



Design Guide for Reconstruction of Primary Education Structures in the Process Covid-19 Pandemic

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Abstract

Schools are nearly a living organism which supports future generations, abilities and leaders, and enables our communities to improve. Even though their major purpose is to provide students with a good education, school structures and campuses ensure a number of social duties and functions. While there are 18 million 241 thousand 881 students at the primary and secondary education level in Turkey in 2019-2020 school year, there are 1 million 117 thousand 686 teachers (Hürriyet,2020). Primary and secondary school buildings more than 68 thousand 589 in Turkey were closed during the pandemic, and all the students attended the educational activities from their homes (Hürriyet,2020). Educators' continuation for teaching students was ensured by such innovations as distance education. However, the impediments to distance education have increased socio-economic inequalities. Access to distance education has become dependent on technological tools, including internet infrastructure ownership, computer-tablet availability. In some homes, students completed their schoolwork, sometimes sharing smart devices among siblings. The fact that students go to school does not only support their education but also improves them physically, mentally and socially. For all these reasons, it is crucial to start finding a way to reopen schools in a safe and measured way. Although distance education will continue in some way after the schools are reopened, getting back to the classroom (even in a limited way) is critical to the emotional and mental well-being of students. Even though the curriculum plays an important role in preparing children for success as adults, problem solving, coming together, communicating, producing collaborative work, social relationships and interpersonal experiences are also very important for childhood development. Many students missed reconnecting with their friends and teachers and sharing experiences such as classroom trips and graduation ceremonies.

Reopening of schools under pandemic conditions is a difficult and complex decision that must be broken down into manageable pieces. Actions to be taken today in response to the COVID-19 pandemic will lay the groundwork for the proactive, long-term preparation needed to ensure that schools are resistive to future disasters and pandemics, including potential flu outbreaks. This study summarizes the findings on primary education structures and provides education authorities with insight and guidance on school reopening.

Keywords: Educational Building, Covid-19, Educational Building Design, Pandemic.

PURPOSE

It should not be thought that the effects of the Covid-19 pandemic will be temporary. Due to the rapid increase in the population in cities, the acceleration of human mobility on a global scale, and the changes on dietary and consumption habits, it is predicted that global pandemics will be repeated at different scales every ten years. In this case, even if the space of education, which is a public phenomenon, seems to be a virtual environment at the time of the pandemic, post-pandemic educational structures will be designed in the manner that health is at the forefront. While health and hygiene rules are the design factors that come into prominence in the design of the post-pandemic education structure, socialization should be taken equally with these design factors, and structures where



students will socialize within the framework of health should be planned. Safe spaces for educators and students, where education and training activities will be carried out with the awareness of protecting their health should be created. In the study, the design decisions in the layout plan, architectural planning and equipment scale were fictionalized to reconstruct the primary school structures after the pandemic. The aim of the study is the proposal of the necessary changes and architectural arrangements to create pandemic and epidemic scenarios in education structures and to ensure that primary education structures perform best and be affected by the least damage during the pandemic.

SCOPE

The Covid-19 pandemic has affected almost every area of our lives, our daily habits, our relationships with people, our emotions, thoughts, and culture. It is an unavoidable fact that it will affect our lives and, as a reflection, our spaces in the short, medium and long term. After the pandemic, the effects of the pandemic will continue spatially.

During the pandemic period, most of the educational spaces have not been used for a long time. It is tried to be produced temporary solutions (social distance markings, reducing the number of users, etc.) in the spaces used. The psychology of the student, effective and efficient education and the commitment of the student to his school-teacher-class are very important. During the distance education period due to the pandemic, such problems that students cannot concentrate on the courses, cannot have an efficient education period, do not have resources, suitable spaces for distance education, etc. have occurred. In order to reduce the effects of the pandemic on the field of education, each country has determined its own planning and regulation criteria in educational spaces. In this process, it is an important issue the transition to face-to-face education by following the pandemic rules and with the least damage in education. In this process, planning and preparations should be made in the transition to face-to-face education. This study will explain the measures that can be taken in primary education structures for the transition to face-to-face education, based on the fact that pandemics can always be in our lives, for future pandemics even if the Covid-19 pandemic ends, the decisions in the planning of primary education structures in detail, by making them concrete with diagrams.

METHODOLOGY OF THE STUDY

This study is a diagram-oriented approach to the reconstruction of educational structures with the pandemic. It is an interpretation study aimed at understanding, evaluating and producing solutions in the current agenda. Diagrams were used as a tool for thinking and designing. The situation of the educational structures that constitute the basis of the study at the time of the pandemic is briefly mentioned, it is examined how our solution generation system and understanding mechanism are related to representation with diagrams, some usage strategies in educational structures are explained so far, and it is tried to reveal the potential of diagrammatic design by comparing the solution diagrams that are clustered according to the pandemics which are transformative powers.

RESEARCH PROBLEM

Education has been the area most negatively affected by the pandemic. Due to the pandemic, education was suspended for a while, but this break did not last long. The phenomenon of education has undergone a rapid change and has been transferred to the digital environment as online distance education. Students have experienced the shortcomings of distance education. Infrastructure deficiencies have emerged in many countries, students who were accustomed to the education structure and school desks had difficulties in concentrating in the home environment, and students who did not have communication tools were completely excluded from education. As a result, the expected efficiency from the online courses could not be obtained.

Educational spaces have become unusable during the pandemic. Educational spaces have lost their function, since appropriate architectural plans cannot be made in the event of a possible pandemic. It is unavoidable that there will be serious changes and transformations



in the design of educational structures after the pandemic. The newly designed educational spaces should be arranged in such a way that they do not lose their function in the event of a possible epidemic.

The educational spaces we use today are in the typology of educational structures from the 19th century. This typological approach is in the form that it is multi-storey and large-scale, and has a maximum number of students in minimum square meters, and use of classroom-open space and open-closed space are disconnected, and comfort conditions are very low in the city. In this study, solutions will be sought on how the design of school buildings that can adapt flexibly, where distance-space sizes, natural light and natural ventilation gain importance, classroom-open space use relations, contact is minimal, common usage areas are diversified, the existence of spaces suitable for individual use in controlled life with the pandemic, which is the new life order.

Answers to the following questions will be sought in this study in order to design educational structures and produce solutions to pandemics.

- How will the space of education, which is a public phenomenon today, be shaped by the Covid-19 pandemic?
- Can health-oriented design be realized in educational structures? If it can be realized, how will it be?
- Will the pandemic affect the sizing of educational spaces?
- Will spaces that lose their function in educational structures emerge?
- How will the layout of the spaces in the educational structure change?
- What potential does the pandemic bring to the restructuring of educational structures?
- What are the main differences between the pre-pandemic educational structures design approach and the post-pandemic design approach?
- How can the reconstruction of educational structures be categorized?

1.Introduction

The Covid-19 virus, which emerged in Wuhan, China and spread all over the world has affected our country and the world in many areas. It is expected that there will be transformations that are likely to be permanent in the short and long term, especially in education structures.

Students in Turkey continued the majority of the 2019-2020 spring semester through distance education, and face-to-face education was stopped. Students have been away from their schools. While transitioning to the new normal in these days, are the school structures that will accommodate the students suitable for the pandemic conditions? How will the space of education, which is a public phenomenon, be shaped after the Covid-19 pandemic? What design decisions need to be taken to plan schools in accordance with pandemic conditions? In this study, answers to these questions will be sought.

Schools are not only spaces where students receive education but also a space for children to socialize. For this reason, the spaces where students will spend time in classrooms and during break times are important. In this pandemic period, where the concept of "social distance", which is a part of our daily life, is more important than ever, the first structures that should be applied are undoubtedly the schools where students receive education. How will the social distance rule be followed in schools? How will the education structures be arranged according to the social distance rule? Healthy and safe environments should be provided by making necessary arrangements in the spaces where students spend time to socialize during and outside of education time. This study, which will be useful for reopening of schools, includes suggestions for schools to create a safe space during the pandemic. Some acceptances were made in the study before these recommendations were explained.

These are:

Social distance which is accepted as 1.5 meters in Turkey is accepted as 1.8 meters in the USA and 2 meters in Canada-Spain-India-England. In the statements made by the World



Health Organization, social distance is recommended as 2 meters. In the study, the social distance was taken as 2 meters in the diagrams and explanations shown with dashed lines (Hürriyet, 07.08.2020).

- Classes with 25-30 students in normal times are the spaces where 10-15 students will spend time and use at the same time, during the transition to hybrid education in order not to create density.
- Classrooms are considered as a living space where students can socialize outside their education time, and continuous education takes space, and they constitute the most basic unit of schools.
- During the pandemic, current data and acceptances may change and develop in the light of the investigations and researches related to the pandemic. And consequently, the study can be revised as a result of new research.

Educational structures in Turkey have been implemented with the concept of type project from the past to the present, have been weak in using their own identity and close environment data, and have moved away from the characteristic of innovative education structures. The issue of innovative, healthy, sustainable education structures has come into prominence again with the reopening of schools with the Covid-19 pandemic. Innovative educational structures are important in achieving the goals of education programs and increasing student success and positive attitudes towards school. In this context, although it varies by the curriculum applied, it is of great importance to determine the spaces of use that should be in a safe and healthy school structure against the pandemic during the pandemic process, the characteristics of these spaces, locations of the spaces in the units of the school structure and their dimensions, taking into account the social distance measure. In addition, it is necessary to determine the regulations regarding usage spaces very well.

It should be noted that educational structures are the spaces that affect the psychology of children the most after home and family. The purpose of the design of these spaces is to create spaces where students enjoy going to school, feel safe, there is no situations that pose any threat to their health, it encourages the excitement of learning, it makes students enjoy the environment they are in, and feel a sense of belonging.

2. TRANSFORMATION OF EDUCATIONAL STRUCTURES WITH THE COVID-19 PANDEMIC

Considering the physical, mental and social needs of children, an education model that does not have patterns and strives for constant change and self-renewal should be designed.

This education model should be able to give the child a sense of responsibility, that instills a sense of creativity and using his skills. It attaches great importance to student participation by putting the student at the center in education models that are constantly improving and changing. School structures, where students are able to have a sense of belonging, will enable an emotional bond to be established between the student and the school structure, and in the school structure with social common spaces, education and training will be able to continue outside the classroom. In school structures that are integrated with nature and designed to be sensitive to the environment, students will grow up as people who respect the environment. All details in the education structure design should be designed with the educational purpose in mind. Space designs that only nurture the mental side of students and not their sensory side should be avoided. Communication should be at the forefront in the formation of the classroom order, the participation of students should be supported, and accessible healthy spaces should be designed.

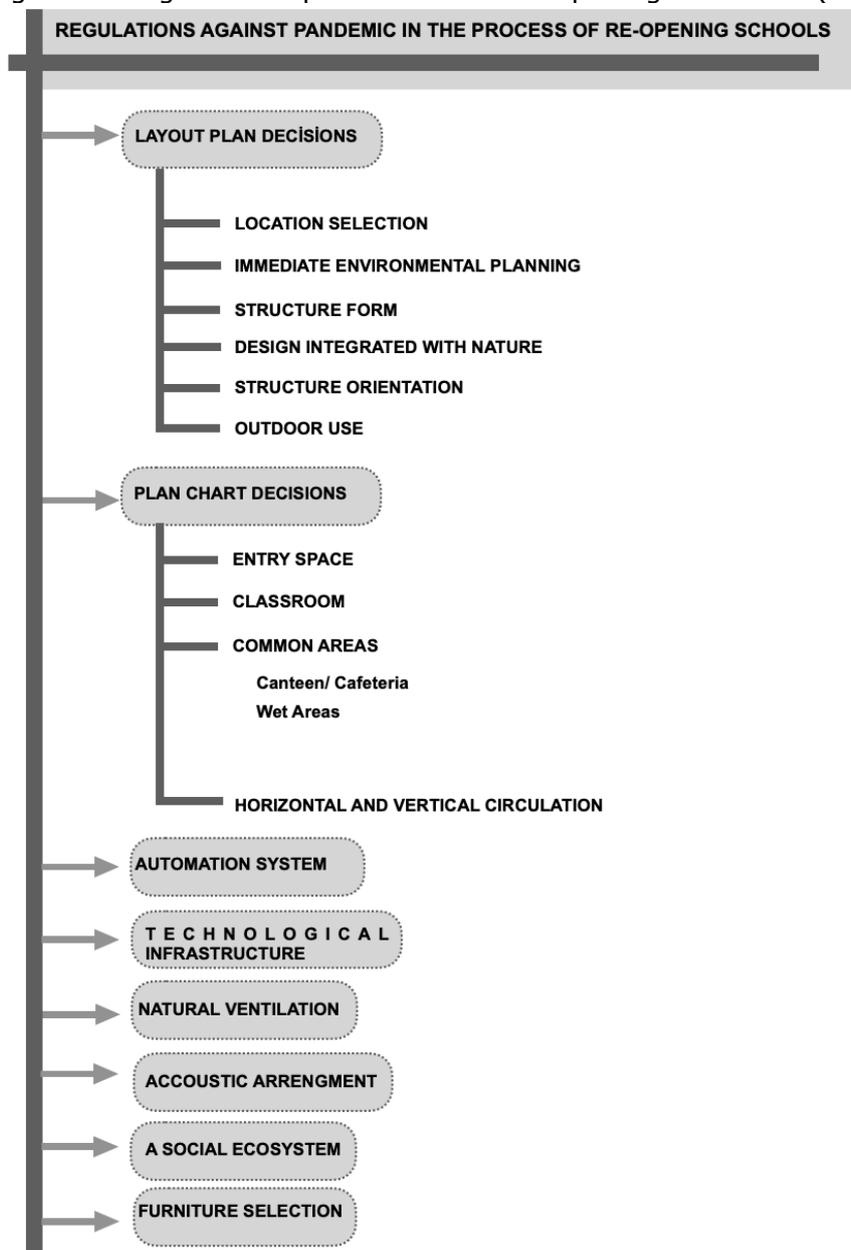
In conjunction with the pandemic, the most important design criteria in educational structures have been to design a space where students can get a healthy and quality education. It should be ensured that the regulations made are permanent, whether they are for Covid-19 or any other pandemics. With the pandemic, concepts such as school

health, student health, the health of employees at school, and a healthy school have become important. In a healthy school structure, there are some properties as the following;

- Located in a healthy environment and fulfilling hygiene criteria
- Producing solutions to urgent health problems of students and employees at school
- Providing physical security in spaces
- Enabling students' mental, sensory, social and physical development.

In the future, schools should be the structures that are both sustainable and adaptable to the current emergency conditions. It should be noted that quality education takes space in quality spaces. This study, which is made with the fact that the effects of Covid-19 will continue for a long time in Turkey and in the world, aims to prevent deficiencies in school structures, misinformation and misapplications, and to design healthy and safe schools. The physical arrangements necessary against the pandemic in the reopening of schools will be examined under eight major topics according to acceptances (Tab 1.).

Table 1. Regulations against the pandemic in the reopening of schools (Author, 2021)





2.1 Layout plan decisions

Schools can be an urban reference point with their size and function.

2.1.1. Location Selection:

Due care should be exercised for the location, usage and size of school structures in urban settlements. In the location selection of primary education structures;

- Accessibility on foot should be provided to the education unit in the neighborhood, which is the smallest sub-unit of the urban scale. The education structure must be within a accessible distance. It should be suitable for children's accessibility measures and design. Primary schools should have the following properties; They should be located within 600 meters of accessible distance in the immediate vicinity of the residence,
- They should be on the smooth public transport network,
- They should be integrated with educational structure and regional planning,

According to the research, while 71% of adults in the USA used to go to school on foot or by bicycle during their school term, this rate has decreased to 17% today. There has been a 25% decrease in the number of students going to school on foot or by bicycle in the last thirty years. Today, the proportion of children living within walking distance of school is 21% (Kol,2003). With the pandemic, people will prefer schools within walking distance, as they will avoid public transportation and school buses, so that in the future, education structures will be on a smaller scale but more widely.

2.1.2. Immediate Environmental Planning

Parking lots and vehicle roads should be designed in harmony with the surrounding traffic circulation system. There should be a service road in the field for emergencies and shuttle service, and this service road should provide appropriate and safe vehicle access that will not interrupt the use of the open area where students are located.

Pedestrian and vehicle circulation should be separated in transportation to the education structure. The entrance and exit of the service vehicles should be provided from the second access point. The location of the shuttle vehicles should be arranged in such a way that students can get off the service inside or outside the schoolyard.

In accordance with the accessibility criteria for everyone, there should be easy access to all spaces.

2.1.3. Structure Form

Educational structures can be grouped according to their functions. Thus, education and management units can be separated from each other. It will help to become diversified different carrier systems and axle spacings according to different functions. Differentiation will be made in the dimensions and volumes of the structure blocks, which are grouped according to different functions. While sizing the spaces, the number of students and the social distance rule should be considered. According to different functions, the height of the structure blocks may need to be changed.

Educational structures should allow development with a modular system. The presence of clusterable units in this modular system reduces the distance of the corridors with horizontal circulation and enables the circulation area to be used effectively for education. The decrease in the length of the corridor gives the student a scale of space according to the user. In the long corridor system, the student feels small. Due to the short length of the corridor in the clustered space, the student will feel safe. Clustered spaces create sub-educational spaces by sharing common side spaces (Fig.1). These sub-educational spaces will provide a comfortable relationship between student-student, student-teacher. It will arouse the feeling of being surrounded in the students, which in this case helps to strengthen the sense of space in the students.

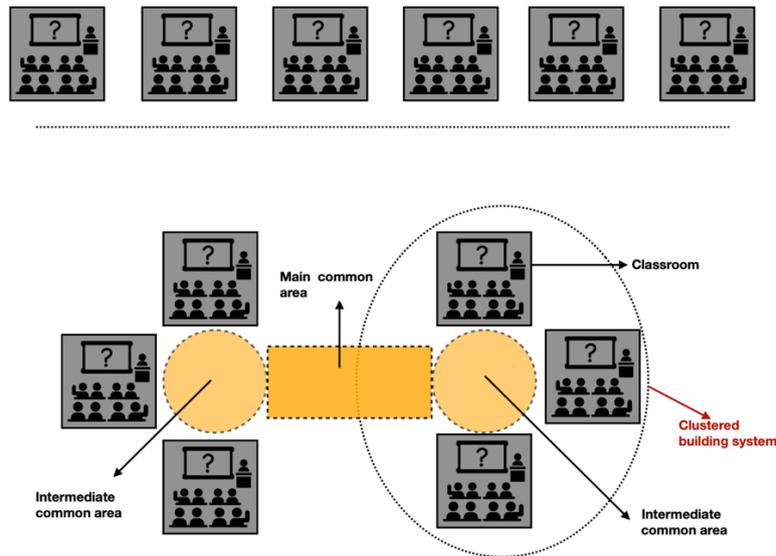


Figure 1. Clustered structure system and sub-educational spaces (Author, 2021)

2.1.4. Design Integrated With Nature

Many design ideas can be created to associate the educational structure with nature. A design integrated with nature can be created by integrating nature into the structure at different elevations. The education structure design integrated with nature allows the student to grow up as an environmentally friendly person, and establishes the distinction and relationship between indoor and outdoor space by living in harmony with nature. Nature, green, outdoor sports become an indispensable part of life. The importance of nature should be taught to children, especially at a young age. Activities such as gardening, planting seeds, planting trees and creating a terrace should be taught to kindergarten age children by playing games, and the idea of learning from nature should be developed. Education and training should not stay in the classroom only, classrooms should be integrated with outdoor-nature and nature should be a learning space. For this reason, in the design of educational structures, alternative working and learning spaces should be produced in nature. In the design model integrated with nature, students learn the components of nature, observe the changes in nature, make nature a part of learning, and avoid practices that harm nature, develop environmental awareness, produce new ideas for a sustainable future. The school can be a learning tool only with its physical structure and design. For this reason, design decisions such as the use of natural light, natural ventilation, passive air conditioning, use of local durable long-lasting recycled materials, utilization of renewable energy systems, waste management planning can be implemented. Floor gardens can be designed for students of different age groups at different levels in the school structure. Thus, all students do not use the school garden on the ground floor and each floor can be made self-supporting without creating congestion.

2.1.5. Structure Orientation

The general orientation of educational structures should be in the north-south direction. Classrooms in the southeastern is ideal for students.

2.1.6. Outdoor Use

During the pandemic, the areas that people realize the most their importance are green areas. Mostly, during the stay at home, the children missed to go out to the open area and play in the open area. People tend to grow flowers in pots on their balconies and in front of windows. Plant breeding processes have an important role in the development of children. Spaces such as playgrounds and activity areas are needed for the development of children's social and emotional intelligence. In educational structures, attention should be paid not only to the classroom design, but also to the gardens, which are the common

areas where children will spend time together. School gardens, supported by green areas, integrated with nature, have a positive effect on the development of children.

In order to encourage the use of open space during the pandemic period, the use of open space in school structures can be increased. Socializing areas can be created for common use in the open area. By grouping and zoning these open areas to serve different age groups, students both use equipment suitable for their own ergonomic characteristics and prevent concentration in certain areas (Fig.2).

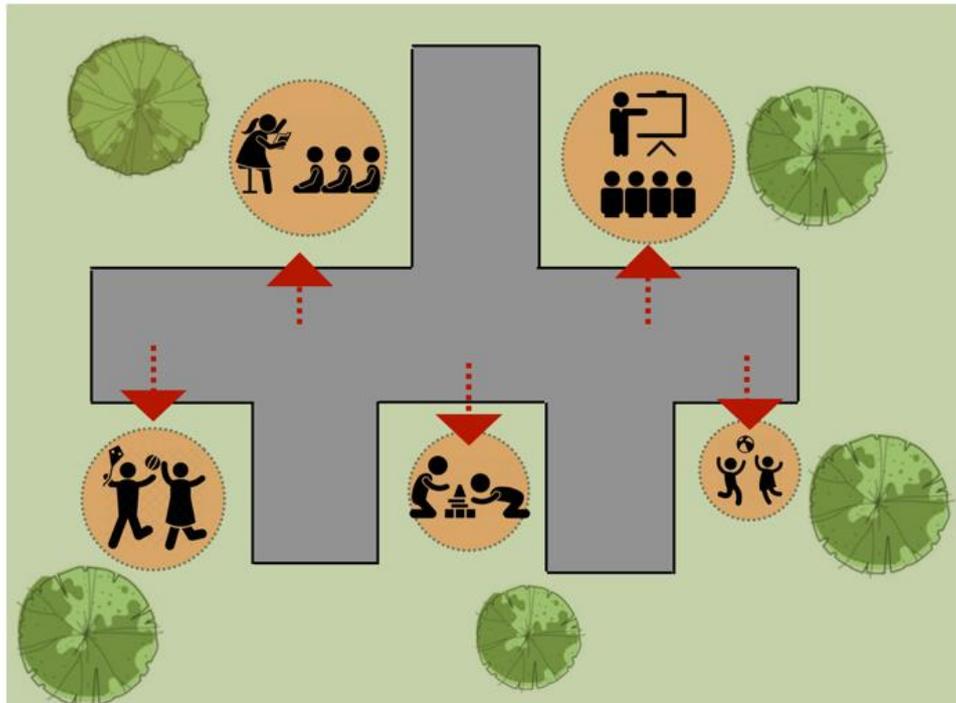


Figure 2. Common open space use and grouping of common open spaces (Author, 2021)

In addition, the classrooms on the ground floor can be integrated with the garden and garden area of each classroom can be created. Thus, "open classrooms", which are created with the thought that the virus spreads faster in closed areas, allow education to overflow outside the classroom and education is prevented from staying indoors only (Fig.3).

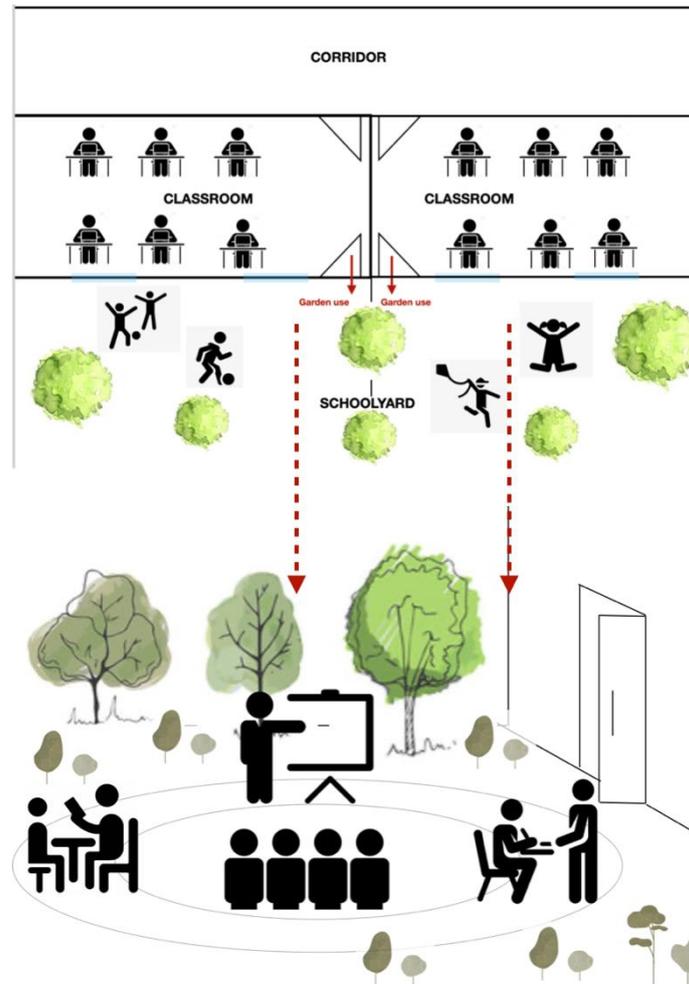


Figure 3. Gardens as a class of open space (Author, 2021)

2.2. Plan Chart Decisions

2.2.1. Entry space:

The entry point in school structures is a specialized node where external and internal circulation meet. At this point, the entrance and exit gates of the school should be at different points to provide easy access to other spaces of the school in order to prevent the formation of crowds and to minimize the possibility of contact. By separating the entrance and exit areas, user encounters are prevented and pedestrian movement at the door at that point becomes only one-way (Fig.4). In addition, a front section should be reserved for disinfection in the entrance area. When users enter this space, they will find hygiene stations where they will perform disinfection processes. The disinfection area will act as an inspection surveillance point with thermal cameras. The parents of the students will not be included in the school structure during the pandemic period and interviews with the teachers will be able to be performed at the parent meeting space designed in the disinfection section. In addition, a controlled quarantine area should be established for symptomatic students in this area (Fig.5).

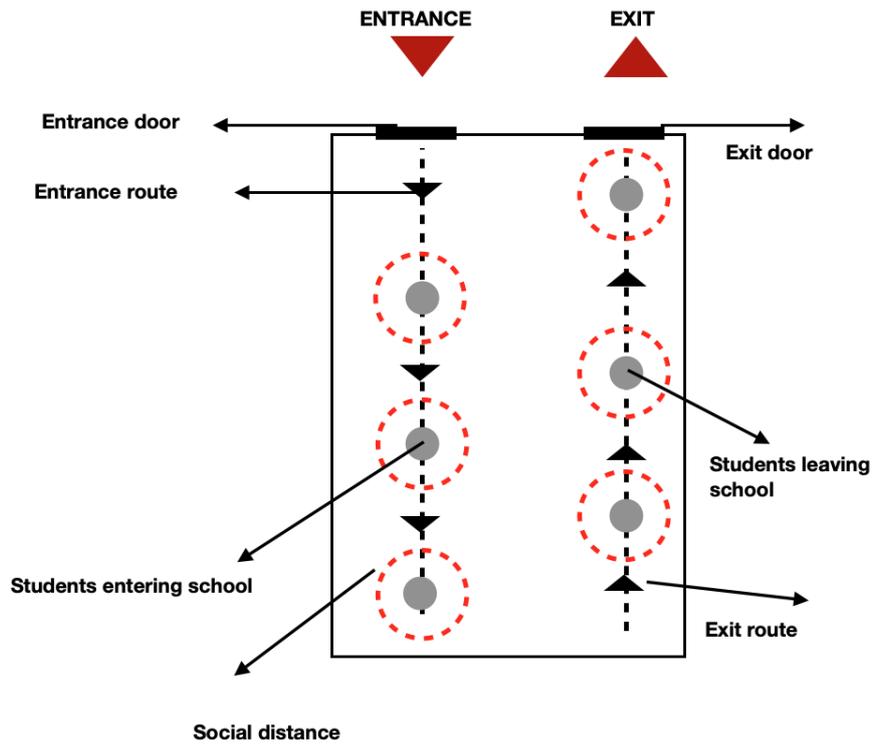


Figure 4. Location of entrance and exit areas (Author, 2021)

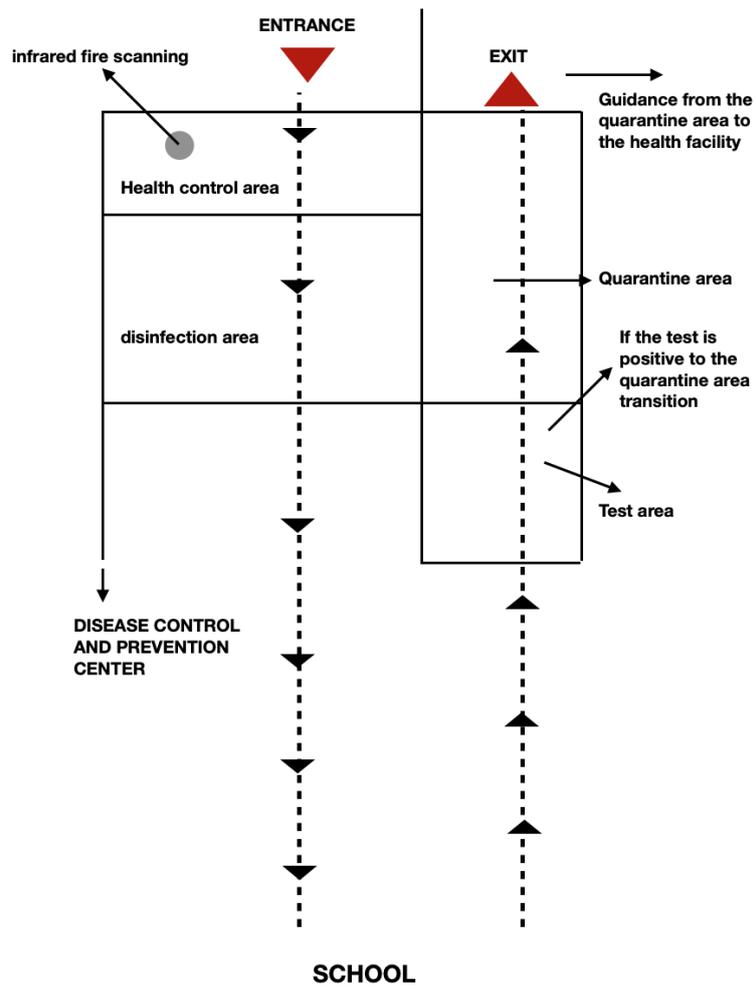


Figure 5. disinfection section (Author, 2021)

2.2.2. Classes with Teaching Spaces

During the pandemic, classrooms should be designed as the most basic and self-sufficient learning and living space where students can socialize outside of education. It should be able to allow the student to study, rest and eat during a school day. Students can mostly socialize with their friends in the classrooms instead of the common areas at school. With the opening of schools during the pandemic, classes should also be organized in accordance with the social distance rule. The arrangement of classes according to social distance can be done by changing the floor covering or markings on the floor. The single sitting area of each student in the classroom, the circulation area in the classroom apart from the single sitting areas of the students, the teacher's area of use should be determined and separated with the necessary guidance signs. If the classroom is divided into activity areas (center-based learning) where students turn in small groups to interact with the teacher, it is necessary to limit the number of students in an area to two or three (Fig.6.).

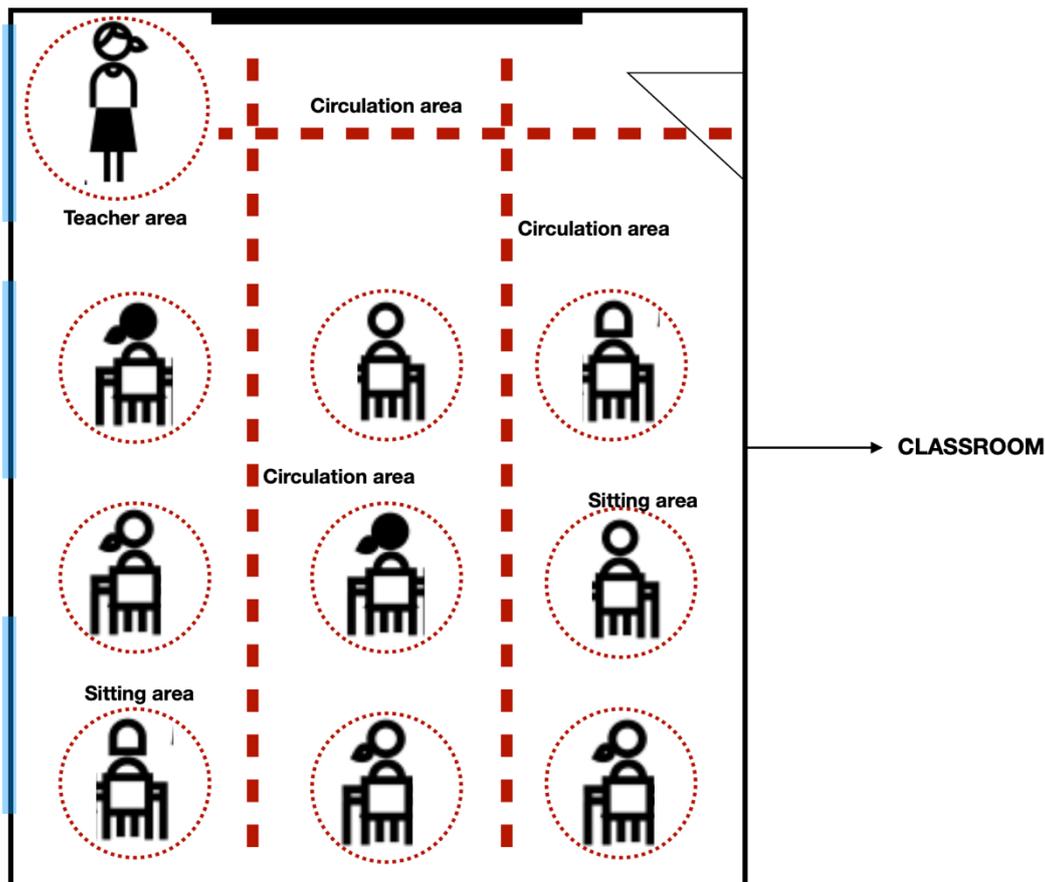


Figure 6. Classroom seating and circulation layout (Author, 2021)

In the selection of furniture such as tables, desks, chairs, bookshelves, etc. in classrooms, it should be paid attention that the surface of the goods is made of nanotechnological material that does not repel bacteria and viruses or is made of easy-to-clean material. Classroom equipment, which is immobile, has no wheels, and is fixed to the ground according to the social distance rule (it was taken as 2 meters in the study), should be spaced facing the board. Materials that are not very necessary in the classroom and that become dirty quickly should be removed from the classroom, and free spaces should be obtained that will expand the dirt-free movement area in the classroom. Closets and coat hangers used in common in the classroom should be removed considering the transmission of the virus through contact, and instead of this equipment, a closed storage area made of easy-to-clean materials should be created where each student can space their stuff, coats, and bags in their own separate sections.



In addition, niches to be created in the classroom will break the monotony in the classroom, create informal learning spaces, and enrich the life of the students in the classroom. In these niches, alternative recreation and study areas such as reading niche, study niche, resting niche that can meet the different needs of the student will strengthen the student's sense of belonging to the space.

To determine the teacher's work area in the classroom, it will prevent teachers from going to the teachers' room, which is a collective use area and has the possibility of increasing virus transmission, by enabling it to be used by classroom teachers or teachers with the next lesson during and out of class times. For special programs such as arts, it would be more appropriate to rotate teachers rather than students between classes.

Positioning a hygiene corner near the door in the classroom will ensure that needs such as hand washing are met in the classroom during the pandemic by reducing the encounter and contact with other students, without going to the common toilets. In this area, there will be materials to be used for hygiene purposes, informative posters and boards where posters will be hung.

After Covid 19, classrooms will turn into common areas where students can perform many activities in the same area, needs for cleaning are met, when necessary, students use them as a resting area and sometimes socialize with other friends.

2.2.3. Common Areas

Education is a phenomenon that includes social activities. Informal common use areas in an education structure are of great importance for students to learn from each other by enabling students to come together outside of class.

The large spaces in the common areas are divided by furniture, panels, glass walls and plants instead of walls, thus use and movement of students are restricted. This situation not only makes it easier to make changes in the space over time, but also enriches the use of the space, increases the visual continuity of the students, which is instructive for the students, and also prevents the crowding that will increase the virus transmission. For example, slowing down the student movement in wide corridor spaces, creating meeting points for a small number of controlled students enable students to socialize in small groups during extracurricular times, alternative spaces for learning are produced (Fig.7). Secondary alternative spaces produced can also be diversified for small groups and individual use. The creation of these alternative spaces supports the continuous living of the common areas, their use for different functions at different times, and the education that takes space in the classroom. Thus, the educational structure turns from being a school that lives only in class time into a social school structure that lives continuously. A social school structure develops students' sense of belonging to their school.

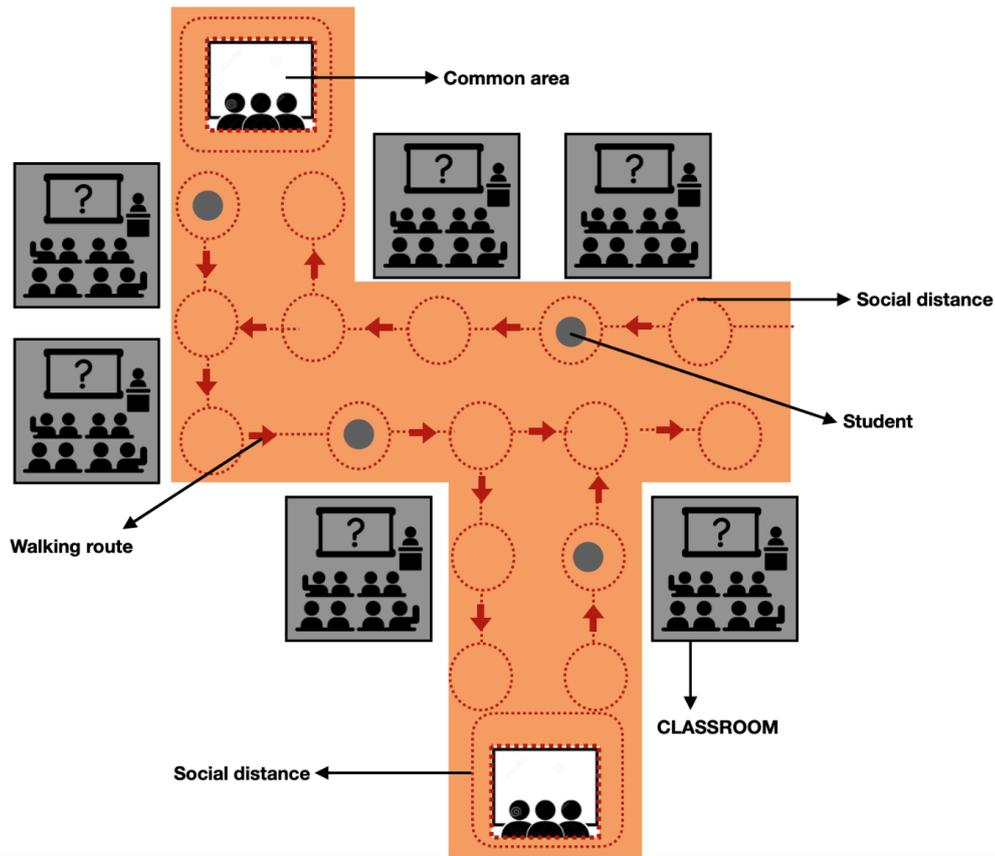


Figure 7. Dividing the common use areas (Author, 2021)

Necessary materials for disinfection (disinfectant, cologne, paper towel, mask) should be included in the hygiene areas to be designed in the common use areas. Masks and similar wastes should also be thrown into the trash cans spaced in this hygiene area. Boards should be spaced in hygiene areas and informative and warning posters about the pandemic should be hung on these boards (Fig.8).

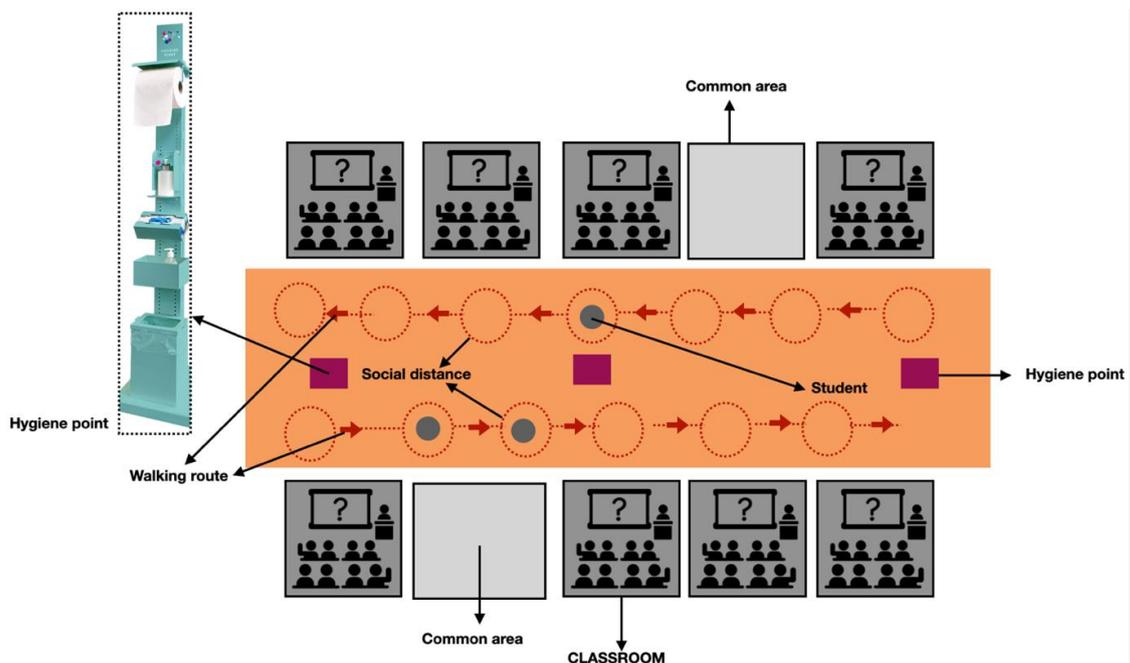


Figure 8. Hygiene points in the common use area (Author, 2021)



Canteen-Cafeteria

Canteen and food service areas may pose a risk due to a large number of activities and large numbers of users who can spread the virus. Also, canteens and cafeterias are typically designed for large groups, which creates problems for social distancing. Due to the high density of users in these areas, long queues may occur during food selection. Closing the canteens and cafeterias for eating and reconstructing these areas as teaching spaces is an opportunity to meet the spatial needs.

The following strategies can be used for food service when canteens and cafeterias are closed:

- Asking staff and students to bring their water and food from home.
 - Provide students with fixed menu for meals in the classroom or outdoors.
 - Providing handwashing or hand disinfection stations in classrooms with adequate number of contactless recycling and waste bins.
 - Eliminate the use of hand-contact vending machines and devices that sell food or snacks.
- When the number of COVID-19 cases and deaths on a local scale has decreased significantly, schools can continue to serve food in cafeterias and canteens. The following strategies may be considered as these areas continue to serve food:
- Providing social distancing signs for the lunch queue in the cafeteria and canteen.
 - Using contactless points of sale.
 - Selling packaged meals.
 - Eliminate shared serving utensils, plates, glasses or cutlery boxes, and providing individually wrapped disposable utensils.
 - Providing lots of cleaning supplies and hand sanitizer stations.

Wet Areas

Toilets are dangerous areas for virus transmission in multiple building types. A large number of scientific studies are risky areas open to the public with a high usage density. The dangers in the toilets contain the challenges of social distancing while waiting in line as well as going in and out of the cabins. Also, surface transmission can occur from contact with contaminated surfaces or personal trash. Fecal-oral, aerosolization, and surface transmission have the potential to occur in toilets. With the pandemic, more attention will be paid to the sterilization of wet areas.

Strategies that can reduce risk in toilets include (Fig.9):

- Non-contact operator usage for toilet flushing, toilet seat cover closing, faucets, soap dispensers and paper towel dispensers.
- Poster placement indicating that toilet seat covers (if any) must be closed before flushing.
- Changing cabinet walls in the form that it touches the floor.
- Ensuring entry and exit to the toilet area with automatic doors, hands-free door hardware or proximity sensors.
- Restricting access to luminaires to ensure social distancing.
- Limit the number of people allowed to use the toilet at a time
- Providing barriers / ground markings to ensure social distancing while coming into line
- Directing to use the toilets located throughout the structure to limit the number of people using the toilet in an area
- Placing posters asking students and staff to wash their hands before and after using the toilets
- Providing trash cans that do not require manual contact.

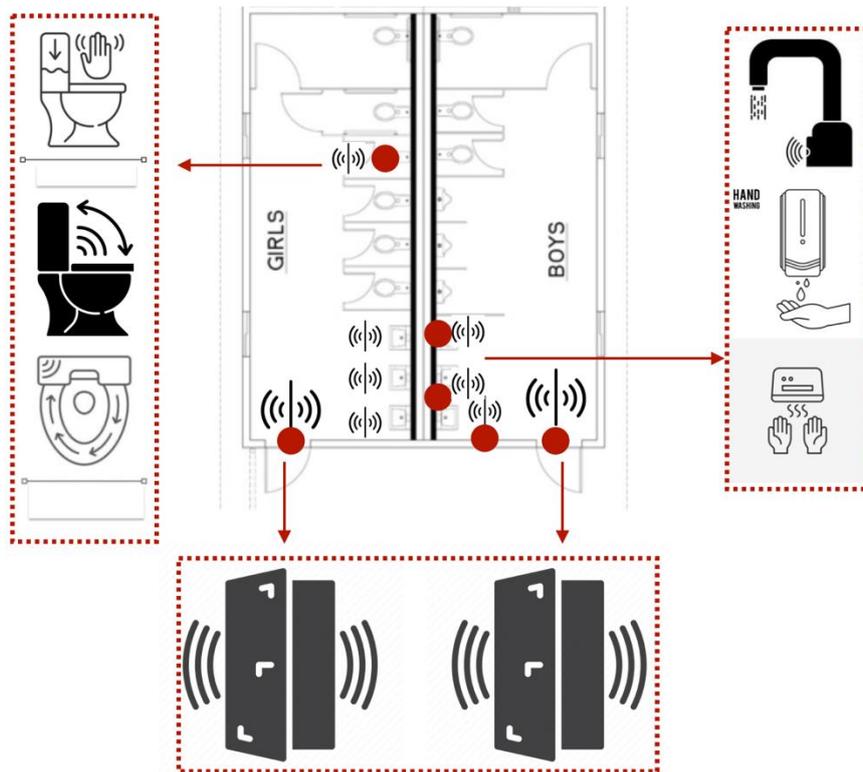


Figure 9. Pandemic strategies in toilets (Author, 2021)

2.2.4. Horizontal and Vertical circulations

Instead of using corridors only for horizontal circulation, transportation and movement, it is necessary to transform them into spaces containing mixed functions. Corridors can be used as a space for students to learn from each other and for small groups to come together. The important point here is to design the corridors as a space for small groups to come together and to learn individually, by making the right connections to each other, to operate corridors as small public spaces due to the pandemic (Fig.10). Educational structures should be living corridors and spaces of public life, where students encounter public life, where public life is reflected.

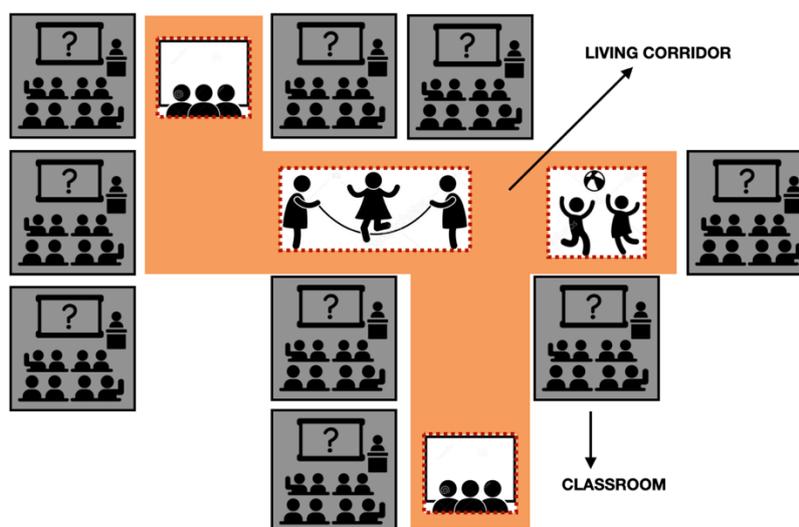


Fig.10. living corridor (Author, 2021)

The markings and directions on the ground in the common circulation areas and the social distance rule should be emphasized in the education structure. Movements of users in



different directions within the school structure should be planned in one direction on separate directions. This will prevent encounters. While making these markings, visually disabled students at school should not be forgotten, it should be designed in a way that includes them.

2.3. Automation Systems

Sensor systems that provide non-contact use should be used at the doors located in common areas where usage is intense (for example, school entrance and exit areas, toilet, cafeteria, etc.). Soap dispensers in toilets and sensor systems in lavatory combination faucets should be preferred.

2.4. Technological Infrastructure

In the hybrid education system adopted during the pandemic period, hardware and infrastructures such as smart board, tablet, computer, camera, microphone, communication and educational software, high-speed internet will help in classroom and distance education.

The technological infrastructure can also be used in smart systems within the school. Elevators called with smart systems, windows and sunshades opened with applications can be given as examples.

2.5. Natural Ventilation

The Covid-19 pandemic, which is effective in the world, once again brought forward the importance of clean air. Dr. Hywek Davies reminds the importance of clean air saying that if you are in an unventilated environment, leave the space immediately, and also said that if fresh air can be brought indoors with natural ventilation from the outside to the buildings, it dilutes the virus load in the space, even if there is a person carrying a virus in the building, thus reducing the risk of getting the virus to other people in the space (Shukman, 2020).

Prof. Dr. Çiğdem Çağlayan stated that breathing polluted air is a very important reason for the increase of all respiratory diseases and the effects of the disease, including Covid-19. She emphasizes that Covid-19 is more deadly in spaces that do not have natural ventilation and where polluted air is present, and that breathing polluted air makes it easier for Covid-19 to be absorbed and settled in the body (Temiz Hava H.P., 2020). For this reason, living in spaces that are not ventilated with natural ventilation paves the way for respiratory diseases such as Covid-19. Therefore, it is necessary to use natural ventilation system and avoid artificial ventilation-air conditioning systems in order to minimize the damages that Covid-19 may cause in humans.

The air that is polluted for most of a class hour needs to be rapidly oxygenated and ventilated during extracurricular time. It is possible with a good insulation in the structure that the indoor temperature of the classroom does not decrease during ventilation. For this reason, the selection of suitable joinery is very important. Part of the joinery should be designed to provide continuous ventilation of the classroom. This design should be in the form that wing openings with small and large parts should be suitable for double axis use, the area swept by the opened wing and the opening shape should not prevent students from working and not endanger the safety of children. This fragmented joinery system is spaced at different levels on the surface where it is located, and due to this, better air circulation is provided, more natural air enters the classroom, and it prevents the heated air from suddenly shifting in the classroom. In addition, clean, fresh air circulates in the classroom during the lesson. Apart from these, the roof skylights to be designed for the school structure not only allow natural light to enter, but also contribute to passive air conditioning by providing natural ventilation with the right design.

2.6. Acoustic Arrangement

Controlled social life by mask-distance-cleaning measures, which are the ways of protection from the Covid-19 pandemic, and the mask factor that we will use on the way back to

school will emphasize the importance of the acoustic arrangement of the structures. Because some measures can be taken in the classroom to talk behind the mask and to hear the voice better in online environments in distance education. Such precautions as the use of acoustic improvers on classroom walls and ceilings, the use of sound-absorbing suspended ceilings, the covering of wall planes with sound-absorbing materials, the detailing of door and window joinery in a non-vibrating manner, the selection of low-reflective non-resonant materials in the flooring, and the creation of fabric panel areas can be taken (Fig.11).

In addition, by providing a controlled environment with appropriate sound insulation in classroom-classroom, classroom-corridor divisions, even if the lesson times in the two classes overlap, the formation of disturbing spaces will be prevented or the movement in the circulation area will not affect the class.

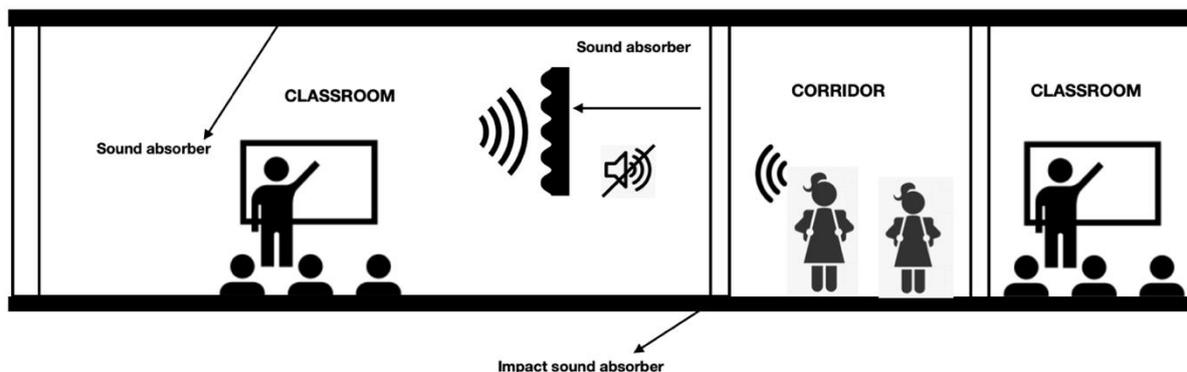


Figure 11. Sound comfort in classrooms (Author, 2021)

2.7. A Social Ecosystem

When it comes to school structure, the first thing that comes to mind is education and the image of a teacher in front of the blackboard in the classroom and the image of a student sitting on the desks facing the blackboard. However, school structures should not be focused only on education and teachers. In countries with developed education systems, studies and models are carried out that put the student at the center, on teaching instead of educating, and experiencing instead of memorizing. In new education models, the concept of space and the setting of space are also changing. The concept "*Learning Spaces*" is frequently encountered.

Education is a social phenomenon and should include formal and informal learning. Spaces should be created to improve the informal learning of students during breaks. These spaces can be seen as different socializing, meeting and meeting spaces. Courtyards, floor terraces, floor gardens, open areas within the structure can be given as examples of different socializing spaces. In these socializing spaces, variations can be made in accordance with different weather conditions, different hours, and different seasons. The diversity setup in socializing spaces enriches the spatial characteristics of the educational structure, and it will enable the student to develop a sense of space and experience different spatial situations. While experiencing these spaces, taking into account the pandemic period, easy-to-clean materials that encourage learning, and that are in accordance with the social distance rule, fragmented, allowing small groups to experience, separating-panel separated, alternating use, integrated with open usage areas, can be used.

2.8. Furniture Selection

The growth rates of students in educational structures are not the same and the furniture sizes for different age groups are not the same. The furniture selected in schools should be according to the age of each student group and should meet ergonomic features. Health



and safety conditions will be more effective for the pandemic when the student's desk and chair are fixed.

3. Conclusion

The field which is most affected by the pandemic has been education. In the process of returning to the new normal, the first thing to consider is education and education structures. Because education and training lie at the heart of everything, in short, to be able to develop, to be a social creature.

Pandemic is a phenomenon that increases the visibility of opportunities and failing parties in educational structures. Educational spaces are not closed, limited spaces that consist of only desks and where lessons are learned.

With the pandemic, education can be saved of being stuck in walls. The perception that education is only in classrooms should be destroyed. Since the pandemic has become a potential force for change, school structures and spaces, which are a reflection of the education system and the education system, should be changed. Representation of the future education model can be in the form of connecting with imagination, thinking together and working in teams, gaining the ability to design, development of macro-micro muscles, understanding the importance of learning from nature. The reflection of this education system on the space is in relation to design educational structures in such a way that contains spaces where imagination can be put forward, supports the urge to explore, allows student experience, is intertwined with nature, contributes to the health awareness of students and allows them to experience this understanding, uses technological facilities more in spaces, laboratory spaces occupies an important space, and provides information that can be used in daily life, and is helpful for developing projects for this, and that teaches how to access and filter information, and is spaces of the size and size that will provide the highest efficiency, not the minimum size.

Educational structures should be built in accordance with not only pandemics, but also earthquake factor and climatic conditions in the geographical conditions of Turkey. The pandemic process should be used as a driving force and the construction of type project schools in different regions and different climatic conditions should be abandoned. School structures that support the physical, mental and social development of students should be designed. Future school designs should not be project schools, but schools that support education and training, are intertwined with nature, have a flexible design approach, are a social ecosystem, do not lose their function during possible pandemics, and make maximum use of technological opportunities.

In the last few decades, school design has evolved to support the changing needs of students and it is moved away from traditional learning methods. Schools are now areas where transformation and changes take space. Schools are spaces that improve new knowledge, awe-inspiring stories, and visions that allow young adults to grow. Pandemic process is a great opportunity for our society to proactively improve our education system for future generations by refocusing on accessibility, equity and the innate needs of students.

Architects, educators and students at the level of educational policy and strategy decisions must work collaboratively to create innovative solutions that enable problem solving, project-based learning, and virtual or face-to-face learning. Digital learning should not respace our classrooms in the long term. As conditions change and evolve, our learning environments and schools should evolve depending on student-teacher, teacher-educational space, student-educational dual dialectics and in response to student needs.



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