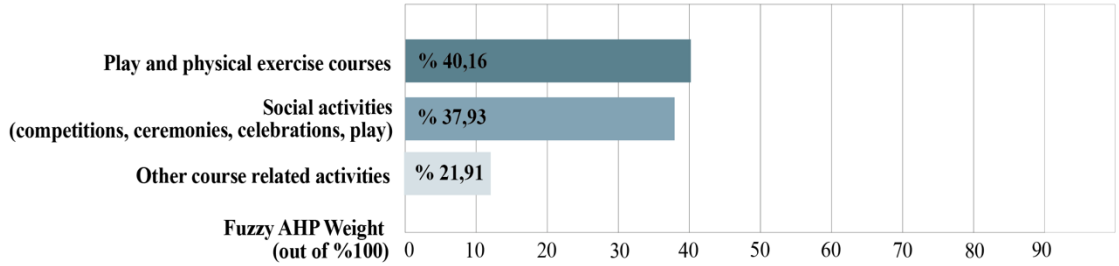
A1 : Sufficient Classroom Size, A2 : Type of Furniture, A3 : Increasing the Ability of Responding Children's Physical and Cognitive Needs, A4 : Differentiated Zones for Learning, A5 : Improvement of Physical Qualities Regarding Acoustics & Lighting & Ventilation, A6 : Visual Materials & Exhibiting Children's Work, A7 : Improvement of Technical & Technological Facilities

Participant No	Written responses to the question "Which spatial features of your classroom would you prefer to be changed or developed? "	Response Encoding
1	Şu anda duvarlardaki astığımı öğrenci çalışmalarını, ders görsellerini çocuklara daha uygun, ulaşıp kendileri yapabilecekleri şekilde yerleştirebileceğimiz panolar olmasını isterdim.	A3, A6
2	Müzik çalışmaları yaparken boş bir alan olması uygun olurdu. Sıra ve mobilyaların daha kolay kaldırılabilmesi sınıfları daha kullanışlı yapabilirdi.	A2, A4
3	Panoların artması , öğrenci kitaplığı ve okuma alanı oluşturulması, masa ve sandalyelerin değişmesi. Çok hantal ve eski oldukları için.	A2, A4, A6
4	Geniş ve büyük olması	A1
5	Hiçbir şey	
6	Dersliğin daha büyük olması	A1
7	Sınıfımın geniş olmasını isterim.	A1
8	Renkleriyle, mobilyalarıyla çocukların ruhuna uygun hale getirilmesini isterdim.	A2, A3
9	Sınıftan başka yerde ders yapamadığımız için en azından daha çok alan olmasını isterdim. Mobilyalar daha küçük olabilir.	A1, A2
10	Daha geniş ve hareket açısından özgür sınıflar	A1, A3
11	Daha renkli, çocukların ilgisini çekebilecek şekilde olabilir. Okuma, dinlenme ve etkinlik alanları olmalı.	A3, A4
12	Sınıf içinde farklı alanlar yaratmak, çocukları ara sıra hareket etmelerine olanak sağlamak. Ayakta bir şeyler gösterebilecek olmak. Ya da dersleri açık alana ve derse uygun mekanlara taşımak. Okul bahçesine hemen çıkabilmek.	A4
13	Sınıfımda ses yalıtımı olsun isterdim. Gerek diğer sınıflardan, gerekse dışardan gelen sesler dikkat dağıtıyor.	A5
14	Daha geniş olmasını isterdim. Çocukların hareketleri kısıtlanmasın isterdim. Standartların dışında olmasını isterdim.	A1
15	Oturma düzenini kolay değiştirebilme ve renkleri.	A2, A3
16	Sıralar ikili olmamalı hiçbir yere sığmıyor, hareket etmiyor. Çocuk kullanımına elverişli olsun isterdim.	A2
17	Sıraların hem düzenleme hem de boyut açısından çocuklar için daha uygun hale gelmesi.	A2
18	Sıralar değişmeli bazıları yüksek bazıları alçak uyumlu değiller.	A2
19	Sıralar tekli olmalı.	A2
20	Sınıf dolap ve panoları değişmeli çünkü eskiler	A2
21	Sıraların değiştirilmesi, sınıfın genel olarak çocuklara uygun daha renkli hale gelmesi. Sınıflarda bir kasvet var…	A2
22	Sıraların değişmesi, sınıfın daha büyük olması	A1, A2
23	Daha geniş bir sınıf, daha çok alan ve mobilyaların çocuklara uygun hale getirilmesi.	A1, A3
24	Daha geniş bir sınıf olmalıydı.	A1
25	Daha büyük ve kullanışlı olması.	A1
26	Görselleri asabilmek için olanaklar olmasını isterdim. Çocuklar kendi yaptıklarını yalnız koridora asabiliyor, sınıfta da böyle bir olanak iyi olurdu. Hepsi elimizde kalıyor.	A6
27	Okul bahçesinde de ders yapabilmek isterdim.	A4
28	Aklıma bir şey gelmiyor.	
29	Sınfın daha büyük ve ferah olmasını isterdim.	A1
30	Sıraların düzenlenebilir olması ve farklı işlik köşeleri olmasını isterdim.	A2, A4
31	Sınıf yönü (aşırı güneşli) büyüklüğünün artmasını ve teknolojik altyapısının gelişmesini isterdim.	A1, A5, A7
32	Sınıfta oturma yerleşim düzenini kolayca değiştirebileceğim şekilde mobilyalar olmasını isterdim. Sadece biz kullanmıyoruz o yüzden buna ihtiyaç var ben olsam grup grup ayırırdım masaları.	A2
33	null	
34	Sınıf yönü (aşırı güneşli ve sıcak) büyüklüğünün artmasını ve eskiyen sıraların yenilenmesini, çocuk ihtiyaçlarına uygun daha kullanışlı ve hafif mobilyaların yerleştirilmesini isterdim.	A1, A2, A3, A5
35	Sıraların tek kişilik olması, okuma ve oyun köşelerinin olması	A2, A4
36	Sınıf içinde oturma düzenini değiştirebilmeyi isterdim. Dörtlü gruplar halinde, hem – birbirlerini hem de tahtayı da görebilecekleri şekilde. Alanın darlığı, mevcudun çok olması ve sıraların tipi nedeniyle çok mümkün olmuyor.	A1, A2
37	Daha geniş, çocuklara uygun renklerde, konforlu ortam olmasını isterdim.	A1, A3
38	Sıraların tekli olması, yerde oynayabilmeleri için minder ya da puflardan oluşan bir bölüm.	
39	Sınıft farklı bölümler için yer olması, okuma köşesi gibi…	A4
40	Öğrenci başına düşen alanın artması, öğrencilerin az sayıda olması	A1
41	Öncelikle ders 174nlaştığım alan biraz geniş olmalı. Sınıfta çocuklar ders kitaplarını koysunlar eve getirmesinler diye dolaplar yapılmış bence fazlalıklar ve sadece alanı daraltıyorlar. Düzenli ve büyük kitaplıklar olmalı. Sadece bir duvarda büyük bir pano olmalı. Müzik ve görsel çalışmalar için ayrı köşeler olmalı.	A2, A4
42	Daha büyük olmalı.	A1
43	Daha büyük ve hareket edilebilecek genişlikte.	A1

44	null	
45	Sınıfım çok kalabalık, daha büyük olması gerektiğini düşünüyorum.	
46	Sınıfımın büyük olması, mobilyaların grup çalışmaları için düzenlenebilir olması	A1, A2
47	Yerlerde halı olması, ses sisteminin iyi olması ve daha büyük olmasını isterdim.	A1, A5
48	Görselliğin, genel tasarımın çocuk ruhuna uygun olmasını isterdim. Birinci sınıflar için bu her şey demek.	A3
49	null	
50	null	
51	Biraz daha büyük ve grup çalışmalarına uygun olması gerekli	A1
52	null	
53	Öğrencilerin tümünün tahtayı, beni görebileceği şekilde rahatça düzenleme yapabilmeyi isterdim ve sınıf içinde bile etkinlik alanları oluşturmak etkili olurdu.	A1, A2, A4
54	Sınıfım çok sıcak farklı yönde olmasını isterdim. Gürültü kontrolünün sağlanmasını ve öğretmen masasının daha farklı bir noktada olabilmesini isterdim. Yani sıraları kolayca daha farklı biçimlerde düzenleyebilmeyi isterdim.	
55	Aydınlık olması, daha geniş olması, çocuklara uygun renk ve malzemelerin olması.	A1, A3, A5
56	Aslında sınıf mevcudunun değişmesi gerekiyor. Değişmediği durumda da biraz daha geniş alan olmalıydı.	A1
57	Oturma birimlerinin kolayca düzenlenebilmesi, farklı ders materyallerin verimli şekilde kullanılabilmesi için daha fazla alan	A1, A2
58	Okuma köşesi gibi farklı çalışma alanları öğrencilerin ilgisini daha fazla çekebilir. Sınıf mevcudunun az olması gerekiyor, alan yetersiz kalıyor.	A1, A4
59	Daha geniş olmalı.	A1
60	Yerlerde halıflex olması, daha az öğrenciye çalışıp sınıfın farklı alanlarını farklı işler için bölüştürebilme olanağı olsun isterdim.	A1, A2
61	Ek olarak bir lavabo olmalı, yerlerde minderde oturabilecek farklı şekillerde ders yapılabilecek alan olmalı.	A2, A4
62	Çocukların daha çok keyif alabilecekleri bir ortam olmalı. Klasik düzende tüm gün aynı şekilde oturmaktan sıkılıyorlar. Derslerin biraz oyunla karışması gerekiyor. Bunun için de alan ve uygun mobilyalar gerekli.	A1, A2, A3
63	Daha geniş olmasını isterdim.	A1
64	Az sayıda öğrenciyle klasik sora düzeninde değil daha farklı şekilde, öğrenmeyi destekleyecek şekilde bir yerleşim yapabilmeyi isterdim. Alan ve sıralar buna izin vermiyor.	A1, A2
65	Çocukların kendilerini ifade ettikleri görseller çalışmaları sergileyecek masalar, panolar olmasını isterdim.	A6
66	Uygun mobilyalarla desteklenecek şekilde tematik alanların yer almasını isterdim. Ya da en azından farklı tüpte oturma düzenleri olsun.	A2, A4
67	null	
68	Daha bol oksijen alan bir ortam olmasını isterdim. Çok havasız.	A5
69	İlkokul olduğumu için aslında duvarların renkli görsellerle dolu olması gerekir. Ancak buna izin verilmiyor. Sıraların tek kişilik olmasını ve sınıfın daha geniş olmasını isterdim.	A1, A2, A3, A6
70	null	
71	Daha geniş ve rahat bir sınıf olmasını isterdim.	A1
72	Daha geniş ve ferah bir sınıf olmasın isterdim. Sıralar daha rahat ve çocuklara uygun şekilde olabilirdi.	A1, A2, A3
73	Daha geniş olabilirdi. Şu haliyle sığamıyoruz.	A1
74	Sınıfın öğrenci sayısına göre daha büyük olması.	A1
75	Daha büyük bir sınıfım olsun isterdim. Farklı dersler için farklı alanlar oluşturabileceğim birimlerin ve alanın olmasını isterdim.	A1, A2
76	Daha çok sınıf panosu olmalı, her öğrenci kendi çalışmasını sergileyebilmeli. Zeka oyunları alanı ve okuma köşesi için yer olmasın isterdim.	A2, A4
77	Farklı etkinlikler için köşelere ihtiyacım var.	A4
78	Alan olarak daha büyük bir sınıf olmalı.	A1
79	Sınıfı farklı şekillerde düzenleyebilmek isterdim mesela U düzeninde. Sıraları hareket ettirmek çok zaman alıyor. Daha pratik olmaları iyi olurdu.	A2
80	Oturma düzeni ve bol bol pano.	A2
81	null	
82	İlkokulda dersler az, o yüzden her ders için sınıf içinde köşeler yaratabilmek makul olabilirdi.	A4
83	Çocuk kütüphanesi ve okuma köşesi olmasını isterdim.	A4
84	Sınıfların daha büyük olması gerekir çünkü sayı fazla. Sıra ve dolaptan yürüyecek yer bulamıyoruz.	A1
85	Büyüklüğün artması, panoların kullanışlı olması, sıraların düzenlenebilir olması, sınıf içinde farklı etkinlik alanları yaratabilmek iyi olurdu.	A1, A2, A4
86	Sınıfımın daha geniş olmasını isterdim.	A1
87	Çok sıra var ve alan yetersiz. Daha az kalabalık sınıflar.	A1
88	Daha büyük olmasını, sıraların tek kişi kullanımına uygun olmasını, daha çok pano olmasını isterdim.	A1, A2
89	Gereksiz ve fazla olan mobilyaların çıkarılmasını ve alan açılmasını isterdim.	A1
90	Daha büyük olmalı çünkü çok kalabalığız. Daha modern ve teknolojik araçlarla donatılmalı.	A1,A5, A7
91	Okuma ve elişi sanat çalışmaları için daha farklı bir oturma düzeninin olduğu	
92	Geniş ve aydınlık olmasını isterdim.	A1, A5
93	Sınıf alanının daha büyük olmasnı isterdim.	A1
94	Avrupadaki örneklerdeki gibi daha küçük ve çocuklara göre sıralar, çocuklara hitab eden bir görsellik olmasını isterdim.	A2, A3

95	Sıra (öğrenci) sayısının daha az olmasını isterdim. Çünkü alan dar ve düzenlemeye olanak vermiyor.	A1, A2
96	Çocukların ilgisini çekecek mobilyaların ve görsellerin olmasını isterdim. Daha çok sergileme olanağı olsun isterdim.	A2, A3
97	Daha geniş, derslere uygun uygulama çalışma alanları olsun isterdim.	A1, A4
98	Teknolojik olanakların elden geçmesi ve ders araç gereçlerinin yenilenmesini isterdim.	A5, A7
99	Daha geniş, öğrencilerin vakit geçirebileceği daha çok alanı olması ve görsellerin, ders araçlarının daha ilginç olması	A1, A6
100	null	
101	Poster ve öğrencilerin yaptığı resimleri asabileceğimiz panolar olabilir.	A6
102	Oturma düzeninin daha büyük bir alana yerleştiği, görsellerle zenginleştirebileceğimiz büyük panoların olduğu bir sınıf isterdim.	
103	Daha büyük ortam, daha kullanışlı ve kolay hareket ettirilebilen oturma alanları ve daha çeşitli ders materyalleri kullanabilmeyi isterdim.	A1, A2
104	Sınıfın baktığı cephenin farklı olmasını isterdim, daha aydınlık olmasını daha büyük camlarının olmasını isterdim.	
105	Aydınlık ve havadar olmasın isterdim. Konumu ona uygun şekilde olabilirdi. Mobilyalar, panolar çocukların ilgisini çekebilecek şekilde olabilirdi. Lise sınıfından farklı olmalı.	A2, A3, A5
106		
107	Sıraların değişmesini hem daha yeni, tekli oturmaya ve yer değiştirmeye uygun olmasını isterdim.	
108	Geniş olmalı.	
109	Sınıfımın daha geniş olmasını ve çocukların bir şeyler asabilmesi için panoların daha çok olmasını isterdim.	A6
110	Ders malzemelerini koyabileceğim yerlerin olmasını isterim çoğu açıkta kalıyor. Panoların çocuklara hitab edecek şekilde dizayn edilmiş ve büyük olmalarını isterdim.	A6
111	null	
112	Teknolojik olanakların daha verimli kullanılabilmesini isterdim.	A7
113	null	
114	Daha geniş ve büyük bir sınıf olsun isterdim.	
115	Sıraların şeklinin düzenlenebilir olmasını isterdim, daha küçük ve kare olabilir. Daha geniş bir alan tabi ki gerekirdi… Görsellerin, panoların artmasını isterdim.	A2, A6
116	Sınıfım büyütülmeli.	A1
117	Aydınlık olması, ders araç gereçlerinin eksiksiz olması.	A5
118	Daha büyük ve aydınlık olmasını isterdim. Çocukları heyecanlandırmak için bazı günler az da olsa düzenleme yapabilmek isterdim. Sıralar-masalar buna uygun değil, hem de alan az ve sığamıyoruz.	A1, A2, A5
119	Güneş görmesi ve aydınlık olmasını isterdim. Daha geniş olsa daha rahat hareket edebilirdik.	A1, A5
120	null	
121	Sınıfın altyapı olarak daha gelişmiş olmasını isterdim. Kendi printerımız olması çok rahatlatırdı. Klasik sıra düzenin dışına çıkmaya olanak sağlayan mobilyalar olmasını isterdim.	A7
122	null	
123	Sıraların hareket alanı bırakmadıkları için tekli ya da daha küçük olmalarını, sınıfın daha aydınlık ve geniş olmasını isterdim.	A1
124	null	
125	Akıllı tahtanın daha verimli kullanılması için ses sistemi daha iyi olmalıydı ve internet sıkıntısı çekmemeliyiz.	A5
126	Sıra düzeni… Mesela u düzeni yapabilmek isterdim.	
127	null	
128	Sıraların ölçülerinden duvar renklerine kadar genel olarak çocuk ihtiyaçlarına göre yeniden ele alınması gerektiğini düşünüyorum.	A3
129	Çocukların farklı oturma düzenlerinde oturabilmeleri için daha geniş mekan.	A1
130	Kitaplık ve depolama alanlarının uygun olması. Okulda bir kütüphane yok heveslerini artırmak için bir okuma köşesi yapabilmeyi isterdim.	
131	Daha büyük bir sınıf olmasını isterdim, güvenlik için kütüphanemin duvara montajlı olmasını isterdim.	
132	null	
133	Daha büyük olmasını isterdim.	A1
134	Dümdüz duvarlar yerine daha çok pano koyularak çocukların yaptığı çalışmaları, farklı görselleri asabilmek isterdim. Sıraların daha kullanışlı olmasını isterdim. Çok hantallar ve yerlerinden kalkmıyorlar.	A2, A6
135	Oturma düzenini değiştirebilmek ve en azından bir kısımda farklı bir düzen yapıp mesela resim dersinde ya da okuma yaparken çocukların ilgisini çekebilecek bir alan olmasını isterdim.	A2, A4
136	Sınıfın daha geniş olmasını isterdim. Yapılan çalışmaları daha rahat saklayacak, asacak yer olsun isterim. Konulara göre farklı köşeler oluşturmak için hem malzeme hem de yer olsun isterdim.	A1, A2, A6
137	Okuma köşesi, zeka oyunları köşesi oluşturabilmek isterdim.	
138	Klasik sınıftan farklı olmalı. Günümüze uygun mobilyalar, farklı bir düzenleme olmalı.	A2
139	İçinde çocukların hareket ederek öğrenmelerini sağlayacak bir genişlik ve mobilyalar olmasını isterdim	A1, A2
140	Kalabalık bir sınıf olduğu için öğrencilere akıllı tahtadan bir şeyler gösterirken zorlanıyorum. Buna göre bir düzenleme yapabilmek isterdim.	A1, A2, A7
141	U düzeni oturabileceğimiz bir alan olsun isterdim.	A1, A2
142	Oturma düzenini değiştirebilmek isterdim. Alan nedeniyle mümkün değil.	A1
143	NA	
144	Sıra düzenini değiştirebilmek isterdim. Tıma tıkış ve çocuklar bile zor geçiyor.	A1, A2

Figure:2 Activities performed in outdoor spaces/ school garden



Appendix A.6: Data Regarding the Use Patterns During Recess Periods

Table 1: Children's recess period activities

Case Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
$RecessPeriodActivities[a]	134	93.1%	10	6.9%	144	100.0%

a. Group

$RecessPeriodActivities Frequencies

		Responses		Percent of Cases
		N	Percent	
RecessPeriodActivities[a]	Running	31	15.3%	23.1%
	Visiting the restroom	9	4.5%	6.7%
	Having a snack	10	5.0%	7.5%
	Playing Chase and Ball Games	110	54.5%	82.1%
	Football	9	4.5%	6.7%
	Reading	3	1.5%	2.2%
	Resting	1	0.5%	0.7%
	Playing inside the classroom	18	8.9%	13.4%
	Playing Chess and Board Games	11	5.4%	8.2%
Total		202	100.0%	150.7%

a. Group

Table 2: The list of codes given to the written responses to the Question 16.

A1 : Characteristics of Games, A2 : Interaction With Their Peers/ Socializing, A3 : Engaging in Other Activities Besides Playing Games, A4 : Engagement in Sports Activities, A5 : Differences in Preference of Spending Time Inside/Outside, A6 : Control and Safety Concerns, NO : HAYIR

Participant No	Written responses to the question "Do the age differences lead to changes in the type of activities that children perform during the recess periods?"	Response Encoding
1	Hayır	NO
2	Oynadıkları oyunların özelliği değişiyor. Büyükler daha kurallı oyunlar oynayabiliyorlar, küçükler yalnızca koşturuyor.	A1
3	Küçükler yalnızca oyun oynarke büyükler kitap okuyor, kendi aralrında sohbet ediyorlar.	A1, A2, A3
4	Hayır	NO
5	Oynadıkları oyunlar farklı oluyor.	A1
6	Evet. Büyükler spor aktivitelerinde ve kurallı oyunlarda daha aktifler.	A1, A4
7	Hayır	NO
8	Hayır	NO
9	Genelde küçükler büyükler kadar farklı oyunlar oynayamıyor.	A1
10	Yakın yaşlardaki çocuklar birbirleriyle vakit geçirme eğiliminde oluyor. Oyunları daha farklı oluyor.	A1, A2
11	Hayır	NO
12	Hayır	NO
13	Aynı yaş grubunda öğrencilerle bir arada olmaktan hoşlanıyorlar. Farklı oyunlar oynuyorlar. Büyük öğrenciler küçükleri eziyor.	A2, A6
14	Büyükler küçükleri rahatsız ediyorlar küçükler de onların oyunlarını bozuyor. Oynadıkları oyunlar daha farklı oluyor. Büyükler futbol, basketbol da oynuyor.	A1, A4, A6
15	Hayır	NO
16	Genelde küçükler ve büyükler bir araya gelemiyor. Küçükler büyüklere özenip davranış bozuklukları gösterebiliyorlar.	A2
17	Hayır	NO
18	Etkinliklere katılımları daha farklı oluyor çünkü algılayış biçimleri farklı. Oynadıkları oyunlar farklı.	A1
19	Hayır	NO
20	Hayır	NO
21	Oynadıkları oyunlar farklı.	A1
22	Büyükler daga geniş mekana ihtiyaç duyuyor çünkü tenefüslerde genelde kurallı top oyunları oynuyorlar ya da spor faaliyetleriyle uğraşıyorlar futbol gibi. Küçükler onlar kadar bilinçli olmuyor.	A1, A4
23	Büyüklerin oyunları daha farklı, belirlenmiş geniş alanlar olmasını gerektiriyor.	A1
24	Büyükler sınıfta da vakit geçiriyorlar, kitap okuyorlar ya da başka uğraşlar bulabiliyorlar. Oysa küçükler ne yapacaklarını bilemiyorlar.	A1, A3
25	Hayır	NO
26	Hayır	NO
27	Hayır	NO
28	Son sınıflar ihtiyaçlarını giderme ve sosyalleşme açısından daha olgun oluyorlar. Beslenme saatinde yemeğini yiyebilir, arakadaşlarıyla vakit geçirebilir. Küçük gruplar her şeyi baştan öğreniyorlar. Kurallı oyunlar ageçebilmeleri zaman alıyor.	A1, A2, A3
29	Oyunlar açısından farklılıklar oluyor.	A1
30	Oyun farklılıkları	A1
31	Büyükler in birbirleriyle iletişimi daha güçlü oluyor, bir arada oyun oynayabiliyorlar, sosyalleşebiliyorlar.	A1, A2
32	Büyükler daha kurallı oyunlar oynuyorlar.	A1
33	Küçükler anlamsızca koşturuyorlar, büyükler daha bilinçli. Top oyunları, oynayabiliyorlar.	A1, A4
34	Hayır	NO
35	Hayır	NO
36	N/A	
37	Hayır	NO
38	N/A	
39	Seçtikleri oyunlarda farklılıklar oluyor.	A1
40	Yaşça küçük olanlar diğerlerinin oyun alanlarına giremiyorlar, çekiniyorlar.	A1, A2, A6
41	Elbette ki yaş farklılıkları aktiviteleri etkiliyor. Büyükler daha olgun ve sakinken küçükler çok enerjik, konsantrasyonları dağınık. Dolayısıyla büyükle oyun dışı aktiviteler de yaparken küçükler sadece koşturmaya çalışıyorlar.	A2, A3
42	Hayır	NO
43	Oyunlar farklı	A1
44	1. ve 2. sınıflar küçük gruplarla oyunlar oynayabiliyor, büyükler daha geniş gruplarda daha sosyal oyunlar oynuyorlar.	A1, A2
45	Öğrenme düzeyleri ve dolayısıyla eğlenme anlayışları farklı oluyor. Büyükler daha sosyal küçükler daha enerjik aktiviteler içinde oluyorlar.	A2, A5
46	Hayır	NO
47	Büyükler küçüklere sürekli çarpıp düşürüyor. Bedenleri, birbirleriyle ilişkileri ve oyunları farklı.	A1, A2, A6
48	Büyük sınıflar küçük sınıflara zarar veriyor.	A6
49	Büyükler daha karmaşık oyunlar oynayabiliyor.	A1

50	Büyük öğrenciler koşarken küçüklere zarar verebiliyorlar. Büyükler daha çok top oyunu oynuyor. Kurallı faaliyetlere daha meğilliler.	A1, A4
51	Büyükler küçüklere zarar verebiliyor.	A2
52	Hayır	A6
53	Küçük sınıflardaki çocuklar özellikle okulun ilk günlerinde sürekli koşturdukları için birbirleriyle çarpışıp zarar görüyorlar.	A6
54	Büyükler küçüklere zarar veriyor. Sıra vermiyolar.	A6
55	N/A	
56	Küçüklere nasıl oynayacaklarını ne yapacaklarını sürekli olarak anlatmak gerekiyor. 3. ve 4. sınıflar daha biliçli lkendi kendilerine oyun kurup sosyalleşebiliyorla. Büyükler birbirlriyle, küçükler çevreleriyle daha ilgilililer.	A1, A2, A5
57	Oyun oynama biçimleri farklı oluyor.	A1
58	Hayır	NO
59	Oyun kurma alışkanlıkları büyüdükçe gelişiyor. İlgileri farklı alanlara da kayıyor. Satranç oynuyorlar, kitap okuyorlar.	A1, A3
60	Farklı yaş gruplarının farklı bedensel özellikleri ve kapasiteleri var. Çevrelerini algılayış biçimleri gelişiyor. Büyükler daha sosyal ve oyunlar için geniş alana ihtiyaç duyuyorlar.	A1, A2, A5
61	Hayır	NO
62	Hayır	NO
63	Büyükler daha çok spor aktivitelerine ve kurallı oyunlara ilgi duyuyor. Daha bilinçli oluyorlar.	A1, A4
64	N/A	
65	Hayır	NO
66	Oynadıkları oyunlar açısından farklılıklar olduğunu düşünüyorum. Küçükler daha çok koşu, yakalamaca, büyükler maç ip atlama ve grup oyunları.	A1
67	Büyükler daha sosyal ve dengeliler. Küçüklerin daha çok kontrol edilmeye ihtiyaçları oluyor.	A2, A6
68	Fiziksel yapılarındaki farklılıklardan dolayı bir arada oynayamıyorlar. Küçükler zarar görebiliyor.	A1, A2, A6
69	Tenefüs olunca hepsi aynda dışarı koşuyorlar. Büyükler küçüklere dikkat etmeyip çarpışıp zarar verebiliyor.	A6
70	Algılama seviyeleri farklı dolayısıyla küçük çocuklar büyükler kadar sosyal biçimde oyunlara dahil olamıyor.	A1, A2, A5
71	Büyükler hem dılarda hem d içerde daha aktifler. Sınıfta da oynuyorlar dışarda maç da yapıyorlar. Küçük sınıflar aynı bilinç seviyesinde olmadıkları için dah abasit oyunlarla ya da koşturarak vakit geçiriyorlar.	A1
72	Farklı tarzda oyunlar oynuyorlar.	
73	Büyükler daha bilinçli daha farklı oyunlar oynuyorlar. Küçükleri oyalamak gerekiyor. Bazen müzik bile açıyoruz dans etmeyi çok seviyorlar.	A1, A5
74	Küçükler tamamen oyun, büyükler derslerle ve başka uğraşlarla, sporla daha ilgililer	A1, A3, A4
75	Küçükler çok hareketli oldukları için birbirleriyle ve büyüklerle çarpışıyorlar.Takip etmek gerekiyor.	A6
76	Küçükler zarar görüyori rahat oynayamıyorlar.	A6
77	Büyüklerin aktivitleri daha çeşitli ve bilinçli. Küçükler belli bir düzende bir araya gelemiyor, öylesine koşturuyorlar. Bu da kazalara neden oluyor.	A3, A6
78	Bahçe alanına bakacak olusanız aslında zaten küçük yaştaki gruplar için uygun değil. Düşüyorlar, henüz tek başlarına oyun oynamakta güçlük çekiyorlar. Büyükler daha dikkatli hem ihtiyaçlarını rahatça gideriyolar hem de oyunları daha çeşitli.	A1, A3
79	Hayır	NO
80	Hayır	NO
81	N/A	
82	Küçük öğrenciler yerlerinde duramıyor sıkılıyorlar. Çok enerjikler ve koşup oynamaya ihtiyaç duyuyorlar. Büyükler daha sakin, kurallı yunlar oynuyorlar.	A1, A5
83		
84	Bir arada olmaları çok kolay olmuyor. Küçük öğrencilerin olumsuz etkilendiğini düşünüyorum. Ezilme tehlikesi, düşme, şiddet gibi durumlar oluşabiliyor.	A6
85	Tenefüsler kısacık zamanda da olsa her yaş grubu için oyun zamanı demek. Büüykler daha yaratıcı oyunlar bulabiliyorlar, küçüklerin daha fazla yönlendirilmeye ihtiyacı oluyor. Büyüklerden çekinebiliyolar.	A1, A6
86	Büyük öğrenciler farklı oyun grupları oluşturuyor.	
87	Hayır	NO
88	Küçükler koridorlarda ya da sınıfta büyükler daha çok bahçede vakit geçiriyor. Büyüklerin top oyunları, kız öğrencilerin kendi aralarında oyunları, ip atlama vs daha geniş alan gerektiriyor.	A1, A5
89	Büyüklerin yeni oyun yaratma ya da sosyalleşerek farklı aktivitelere yönelebilme eğilimi daha yüksek.	A1, A2, A3
90	Küçükler bilinçsizce koşturuyorlar, büyükler daha kurallı oyunlar oynuyorlar.	A1
91	Büyükler küçüklere istemeden de olsa zarar verebiliyor. Dolayısıyla iki grup birbirine fazla karışmıyor.	A6
92	Hayır	NO
93	Oyunları farklı. Büyükler birbirleriyle daha sosyaller. Küçükleri yönlendirmek gerekiyor.	A1, A2, A6
94	Oyun alanı paylaşımında büyük öğrenciler daha avantajlı. Çünkü hem içerde hem dışarda daha rahat vakit geçirebiliyorlar. Küçüklerin oyunları daha çok kuralsız yani koşturma, enerji atma odaklı.	A1, A5
95	Büyükler küçükleri korkutabiliyor, kazalar olabiliyor. Küçüklere daha fazla göz kulak olmak gerekiyor.	A6
96	Hayır	NO
97	Hayır	NO
98	Oynadıkları oyunlar farklılaşıyor. Büyükler gruplar halinde , bir arada oynuyorlar.	A1

99	Hayır	NO
100	Hayır	NO
101	Küçük öğrenciler kendilerini büyükler kadar rahat ifade edemiyorlar. Bu durum da oyunlara , aktivitelere yansıyor. Büyükler daha sosyal ve takım oyunlarına daha yatkın. Oyun dışı aktiviteleri de daha çeşitli.	A1, A2, A3
102	Hayır	NO
103	Oyun değişiklikleri	A1
104	Hayır	NO
105	Aslında küçük büyük bir arada kontrollü biçimde vakit geçirirlerse küçükler büyüklerden bir şeyler öğrenebiliyorlar. Ama serbest zamanlarda bunu kontrol etmek kolay değil. Büyükler kendi aralarında küçükler kendi aralarında oyun oynuyor. Genelde büyükler daha sosyal.	A2, A6
106	Hayır	NO
107	Hayır	NO
108	N/A	
109	Sürekli yaralanmalar oluyor ve genelde etkilenen taraf küçük gruplar oluyor.	A6
110	Büyükler dersleri anlama, bireysel faaliyetler gerçekleştirme açısından daha yetkin. Liderlik vasıfları da yaş gereği daha gelişkin durumda. Küçük öğrencilere göre, yani mesela dördüncü sınıflar birinci sınıflara göre daha sosyal, daha çeşitli aktiveteler gerçekleşitirmeye yatkın. Tenefüslerde de bu durumun etkisi görülüyor.	A2, A3
111	Oynadıkları oyunların tipi açısından farklılıklar var.	A1
112	Büüykler daha sosyal oyunlar oynarken küçükler çok da farkında olmadan vakit geçiriyorlar. Aslında okul bahçesi küçüklerin oyunları için çok uygun değil. Tümüyle sert zemin ve koşarken düşüp yaralanıyorlar.	A1, A2, A6
113	N/A	
114	N/A	
115	Hayır	NO
116	Tenefüs zili çalıdığı anda hepsi dışarı koşuyor. Bahçede bir yer kapma yarılı oluyor ve geneşde büyük çocuklar küçüklerden oyunlarını bozdukları için şikayetçi oluyorlar. Aslında oyuna katılma, oynama becerileri farklı, oyunları farklı.	A1, A6
117	Yaş gruplarına göre oynadıkları alanlar ve oyun çeşitleri farklıdır. Büyükler spor alanını tercih ediyor, küçükler oyun alanındalar. Büyükler daha sistemli oynuyor.	A1, A4
118	Yaş gruplarına göre oyun alanları farklılık gösteriyor.	A5
119	Oynadıkları oyunların tipi ve içerde dışarda vakit geçirmeler açısından farklılık var. Küçükler dah ürkek ve içerde olmaya yatkınlar.	A1, A5
120	Ufak sınıfların serbest zaman aktivitelerinde daha sıkı yetişkin kontrolüne ihtiyaç duyuluyor. Büüykler hem bahçede hem içerde daha aktifler ama küçükler daha çok içerde olmayı tercih ediyor.	A5, A6
121	Hayır	
122	Oyun oynama şekilleri farklı. Bir de sürekli olarak kontrol etmek gerekiyor. Tenefüslerde büyük-küçük kavgası çok fazla oluyor.	A1, A6
123	Büyükler daha bilinçli davranıyor, kurallı oyunlar oynuyorlar. Küçükler büyükler kadar oyun kurma ya da sosyalleşme becerisine sahip değil.	A1, A2
124	Küçük öğrenciler sınıf içinde oynarken büyükler koridor ve bahçeyi daha çok kullanıyor.	A5
125	Küçük sınıflar (1. sınıflar) zaten yeni geldiklerinde bir alışma dönemi geçiriyorlar. Oyun parkından okul bahçesine geçiş onlar için ani bir değişiklik oluyor. Haliyle ne yapacaklarını bilemiyorlar. Düşüyorlar, zorlanabiliyorlar. Büyükler daha farklı oyunlar bulabiliyorlar, spor sahasını daha aktif kullanabiliyorlar.	A1, A4, A6
126	Büyükler küçüklere zarar verebiliyor. Küçüklerin daha fazla kontrol edilmesi gerekiyor.	A6
127	N/A	
128	Büyük öğreciler hem zihinsel hem de fiziksel yönden daha gelişmiş oldukları için birbirlieriyle ilişkileri ve oyun oynama tarzı açısından farklılar.	A1, A2
129	Küçük öğrenciler sınıf içinde oynamayı tercih ediyor, büyükler daha çok bahçede vakit geçiriyor.	A5
130	3. ve 4. sınıf öğrencileri sorumluluk alma ve oyun kurma yönünden daha iyi durumda oluyorlar. Yeni gelen 1. sınıflara özellikle alışma döneminde dikkat etmek gerekiyor.	A1
131	Büyüklerin küçüklere zarar vermesi endişesi oluyor.	A6
132	Oyun ve arkadaşlık, bir arada vakit geçirme biçimleri arasında farklılar var. Büyükler daha sosyal oluyor.	A1, A2
133	Yaş olarak büyüdükçe oyunlar farklılaşıyor. Daha rekabetçi oluyorlar, kovalama ve koşma dışında başka tip oyunlar bukuyorlar. Maç yapıyorlar.	A1, A4
134	Hayır	NO
135	Hayır	NO
136	İletişim konsunda farklılıklar var bu da aktiviteleri etkiliyor. Küçüklerin iletişim becerileri tam gelişmemiş oluyor. Daha çekingen oluyorlar, sınıfta ya da sınıfa yakın alanlarda vakit geçirmeye eğilimli oluyorlar.	A2, A5
137	Hayır	NO
138	Hayır	NO
139	Hayır	NO
140	1.sınıf ve 4. sınıf arasında mekan kullanımı açısından problemler olabiliyor. 4. sınıflar ortak mekanların tümüne yayılmak istiyor, küçükler de onların oyunlarını bölüyor ve kavga ediyorlar.	A5, A6
141	Hayır	NO
142	Hayır	NO
143	Büyük sınıflar hem oynadıkları oyunlar açısından daha farklılar hem de oyun dışında sosyalleşme, daha sporttif faaliyetler mesela maç yapma yakan top vb gibi daha bilinçliler. Küçüklere anlatmak ve başlarında durarak öğretmek yönlendirmek gerekiyor.	A1, A3, A4, A6

144	Zevk aldıkları oyunlar farklı. Verdikleri tepkiler ve kas güçleri birbirlerinden farklı. Büyük yaştaki çocuklar küçüklere zarar verebiliyor, daha hızlılar. Bu nedenle mekan kullanımı açısından kendiliğinden bir bölünme oluyor.	A1, A5, A6

Appendix A.7: The Impact of Spatial Design Quality on Academic Motivation

Table 1: The Impact of Spatial Design Quality On Academic Motivation

T-Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	STUMOTIVATION	6.43	144	.866	.072
	TEACMOTIVATION	6.13	144	1.164	.097

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	STUMOTIVATION & TEACMOTIVATION	144	.661	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	STUMOTIVATION - TEACMOTIVATION	.306	.879	.073	.161	.450	4.170	143	.000

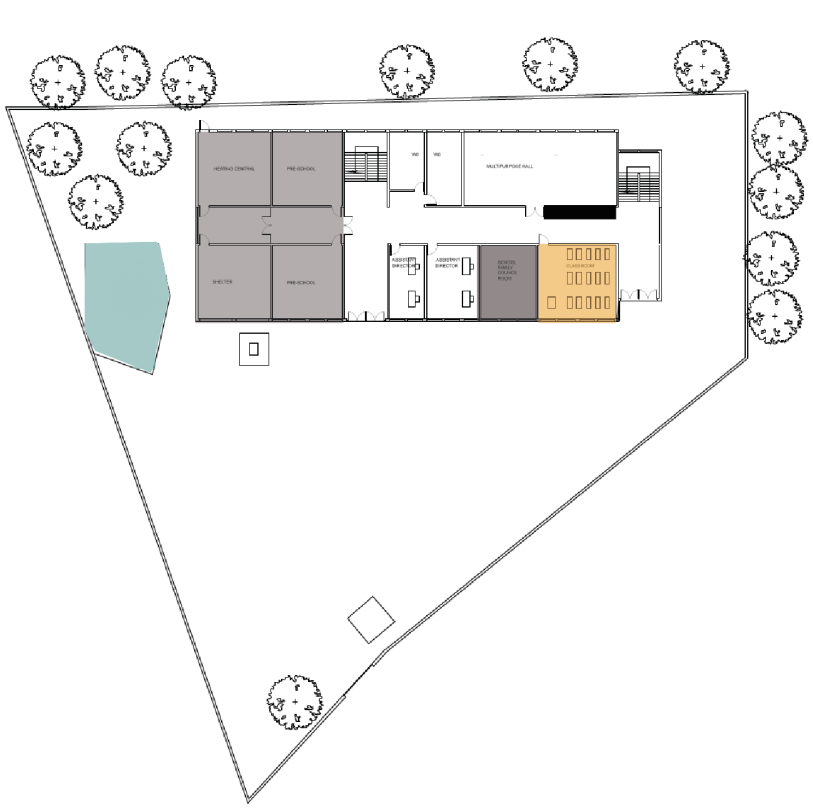
Appendix A.8 Functional Changes and spatial Alterations Marked on Plan Drawings

Figure 1: Schematic plan drawings of Ahmet Haşim and Mustafa Itri Primary Schools

Figure 2: Schematic plan drawings of Nail Reşit and Şakire Sadi Obdan Primary Schools

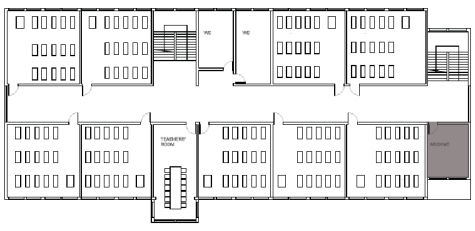
Figure 3: Schematic plan drawings of Kocatepe and Osmangazi Primary Schools

Converted to a standard classroom
Converted to a subject-specific or informal learning space
Converted to an administrative zone with limited student access
Converted to a social area, adining hall, a cafeteria or a gathering space
Pre-school section



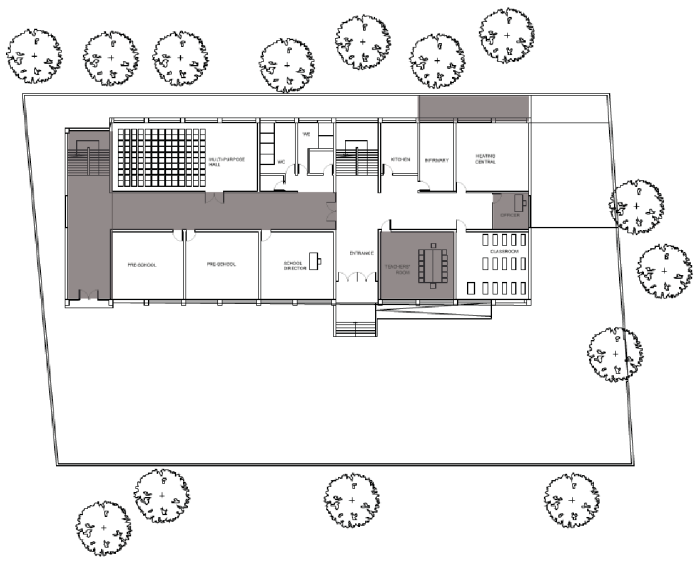
FIRST FLOOR

SECOND FLOOR



THIRD FLOOR

5. KOCATEPE
PRIMARY SCHOOL



FIRST FLOOR

SECOND FLOOR

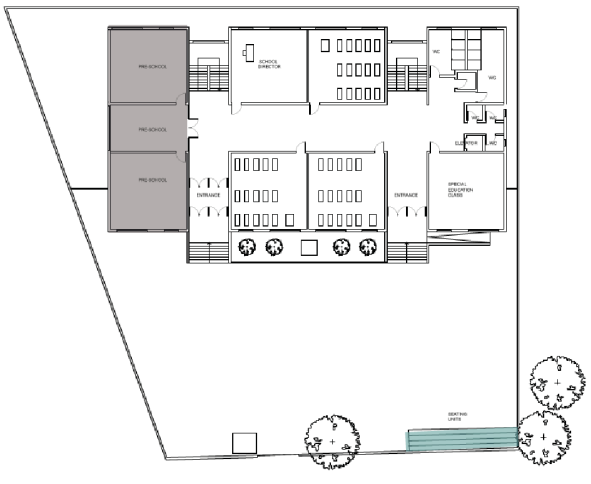
6. OSMANGAZİ
PRIMARY SCHOOL

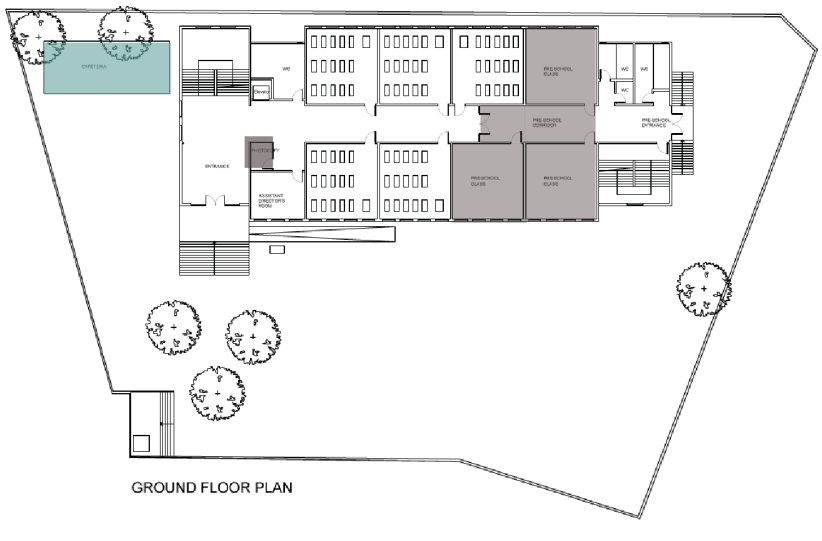
Figure 4: Schematic plan drawings of Haci İlbey and Şair Şinasi Primary Schools

7. HACI İLBEY
PRIMARY SCHOOL

8.ŞAİR ŞİNASİ
PRIMARY SCHOOL

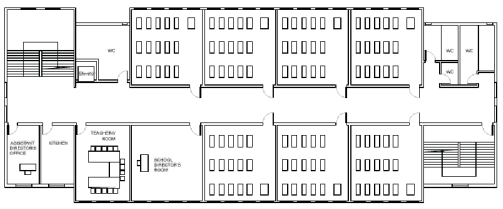
Figure 5: Schematic plan drawings of Bayrampaşa and Uluğbey Primary Schools





GROUND FLOOR PLAN

FIRST FLOOR PLAN

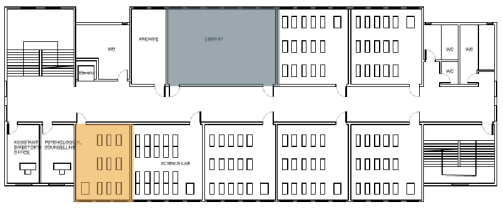


FIRST FLOOR PLAN

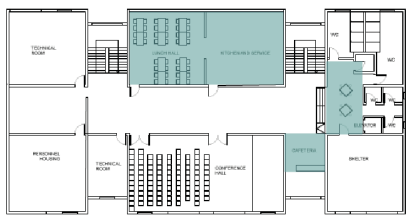
SECOND FLOOR PLAN

SECOND FLOOR PLAN

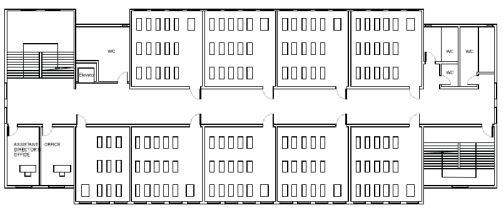
THIRD FLOOR PLAN



THIRD FLOOR PLAN



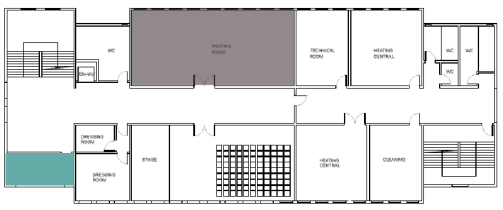
BASEMENT PLAN



FOURTH FLOOR PLAN

9. BAYRAMPASA PRIMARY SCHOOL

- Converted to a standard classroom
- Converted to a subject-specific or informal learning space
- Converted to an administrative zone with limited student access
- Converted to a social area, adining hall, a cafeteria or a gathering space
- Pre-school section

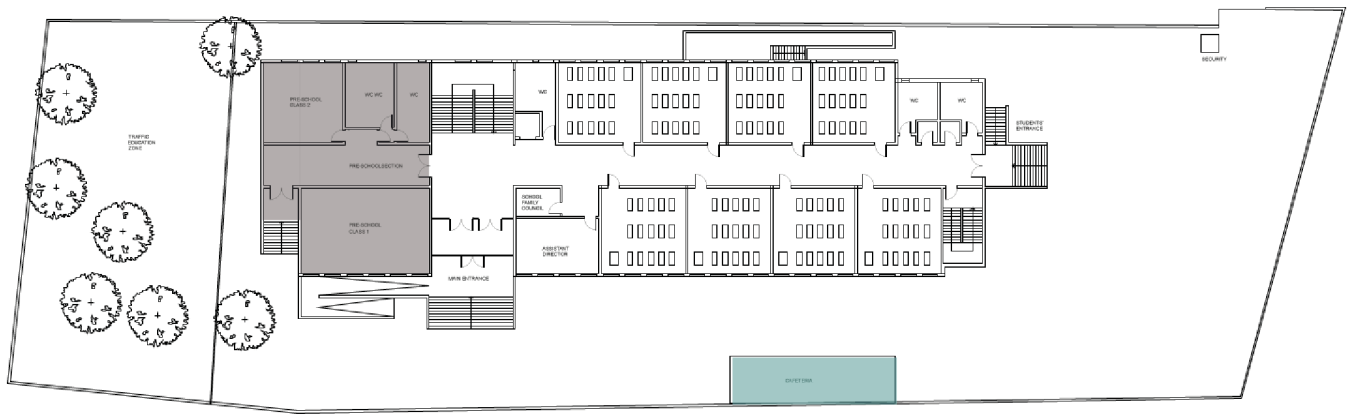


BASEMENT FLOOR PLAN

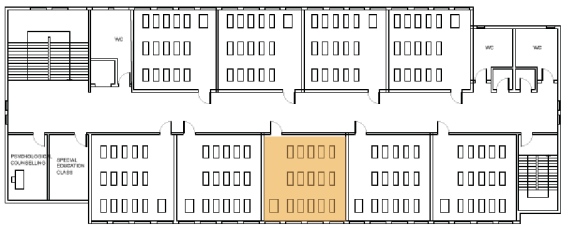
10.ULUGBEY PRIMARY SCHOOL

Figure 6: Schematic plan drawings of Şair Baki Primary School

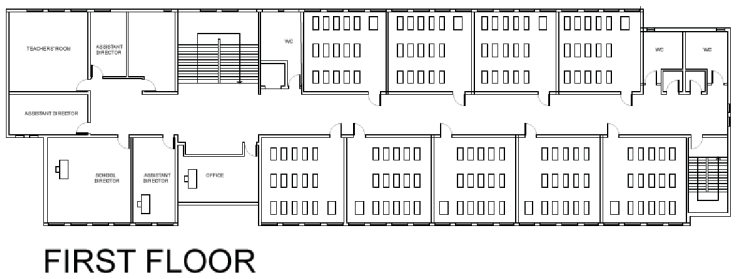
Converted to a standard classroom
Converted to a subject-specific or informal learning space
Converted to an administrative zone with limited student access
Converted to a social area, adining hall, a cafeteria or a gathering space
Pre-school section



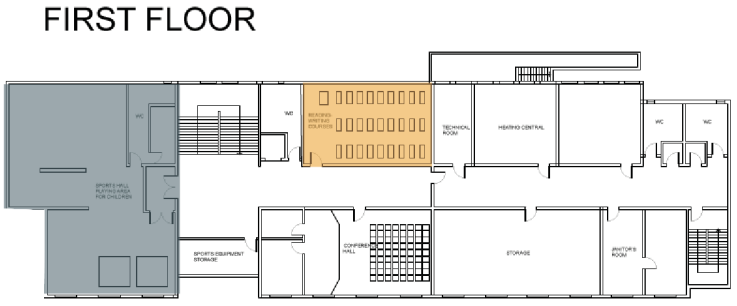
THIRD FLOOR



SECOND FLOOR



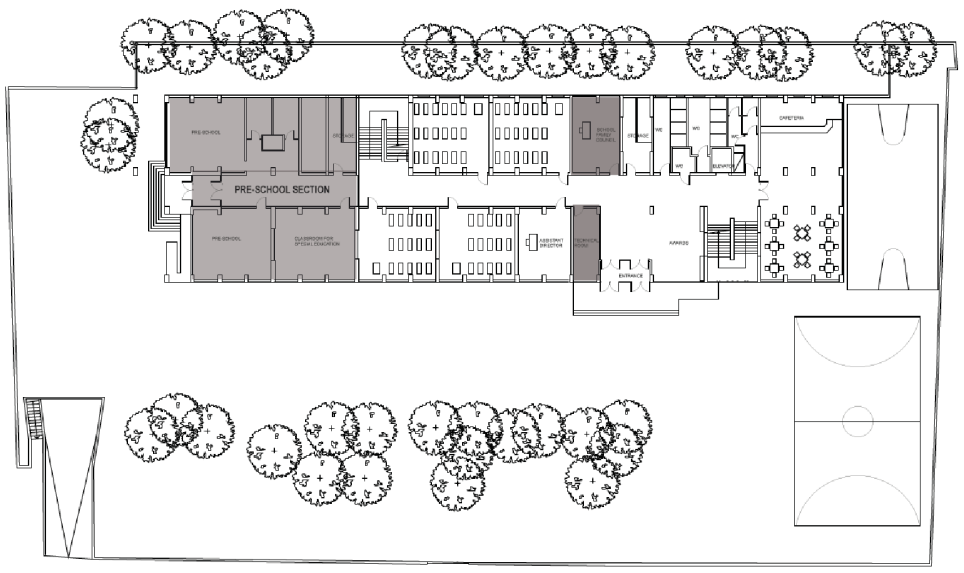
FIRST FLOOR



BASEMENT FLOOR

11.ŞAİR BAKİ
PRIMARY SCHOOL

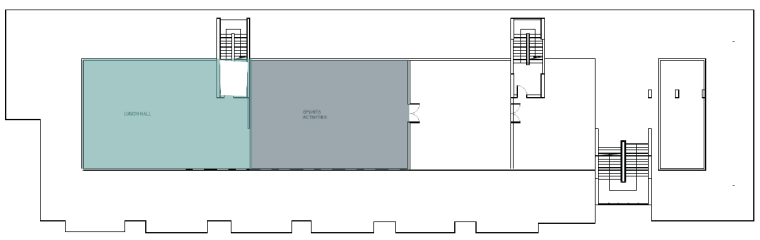
Figure 7: Schematic plan drawings of Oğuzhan and Tuna Primary Schools



FIRST FLOOR

SECOND FLOOR

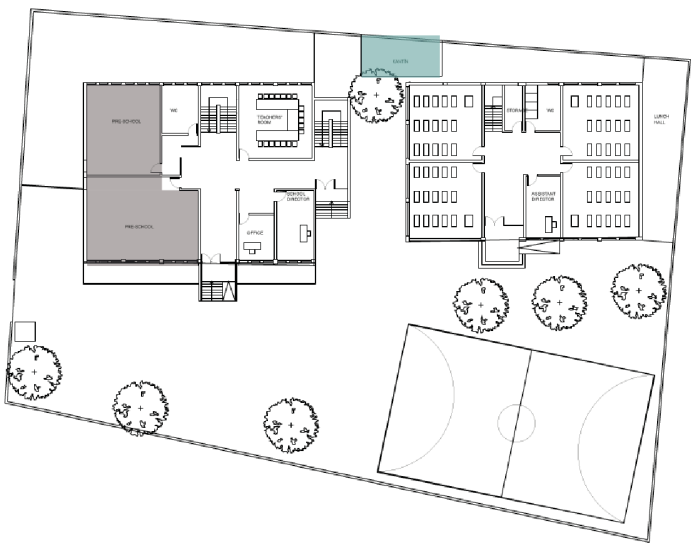
THIRD FLOOR



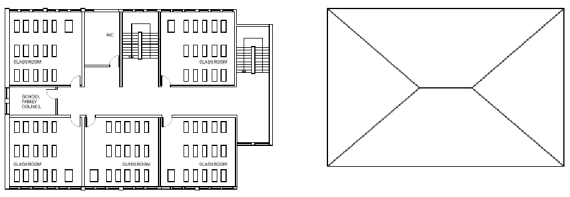
FOURTH FLOOR (ROOF LEVEL)

BASEMENT

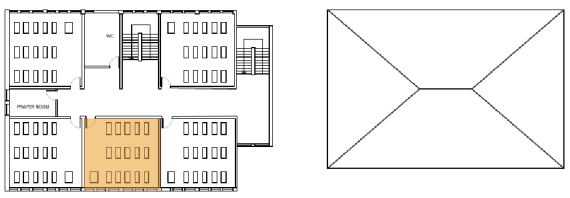
12.OGUZHAN
PRIMARY SCHOOL



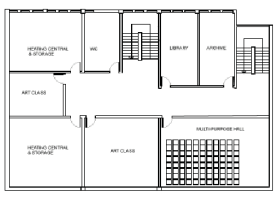
FIRST FLOOR



SECOND FLOOR

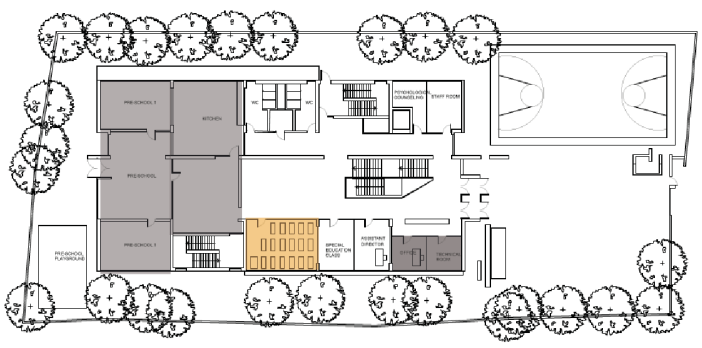


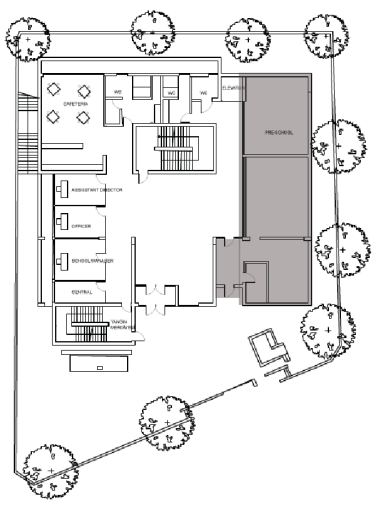
THIRD FLOOR



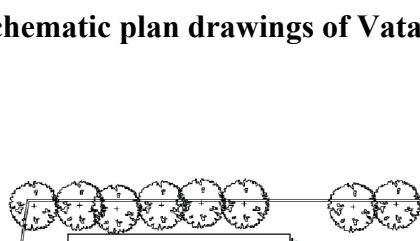
13.TUNA
PRIMARY SCHOOL

Figure 8: Schematic plan drawings of Vatan and Şehit Kamil Balkan Primary Schools





FIRST FLOOR



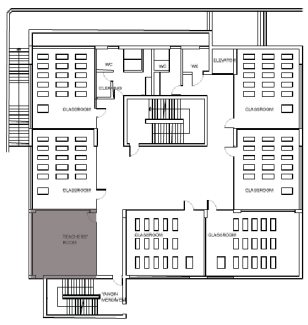
SECOND FLOOR

THIRD FLOOR

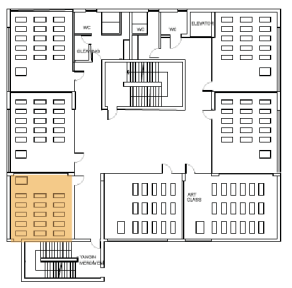
FOURTH FLOOR PLAN

BASEMENT

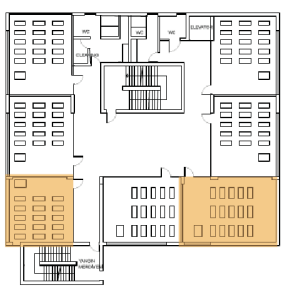
14.VATAN
PRIMARY SCHOOL



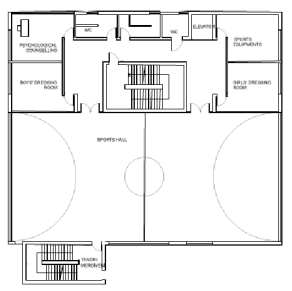
FIRST FLOOR PLAN



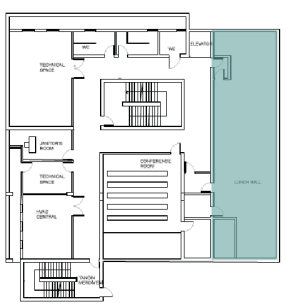
SECOND FLOOR PLAN



THIRD FLOOR PLAN



FOURTH FLOOR PLAN



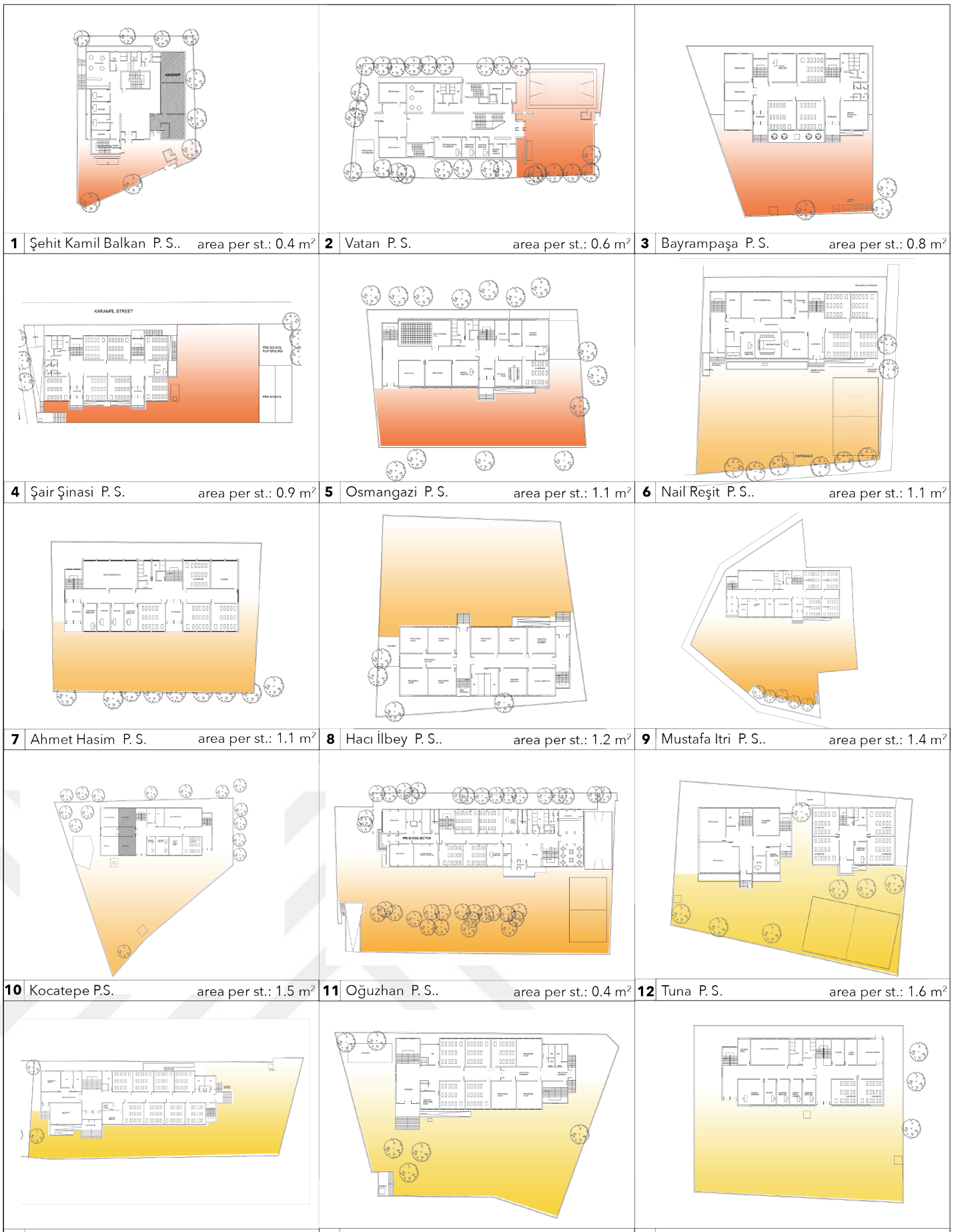
BASEMENT FLOOR PLAN

15.ŞEHİT KAMİL BALKAN
PRIMARY SCHOOL

Converted to a standard classroom
Converted to a subject-specific or informal learning space
Converted to an administrative zone with limited student access
Converted to a social area, adining hall, a cafeteria or a gathering space
Pre-school section

Appendix A.9 Accessible School Garden Zones

Table 1: Accessible school garden zones for students indicated in color on school plans



1 Şehit Kamil Balkan P. S..	area per st.: 0.4 m²	
2 Vatan P. S.	area per st.: 0.6 m²	
3 Bayrampaşa P. S.	area per st.: 0.8 m²	
4 Şair Şinasi P. S.	area per st.: 0.9 m²	
5 Osmangazi P. S.	area per st.: 1.1 m²	
6 Nail Reşit P. S..	area per st.: 1.1 m²	
7 Ahmet Hasim P. S.	area per st.: 1.1 m²	
8 Hacı İlbey P. S..	area per st.: 1.2 m²	
9 Mustafa Itri P. S..	area per st.: 1.4 m²	
10 Kocatepe P.S.	area per st.: 1.5 m²	
11 Oğuzhan P. S..	area per st.: 0.4 m²	
12 Tuna P. S.	area per st.: 1.6 m²	
13 Şair Baki P. S.	area per st.: 1.6 m²	
14 Uluğbey P. S..	area per st.: 1.8 m²	
15 Şakire Sadi Obdan P. S.	area per st.: 2.1 m²	

Appendix A.10: Accessible Outdoor Area at Schools

Table 1: Amounts of Accessible Outdoor Area at Schools

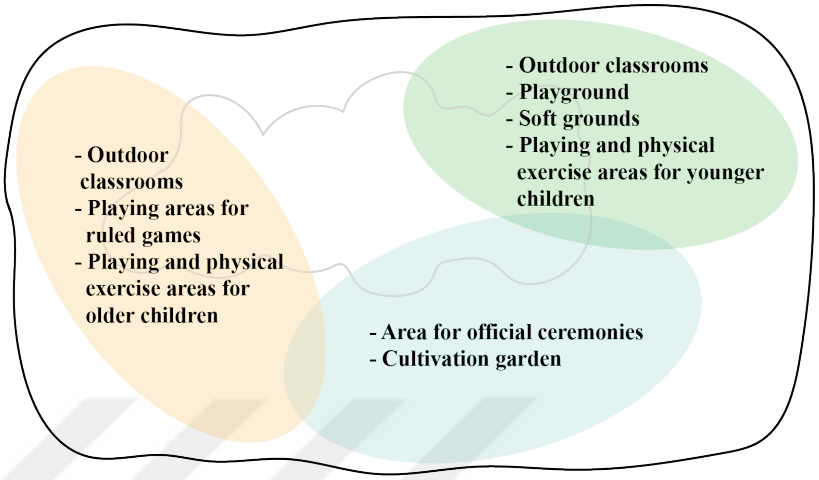
Name of the School	Project Year	Number of Students	Total Site Area	Building Foot Print	Total Outdoor Area	Garden Area Available for Children's Use	Accessible Outdoor Area per Student
Şehit Kamil Balkan Primary School	2013*	870	1164	641	523	340	0.4
Vatan Primary School	2013*	861	1720	651	1069	546	0.6
Bayrampaşa Primary School	2006	992	1805	821	984	817	0.8
Şair Sinasi Primary School	2005	1050	1864	718	1146	900	0.9
Osmangazi Primary School	2011*	845	1996	794	1202	848	1.0
Nail Reşit Primary School	2003	1167	2389	778	1611	1235	1.1
Ahmet Haşim Primary School	2001	790	2027	825	1202	878	1.1
Hacı İlbey Primary School	2009 *	1117	2495	807	1688	1368	1.2
Mustafa Itri Primary School	2001	1176	3103	825	2278	1632	1.4
Kocatepe Primary School	2000	970	2891	803	2088	1468	1.5
Oğuzhan Primary School	2015	1550	4362	1164	3198	2361	1.5
Şair Baki Primary School	2017*	1358	3608	1158	2450	2142	1.6
Tuna Primary School	2005*	875	2615	767	1848	1420	1.6
Uluğbey Primary School	2005	845	2850	870	1980	1516	1.8
Şakire Sadi Obdan Primary School	2013*	715	2650	798	1852	1525	2.132867133
* Rebuilt or totally renovated.						mean:	1.24

Appendix A.11: A Conceptual Diagrammatic Representation of Suggestions to Enhance Flexibility in the Existing Primary Schools

1. OUTDOOR SPACE USE

School ground can be divided into sub-spaces defined and customized according to the particular needs of students who belong to different age groups.

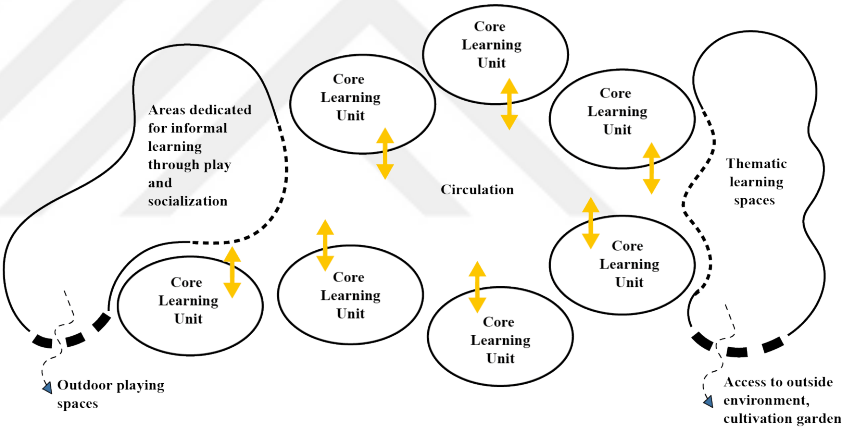
Spatial variety can be enhanced to extend learning activities to the outside and natural environment.



2. ARTICULATION OF LEARNING UNITS

Visual permeability can be supported by the use of transparent surfaces between the circulation and core learning units to make children feel that the whole school belongs to their learning domain.

Multi-purpose informal study and playing alcoves can be integrated to main circulation routes. Thematic learning areas such as arts and crafts rooms can be carried from basement floors to make them more accessible and efficiently use and these spaces can be supported by providing students opportunities to exhibit their work.



3. ALTERNATIVE SCENARIOS TO UTILIZE LEARNING SPACES

The spaces can be divided into smaller thematic areas or combined to adapt according to the needs of educational activities performed by larger groups by the use of modifiable boundaries.