

Architectural Design Guidelines for Early Childhood Education



Acknowledgements

These guidelines were prepared by Jure Kotnik, (Architect, CEB Consultant) under the supervision of Yael Duthilleul, Technical Advisor at the Directorate for Technical Assessment and Monitoring (TAM) at the Council of Europe Development Bank (CEB).

Disclaimer

The findings, interpretations and conclusions expressed here are those of the authors and do not necessarily reflect those of the Organs of the Council of Europe Development Bank (CEB), who cannot guarantee the accuracy of the data included in this paper.

The designations employed and the presentation of the material in this paper do not imply the expression of any opinion whatsoever on the part of the CEB concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Please cite this publication as:

CEB (2018), Architectural Design Guidelines for Early Childhood Education: CEB Publishing, Paris.
https://coebank.org/media/documents/Architectural_design_guidelines.pdf

Foreword

Ensuring inclusive and quality education is one of the 17 Sustainable Development Goals (SDGs) that countries have agreed to achieve by 2030. Among the targets identified to monitor the achievement of this goal, the need to build and upgrade education facilities that are *child, disability and gender sensitive and provide safe, nonviolent, inclusive and effective learning environments for all* is specifically mentioned.

The challenge facing countries today is not just to build more schools, but to ensure that the physical space contributes to better student learning outcomes and well-being and at the same time supports a more efficient use of education resources. With learning outcomes at the focus of the international policy debate on education today, new research addressing what makes a learning environment effective is developing.

These *Architectural Design Guidelines for Early Childhood Education* provide a tool for education officials, architects and engineers involved in the design and construction of education facilities to imagine new learning environments for young children. They were developed to support the implementation of one of the projects financed by the Council of Europe Development Bank (CEB). With around €7 billion of investments in education since its establishment over sixty years ago, the CEB has accompanied many of its member countries in their efforts to improve and expand education facilities by strengthening local capacity and fostering the exchange of knowledge and experiences.

We hope these guidelines can help other countries create learning environments that meet the needs of young children in an effective and sustainable manner.

Monica Brezzi

Director

Technical Assessment and Monitoring Department

Introduction

These *Architectural Design Guidelines for Early Childhood Education* aim at supporting education officials, architects and engineers involved in the plan, design, construction and evaluation of early childhood education facilities to create high quality educational spaces. The principles and examples presented apply a flexible and open approach to design, support a more efficient use of the space and promote a learning environment that encourages young children's cognitive, social and physical development while ensuring their health and safety.

Originally these guidelines were developed as a technical input to support the preparation and implementation of a CEB financed project in one of our member countries. The project aimed at improving access to quality preschool infrastructure by financing the construction of new education facilities throughout the country. The Government saw the loan as an opportunity to develop a new way to conceive and make use of the space to promote children's well-being and development and better reflect international trends. Existing kindergartens tended to have complex geometrical forms, were a succession of closed rooms without proper lighting along wide corridors without direct access to playgrounds and with toilets closed and separated from the classroom, usually not adapted to children's age and size. There were single rooms for sports, arts and drama separated from the classroom, playgrounds usually lacked shaded areas and were equipped with basic plastic slides, metal structures and swings. The existing normative framework guiding the construction of kindergartens and the existing urban plans imposed certain constraints in terms of surface requirements. The challenge was to work within the existing normative but with a different approach.

After several exchanges with officials and local architects and training sessions delivered, the guidelines evolved into its present form. They have proved to be a valuable tool to discuss architectural principles, develop local capacity and inspire new constructions. We believe they can be of use to other countries facing similar challenges and be a starting block in the process to develop a new vision for early childhood education infrastructure. These guidelines reflect a vision of learning that sees children as active actors of their own development and growth. In order for the new spaces to be useful contributors to learning, teachers should be equipped with the necessary environmental competencies to make an effective use of the new learning environment.

We are very happy to make this tool available today to the wider public.

Yael Duthilleul
Education Technical Advisor

Jure Kotnik
Architect

Table of contents

1. Building design principles	1
2. Interior design organisation	6
3. Key functional elements to consider for optimal design	14
4. Playground design	18
5. General recommendations on materials and safety	27
Bibliography	31
Annex: Case Studies Selection	32



ARCHITECTURAL DESIGN GUIDELINES FOR EARLY CHILDHOOD EDUCATION

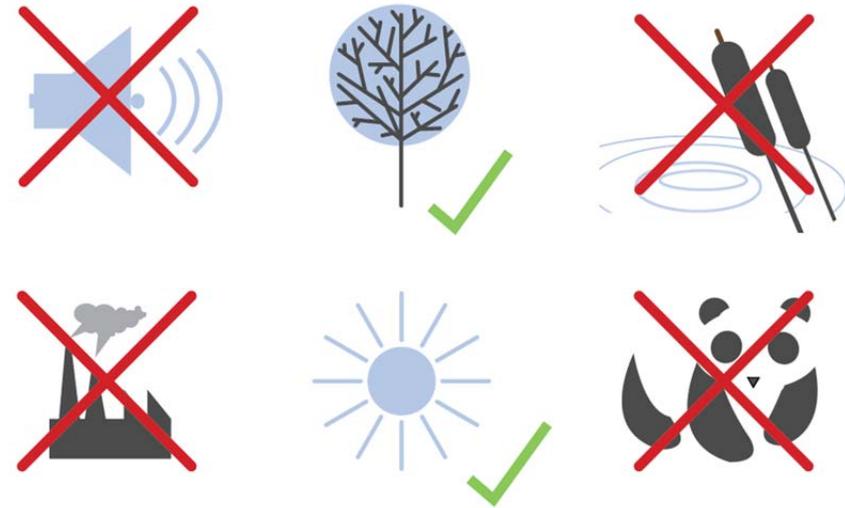
Increasingly, around the world, early childhood education programs are based on a view of the child as a key actor of its own development through his and her interactions with other children, adults, objects and events and of teachers and caretakers as playing a key role in the process by fostering interactions and structuring activities. The characteristics of the physical space where these interactions and explorations take place are also fundamental to facilitate experiences. Research is beginning to share light on the critical aspects that make a difference in learning outcomes.

These guidelines propose a new approach for the design and construction of early childhood education spaces. They encourage the flexibility of the interior design to benefit children's creativity, cognitive and socioemotional development, foster interactions among children and facilitate the arrangement of the space to serve multiple objectives. They conceive the outdoor space as an integral part of the learning space that also needs to be adequately conceived to foster quality outdoor play and provide a stimulating environment. They promote innovation and efficiency in the design and construction while at the same time supporting children's well-being and development, health and safety. Innovation is promoted by the creation of new and diverse spaces to play and learn while efficiency is supported by a better and more flexible use of the space.

The guidelines are organised as follows: Section 1 presents a set of building design principles to keep in mind when designing early childhood education areas. Section 2 provides guidance on how to organise the interior space most effectively. Section 3 presents common design misconceptions that impact costs and functionality. Section 4 focuses on the design of outdoor playgrounds and Section 5 provides some general recommendations on the choice of playground materials and on ensuring safety. The Annex includes an analysis of strengths and weaknesses observed in nine different shape and size early childhood education facilities, which can be used for training purposes.

1. BUILDING DESIGN PRINCIPLES

1.1. Location Selection Criteria



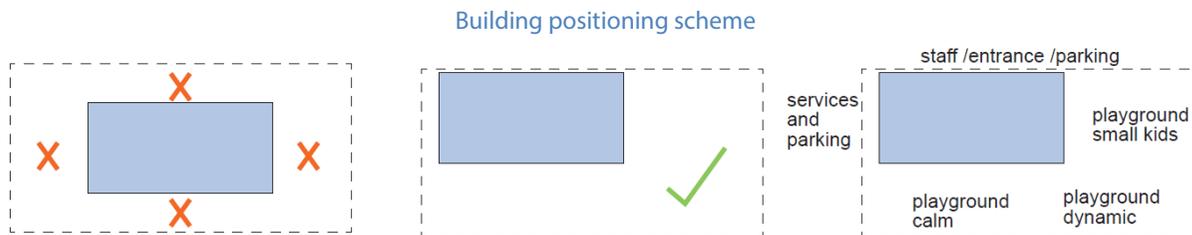
A plot is suitable to build an education facility for the early years if it meets the following criteria:

- It is in a quiet zone, away from noise, dust, smoke, industries or major roads
- It is preferably in a green spot, allowing for the use of green spaces as much as possible
- It offers plenty of sunshine, is sheltered from high winds but ventilated at the same time
- Is not foggy or moist and is not situated in wetlands or floodplains
- It is not the natural habitat of endangered animal species or protected vegetation
- It is within easy access to transportation and services to avoid unreasonable costs
- It is a flat terrain or with a minimal southward slope

1.2. Plot Organisation Principle

The shape of the plot and its surrounding area have an impact on the choice of the building typology which will then impact the organisation of all other elements (interior design, playground, staff and parking areas). It is most likely that new plots, unless in dense urban areas, will offer sufficient space to conceive various building typologies (linear, compact, round, orthogonal).

In most cases it is advised to build the early childhood education centre closer to the edge of the plot in order to make a more efficient use of the land available. Central positioning of the building on the plot is not advisable as it takes away an important share of the area that can be used for playground.



The education building should be placed in a way that all its functional areas (playground, entrance and services areas) can function properly without collisions.

Playrooms should be positioned to profit from a maximum amount of daylight, while at the same time the building has to foresee the need for proper shading. Playrooms should not face northward unless such an orientation offers special value, such as a nice view, peacefulness or similar.

1.3. Construction Principles

Frame construction systems are the most flexible types of construction as they can form big open spaces (that can later be closed if needed) at low cost. The materials used can vary from concrete, timber to steel. Spaces can be closed freely. Pillars can later be used as didactical elements.



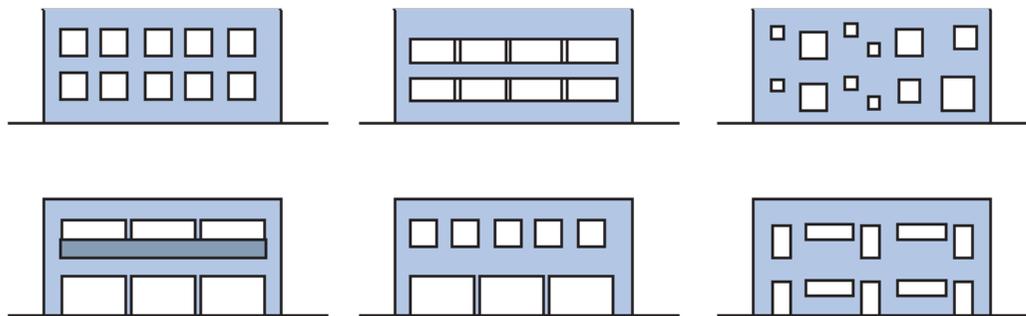
Construction system can affect the functionality of the building
© Elzendaalarchitectuur



1.4. Façade / Windows Design Principle

Window design should enable children to have a good visual connection with the surrounding environment (e.g. nature, playground). This means that the windows should preferably have no parapet wall. In case they do, it can be used as a bench for sitting. Also a dispersed window concept is possible, with some windows at the children's level and some above their height level. Within the same plan, several façade concepts are possible such as symmetric composition, linear, dispersed or combined. Rational use of window elements does not need to translate into monotony of design.

Same building - different façade variations creating visual diversity



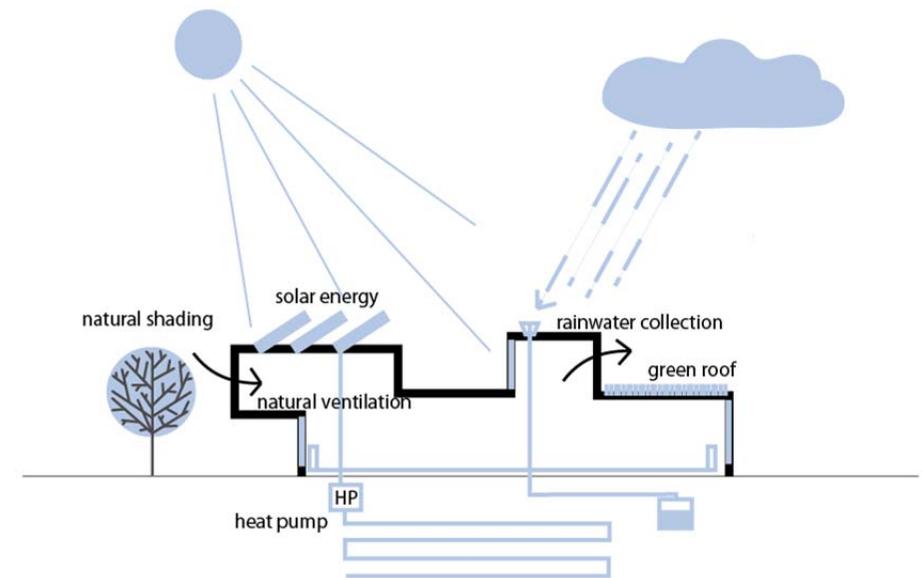
1.5. Sustainable Energy Concept Principle

Designs should promote quality materials and elements that reduce energy loss. This means that the building itself should be designed in a sustainable way by using good isolation, quality multi-layer windows, heat pumps, and solar energy features.

Elements of sustainable energy can also have educational value and introduce children to ecological processes such as recycling, principles of solar energy, the importance of careful use of resources (electricity, water) and similar.



Solar panels on the roof © Cebra



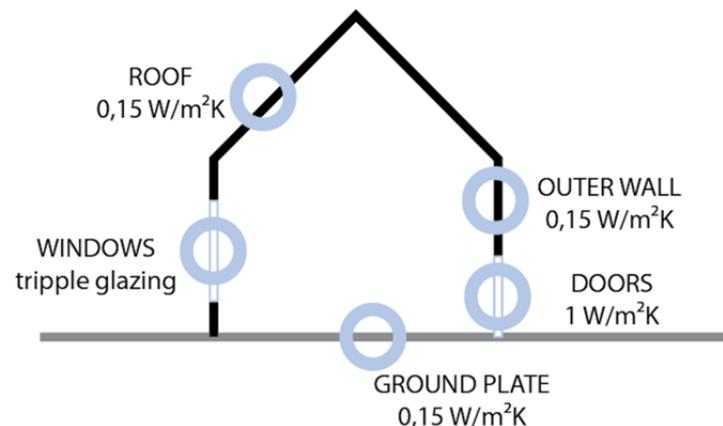
Elements of sustainable design

The construction of education buildings is becoming increasingly sustainable and eco-friendly by promoting:

- the use of natural and eco-friendly materials, especially wood (timber);
- access to green surfaces and trees, as they filter the summer sunlight when in bloom and reduce the need for air conditioning as well as allowing the sun's rays through in the winter;
- clever window openings to provide ample daylight, reducing the need for artificial lighting and thus saving energy and ensuring proper ventilation;
- the use of solar energy and heat pumps in connection with the earth's warmth, and similar alternative energy sources to keep the building warm and to heat water;
- the collection and use of rainwater for toilets, irrigation, etc.

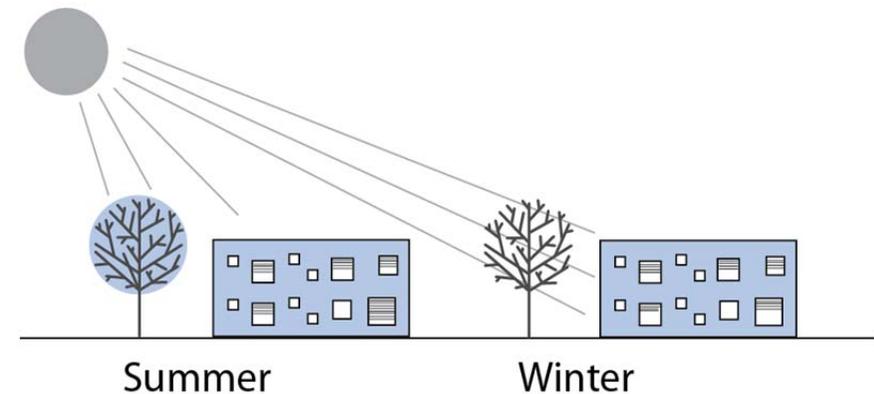
Simple design details can prevent heat losses and, if the building is well isolated, result in lower energy consumption. Different countries prescribe different values for passive or low-energy buildings.

Minimum required standards based on class B2 EU standards are presented below.



Orientation values for the building that would lead to target consumption of 35 kWh/m² in Central Europe (B2 EU standards)

Proper shading can regulate the temperature inside the building and help with natural ventilation. Shading can be mechanical or natural, relying on the use of trees according to the seasons.



External shades are the most efficient heat and light regulators.
Trees can also reduce the heat in the summer and allow sun in the winter

1.6. Active Learning Environment Principles

Promoting children's interaction and active transformation of certain aspects of the physical space and learning environment can be achieved by integrating certain building elements such as black boards and magnets to its design. These interactions that promote a transformation of the physical space contribute to promoting children's sense of ownership of the space, leaving a trace of their individuality and foster their capacity to impact the environment while at the same time developing their physical, social and cognitive skills.



Besides drawing, playing, climbing etc., active façades allow for direct interaction of children with the building

1.7. Accessibility for Children with Disabilities Principle

The design of new education facilities should take into consideration children with disabilities. This applies especially to dimensioning elements such as doors and distances among various elements of furniture and equipment. The building needs to be designed to be handicapped friendly, with the access/entrance suitable for a wheelchair. If the building is two stores-high, an elevator needs to be included.



Inclusive playground games and access ramps
Up: © Courtesy DM - Right: © Bloom blog



1.8. Minimal Material Selection Principle

Reducing the number of materials to be used means less subcontractors. Buildings designed with fewer materials overall tend to be more rational in their design, yet do not necessarily lack architectural expression, as architects can use different colours or shapes within the same material to create variations of the façade. The same element in different positions, orientation or colour can contribute to the architectural design of the building and its attractiveness.



Kindergarten using one type of window openings and one material in different colours to create colourful identity of the building © Cebra

2. INTERIOR DESIGN ORGANISATION

2.1. Floor Plan Organisation

There are three main areas in early childhood education facilities: children areas, staff areas and service areas.

a) Children Areas

Interior spaces should be designed to enable optimum communication amongst children and facilitate staff supervision. All year round, children should be able to engage in various activities, both planned and spontaneous. They should be able to play in groups or retire to peaceful nooks to be by themselves. Infants need open activity areas where they can crawl, explore, and interact with their teachers; pre-school children need more space so that they can engage in more advanced activities. Children areas should be open, fluid and if needed, be transformed from smaller units into bigger ones with partition walls or curtains. They should ideally represent 75% of total space area.

b) Staff Areas

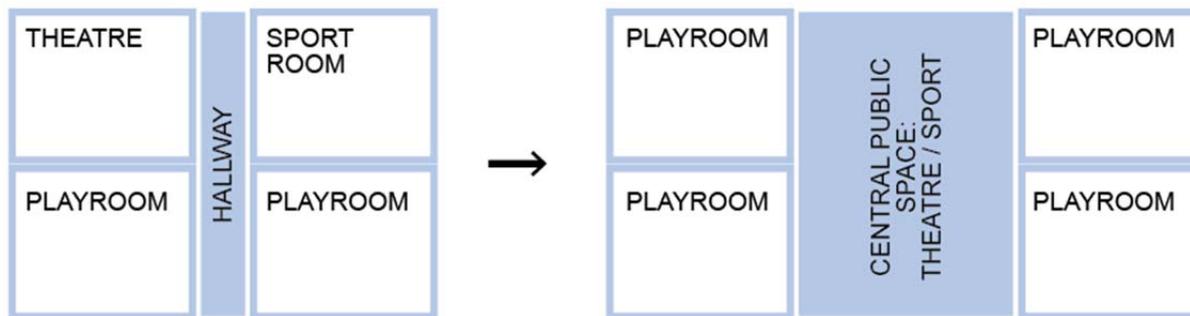
Staff areas are usually located near the main entrance and designed as an independent wing separate from children areas. The size of the staff area depends on the size and type of education facility and the number of staff. Staff areas usually include a staff room, a director's office and an administrative space, changing rooms, staff toilets, storage, and in some cases, offices for specialised staff such as language therapists and child psychologists.

c) Service Areas

Service areas are separated and have an independent service entrance. The size of the service area is proportional to the size of the education facility. The kitchen area is one of the most costly and energy consuming element of the building. The education management (school, municipality, region, etc.) should assess the trade-offs between the different kitchen options available such as having a central kitchen that caters for several education facilities, to having its own kitchen that caters just for a single facility or a distributional kitchen where food is prepared but can be subsequently reheated before deciding what type of kitchen to build. A similar analysis should be conducted for laundry service areas – as these decisions have important implications on investment and operation costs.

2.2. Common Central Spaces

One of the most important innovative elements having been introduced to early childhood education facilities is the establishment of common/public spaces. These spaces are multi-functional and are meant to be used by children for various activities from artistic representation, to motor development and indoor play. Public space design depends on the size of the education establishment. It is advised to build the public space between the playrooms, for easy and direct access. Public spaces can also replace corridors thus making the building more compact and communication areas smaller. They can become the core of public and group activities.



Central spaces can reduce total building size and increase the use of play area



Central multi-use area (Stella Kindergarten- Tetra Pak, Italy)
© Riko d.d Cent

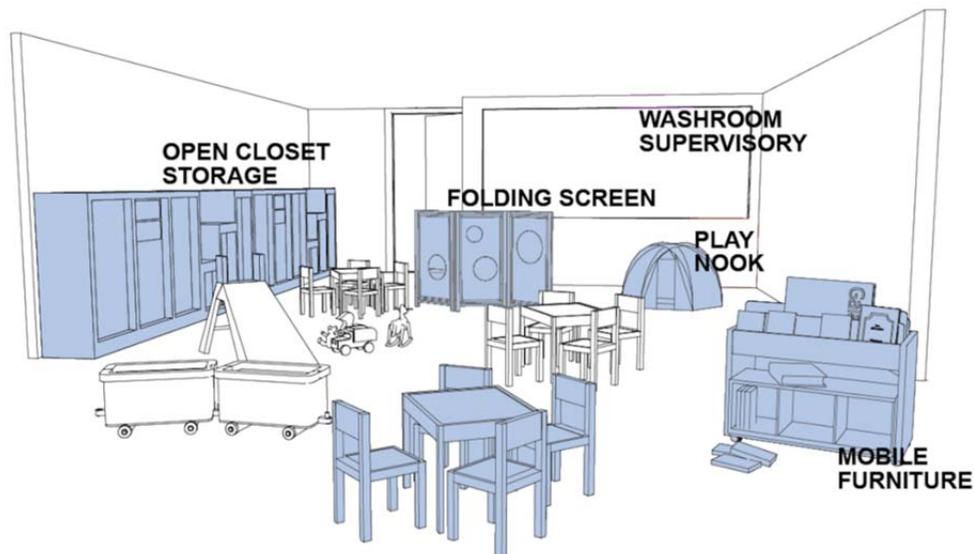


Central space as an extension of the playrooms in Open Kindergarten Podgorje

2.3. Playroom Design

Children spend most of their day in the playroom. These rooms should be designed to provide different play and learning areas for small groups as well as for individual children, while at the same time allowing for group gatherings when needed.

The playrooms shall be big and allow for various activity nooks and specialized areas. Depending on the age of the group, a playroom shall have a play area, cubby storage, diaper station, sleeping, nursing and food preparation areas, all arranged within the same playroom space (with the use of different separations if needed). Washrooms shall be separated from the playroom, but it is advised to have a visual connection through glassed parts of the wall to ensure proper supervision.



Diversity, flexibility, mobility are the key characteristics of a contemporary playroom

2.4. Thematic Nooks

Various thematic nooks with different activities (theatre, reading, sports) or just relaxing areas can be established within the playrooms and in commons spaces.



Small lobby theatre and indoor slide/hiding nook/blackboard in Open kindergarten Podgorje, Slovenia





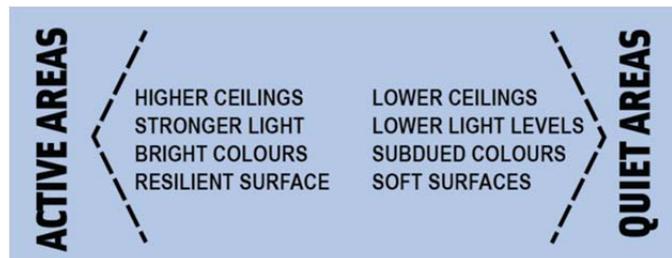
Example of renovated corridor at Ordrup School © Bosch Fjord

Special education corners or a corner for one-on-one learning can be established in public/common spaces or even in the corridors. Space can be saved by introducing pop up spaces for different use. These interventions are also welcomed in existing buildings with wide corridors.

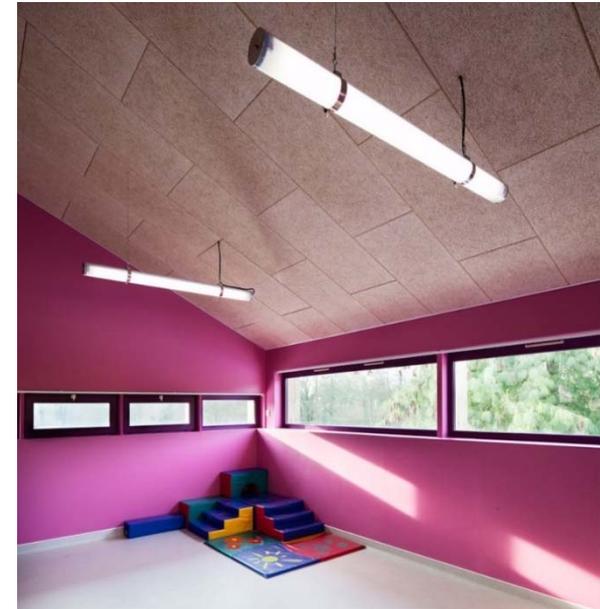
2.5. Interior Design Principles

Spaces shall be designed in order to support different type of activities. Active areas shall be of bigger volume, brighter and exposed to natural light. Quiet areas can be smaller and have lower ceilings; the colours used should be in more subdued tones.

Cost efficient yet articulated design can be achieved with low-cost design elements / furniture / lightning etc.



Design principles for active and for quiet areas



Concrete-wooden boards in combination with colour
© BP architectures



Creating design composition with permutation of lamp colours © Santiago Carroquino

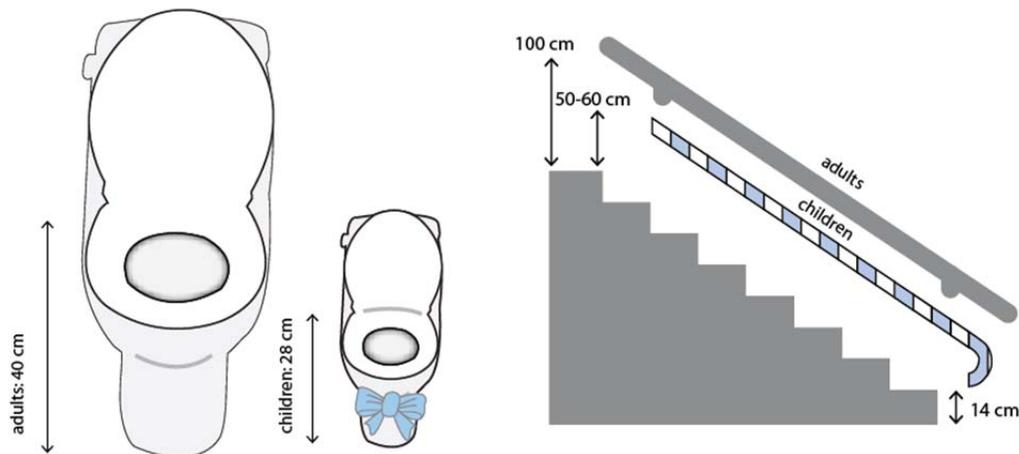
2.6. Furniture Design

The choice of furniture is key, as it is one of the most important elements to promote flexibility and multi-use. Furniture arrangements should be flexible, adjusted to various age groups or specific activities as well as learning methods.

Quality furniture is:

- adjusted to the age and size of the children
- durable
- safe to be used by children (no sharp edges)
- easy to clean
- flexible
- preferably stackable/hanging
- in calm, soothing, coordinated colours

Quality furniture makes optimum use of natural materials and should help to create different environments in the playroom and a home-like feeling.



Mobile wardrobes can be stowed away and provide free space for other activities

2.7. Equipment and Furniture Selection

Elements on wheels can be stored away after use. They usually apply to children areas or staff areas.



Sleeping arrangements can be organised with light stackable beds that save space, and can be stowed away easily allowing space to be used for other purposes. A stack of 15 stackable PVC beds takes less than one square meter; weighting just 1.2 kg, it is easy for a child to move its bed without help.



Light stackable beds are big space savers © Wehrfritz



Closet doors as blackboard, didactical stairs for learning colours and numbers Šmartno

Equipment should include pedagogical elements, promoting opportunities for learning and exploration wherever possible such as on tables, chairs, closets, stairs, walls etc.

2.8. Flexible Spaces

With the right design, furniture and equipment selection, the same space can be used in various ways. Many times playful insertions such as adding a slide can transform any space by adding a playful dimension that contributes to motor skills development. Changing the furniture can also contribute to make the building not only available to children but also to the local community to offer lectures, yoga, dancing classes etc. Facilitating the use of the building after hours can contribute to generating additional income to reduce operating/maintenance costs.



Same space can be used for various activities during business hours and after



2.9. Sliding Walls

Sliding walls facilitate combining different smaller spaces into bigger ones. In education facilities where there are limited options for setting a multi-use central space, two playrooms with sliding walls can form a bigger space that can be used for certain group activities or events.



Sliding wall connecting two playrooms and two groups of children

2.10. Forum Stairs

Connecting two floors gives the option of forming a small amphitheatre.



Stairs used for theatre nook in Open Kindergarten in Minsk



Active corridor with nooks and blackboards

2.11. Corridors Design

Today it is recommended to design education buildings around a central multi-use space. But this is not always possible given the shape of the plot. When it is not possible to avoid hallways, these should neither be too long nor too dark. The so called “labyrinth effect” shall be avoided, as it makes it more difficult for children to orientate themselves in the building. In such cases, corridors can be used as an extension of the playrooms providing additional play and learning areas. Corridors can also be used as a gallery for children’s artwork or as a dressing room.



Corridor as an extension of the playroom

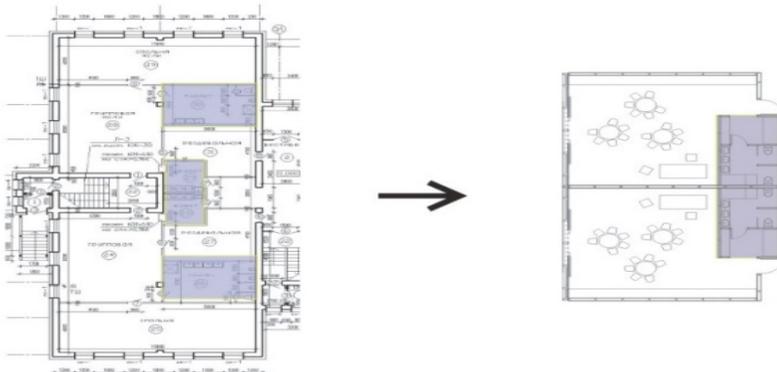
2.12. Washrooms/Toilets

Toilets can be designed with a glass window to facilitate staff supervision of the playroom and to allow natural light into the toilets.



Big window on both sides of the toilets gives visual connection among the playrooms and facilitates child supervision (Ljubljana, Slovenia)

It is recommended to locate sanitary units next to each other and include some space for diaper changing, if needed according to the age group to optimise the infrastructure and design more compact toilet facilities that are easily accessible from each playroom area.



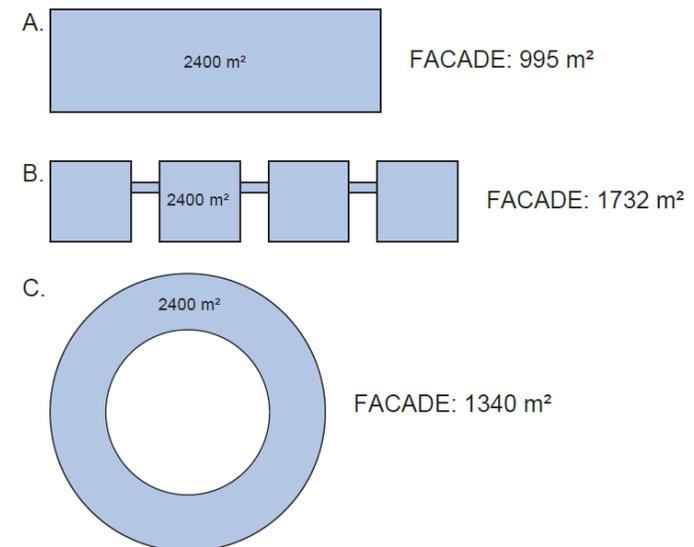
3. KEY FUNCTIONAL ELEMENTS TO CONSIDER FOR OPTIMAL DESIGN

The functionality and efficiency of the design should have priority over aesthetics. In order to do so, it is important to identify the elements that should be avoided. This section shows some of the most common mistakes.

3.1. Choose a Good Distribution Plan

An uneven distribution plan brings the risk of increasing construction costs as this means not only more façade surface, greater material spending and building time, but also has the potential for heat loss in comparison to compact plans.

Example shows same surface in three options and comparison in façade surface A-C from 992m² to up to 1732m²



3.2. Avoid Long Corridors

Many traditional typologies for education buildings rely on long corridors. This makes them rather unpleasant transitional spaces in contrast to designs where all of the communication goes through a shared central indoor space. If longer corridors cannot be avoided due to the shape of the plot, it is advisable to make them at least partially functional using them as a corridor gallery, corridor dressing room or any other purpose in line with the centre's educational objectives.



Long corridors are often insufficiently used, sometimes even confusing for children's orientation in the building © Kambič Miran



3.3. Avoid Complex Exterior Design

Complex roofing and increased details usually results in higher construction costs. Frequently, these complex forms have not been tested, therefore they might not work properly. It is recommended to use basic and proven shapes and details.



It is better to have quality spaces that follow pedagogy, than external attractiveness with no pedagogical purpose attached © Adriano A. Biondo

In many countries the focus of the building lies on a very flashy façade, while kindergartens have to be built inside-out and not the other way round. The focus shall be on the children, the users of the facility and the learning principles in place.



Visual appearance for the sake of attracting attention does not serve necessarily well the learning environment.
© Adharshila Vatika Kindergarten, Mimoa.eu



3.4. Focus on Natural Light

Natural light is key to good interiors and well-being. Some designs may be attractive but they do not always permit enough natural light to come in. Among those are compositions of small windows, windows with vertical shading, large terrace coverings or shadings that reduce the light excessively despite lots of window surfaces.



Decorated façade, lots of windows.
Still poorly illuminated interiors.
© Agence volume 2



3.5. Choose Functionality over Decoration

Like with exteriors, interiors should not have many things which do not serve any purpose, they can be costly and take more time to build. A very rich interior design can also have a counter-effect: children might be disturbed by the overstimulation. It is better to avoid wall images of cartoon characters and rather devote walls to exhibit children's artwork or introduce active walls to encourage various activities such as climbing or drawing, for example.

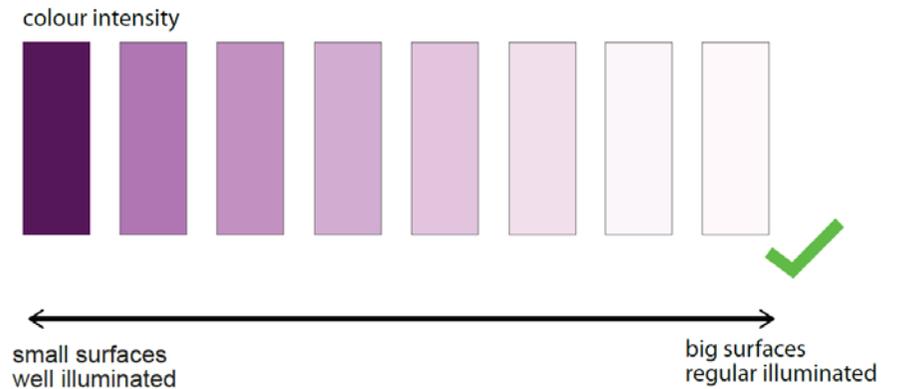


Decoration that serves no functionality should be avoided
© Designowl



3.6. Choose Proper Colours

Many people (including architects) associate children with bright colours, not being aware that colours have an impact on behaviour and emotions. For example, intensive red colour increases the heart-rate of children and intensive yellow colour can stimulate conflicts. As most of the equipment and clothing are already in vivid colours it is better to use subdued colours, natural materials, earthy colours and white to promote peacefulness and an environment more conducive to learning.



The use of colour should be adjusted to the size and illumination of the spaces

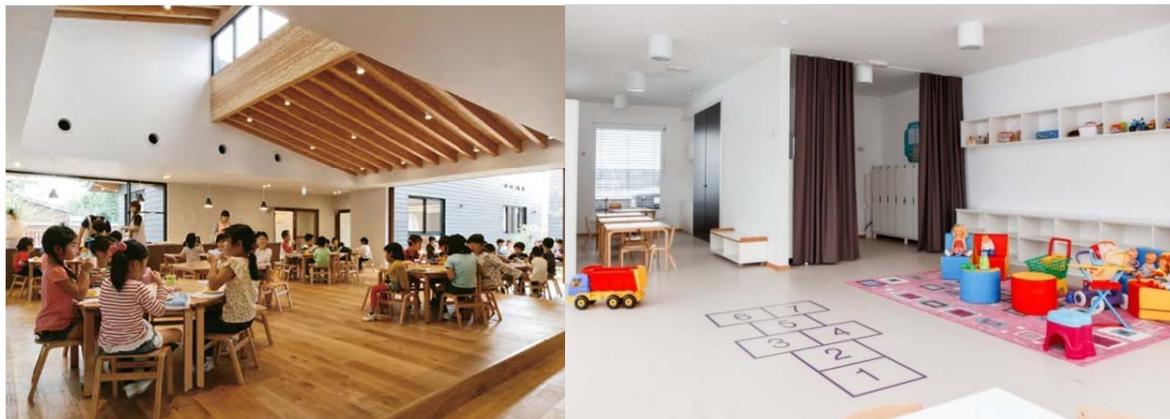


The choice of colours impact on the wellbeing of users – avoid using too much colour or colours that are too intensive
 Left: © LosDelDesierto - Right: ©Jorg Ceglar

4. PLAYGROUND DESIGN

The act of playing is a crucial component in children's socio-cognitive and physical development. Playing promotes brain development and helps lay the neural grid for a successful mind through repetitive play actions. Playing promotes physical success by allowing the child to explore, test, and expand the limits of their growing body. Playing promotes as well social, intellectual, and oral skills development by allowing the child to interact with their peers and the environment. Play takes place indoors and outdoors. Playgrounds (by their very name are outdoor grounds on which to play) if appropriately designed, can provide a safe environment to foster and enhance the opportunities for a child to play alone, with a caregiver, or with other children, like in the interior space. Professionals involved in the design of early childhood learning centres, like preschools, day cares and kindergarten playgrounds should pay particular attention to the conception of the playground in order to ensure there is a continuum of learning opportunities between indoor and outdoor areas. Playgrounds can provide different opportunities to engage in appropriate developmental play.

Some key aspects that need to be taken into consideration when designing quality playgrounds for preschool children follow.



Playrooms with reduced colour scheme
 Left: © HIBINOSEKKEI+Youji no Shiro - Right: © Timeshare Kindergarten Minsk

4.1. Promote Physical Development

Sport is a vital element for any child's development. Numerous studies have shown a relationship between sports practice and overall development. Sport activities also provide an opportunity for children to play together and work in teams. Motor skills are important for the physical development of children and can be promoted by group games.



Play elements that target different physical skills
© NZ Daily News

4.2. Promote Social Skills

Playgrounds should provide spaces that promote children's social interactions, encourage their communication social skills and development. Through playing, children learn social and cultural rules, experience various emotions, and explore the socially shared system of symbols.



Small theatre and outdoor learning areas © Educationnews.org



Sport games areas are an important part of any playground
© Rockford Parents



4.3. Promote Cognitive Skills, Imagination and Learning

Playing is the primary vehicle to promote the development of the imagination, language and cognitive skills. Playgrounds maximize the opportunities for children to engage with their peers and these interactions allow children to express ideas and feelings and develop their oral skills. Play structures promote social play because they provide children with places to congregate and communicate. By playing, they also learn by trial-and-error, through interactions with their environment and peers and to discriminate between relevant and irrelevant information. Playgrounds can provide opportunities for children to combine mathematics, language and music elements with movement.



Playing with sounds on the playground
© Wehrfritz



Floor games including numeric, geographic and language elements are very popular as they are very cost effective © Esplay.co.uk

4.4. Include Thematic Elements

Thematic playgrounds also promote children's socio-emotional development. Different themes invite children to play different roles, giving them the opportunity to practice experiencing and expressing their feelings and emotions. Role and theme play, by involving several participants, also foster communication and social skills. Most common thematic play equipment represents elements from different professions such as fire fighters or farmers, some kind of transportation (cars, planes, trains boats etc.) or animals. Most of these elements have visual resemblance and at the same time include several other play elements such as wall climbing, nets, hiding nooks and similar.



Elements such as ships, rockets, trains or cars as places where role-games can be played are an important part of any playground © All-play.com



4.5. Consider Age Group Appropriate Equipment

It is important to recognize the particular needs and characteristics of children of different ages and offer age-adequate playground elements. Playgrounds can be organised to provide two different sections: one with equipment suitable for younger children and the other for older ones. Sometimes even a smaller area for toddlers can be physically separated from the rest of the playground.



The same swing basket adjusted for younger (left) and older (right) age groups © Wehrfritz

4.6. Create Active and Passive Environments

Playgrounds should have both active and passive areas. Active areas are dynamic and suitable for group play, while passive ones are calmer and serve to retreat, relax or for individual play.



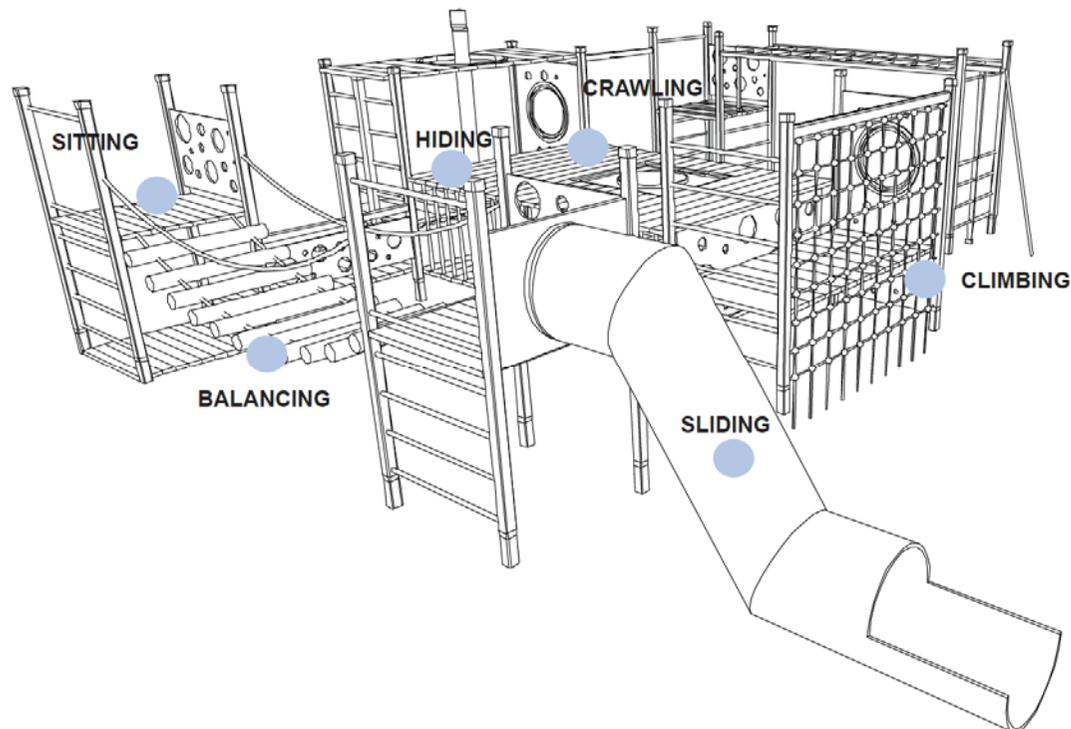
It is important to design both active and passive parts of the playground © Wehrfritz



4.7. Promote Diversity of Play Equipment

Diverse play equipment allows for different activities to take place on the playground. The selection of elements should promote motor skill development through play and sports, as well as social skills, imagination and cognitive skills while at the same time offering spaces for informal open-air learning.

Big and combined play elements should include as much as possible diverse activities



4.8. Favour Natural Materials

When selecting materials, it is advised to use natural elements and favour equipment made from wood, sand, rocks, ropes combined with landscape formations (hills, holes etc.) rather than plastic, artificial playgrounds with a bold colour scheme. Natural materials can also provide sensorial stimulation for younger children and are usually more cost effective.



Rocks, sand, tree logs can be great playground elements © GreenworksPC



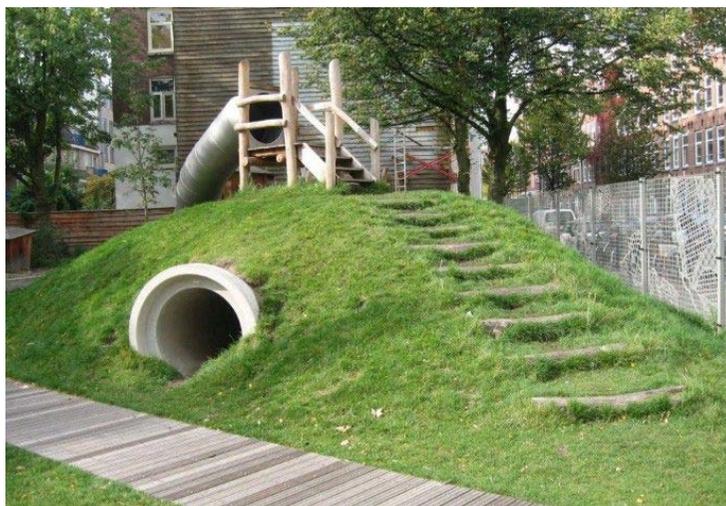
Library of natural sensorial elements for younger children to touch, experience, use



Natural materials playgrounds are gaining their popularity and are less visually disturbing for the environment
© Kaltenbacher architektur

4.9. Play with Topography

Landscape is a powerful tool and can offer the possibility to create diverse and fun playgrounds through different terrain arrangements as well as provide for a number of different activities. Not only can the terrain add to the visual appearance of the playground, but it can also add to gross-motor skill development as many sports and games can include inclined surfaces. More inclined terrains allow for climbing and rope pulling, while landscapes with lower inclinations can be used for skate and bike parks. Children also like to run around small height hilly landscapes. Natural landscape elements can be mostly in grassed surfaces or they can be made artificially with rubber cover, which is especially suitable for urban locations.



Making multi activity hills (with slides, climbing ropes, tunnels etc.) can create a low cost high efficiency playground
© speelmatje.nl - Goya architects

4.10. Provide Proper Shading

Playground covering offers key protection against the sun, heat and sunburns. Especially, smaller children with more vulnerable skin should be carefully protected. This is especially important for the areas of the playground where activities are static (like sandboxes or relax areas for example) and therefore more at risk for sunburns.

Ideally, shading should be natural with leaf-trees that naturally reduce the heat impact on the adjacent buildings and ground. Creating a playground amongst existing trees is a big advantage. Where it is not possible to have trees, artificial shading with cantilevers, umbrellas, sails and tent-like structures of different shapes (square, rectangle, hexagonal etc.) is always an option.



Sail structures with adjustable fabric are the most flexible way of shading © Yarra shae

4.11. Promote Inclusion

It is important for playgrounds to be as inclusive as possible. Single use elements should be avoided as they can lead to conflicts. It is recommended to include play elements that several children can use at the same time, having fun and supporting the development of their social skills as well as their motor skills. For example, a slide on a hill is a playground element that can be used by several children at the same time and combines several play elements like climbing and sliding, while a swing and rocker can only be used by one child at a time and offers a single activity focus.



© onlineplaygrounds.co.uk



Sandboxes are the most vulnerable parts of playground and require adequate shading © Wehrfritz



© pinterest, eibe

Playground design should be accessible to wheelchairs: if needed, ramps should be installed, though it is better to avoid having too many levels. Several elements of inclusive playground equipment are available such as elevated sandboxes, water play elements, sunk-in spinning rides etc.



Elevated sandboxes allow easy wheelchair access to one of most desirable play areas in the playground.
© aaastateofplay.com, independent.living



© Martin Saban-Smith

4.12. Provide Large Open Grass Areas

It is a common issue in some countries to put too many play elements and not leave enough space for large scale social games, gatherings, sports or games that need flat grassed surfaces like football, grass hockey or different other sport activities.



Playgrounds should have grassed non-defined surfaces that can be used in various ways © personaltraininginhove.co.uk





Children learn through experiences- testing and pushing the boundaries are parts of growing up © littledayout.com

4.13. Promote Safety and Experience

Ensuring children's safety is of utmost importance. Designers should include elements that are safe but also offer developmental experiences and opportunities for children to further develop their skills and overcome their fears.



Water play helps develop children's imagination and creativity © pinterest, eibe

4.14. Promote Children's Interaction with the Environment

Children can actively shape their environment. Using wooden elements, sand and water helps them interact with the environment, trigger their imagination and improve their social skills. These elements also are very cost effective.



Children love to organise and interact with their environment
© greenecoservices.com

4.15. Provide Water on the Playground

Water is a natural play element. Playing with water helps children develop their imagination and creativity. The sound, feel and motion of water appeal to children of all ages and abilities. Water play elements consist of a water source (manual pump, water pipe or even a natural source if available) and basins of various sizes and shapes, water chutes and water wheels for example. Water offers a range of stimuli for children, from the sensations of wet and dry, to experimenting with submerged and floating objects as well as changes in temperature.

4.16. Encourage Gardening

Plant growing can be an exciting activity for children and an opportunity to learn about nature and natural cycles. Small areas can be dedicated to growing many types of plants such as herbs, berries, fruits or vegetables that children can later use when baking cookies, cakes or pizzas.



Each playground can have a small garden area ©growveg.com



5. GENERAL RECOMMENDATIONS ON MATERIALS AND SAFETY

Architects and playground designers can choose from a wide variety of materials based on certain characteristics, durability, maintenance, visual appearance and costs. Materials can be divided into two groups: playground elements and flooring. Many times the decision on material selection is based on the concept, which can be more colourful, if using artificial materials or more natural, if using materials such as timber, ropes, rubber, or a combination of the both. Regardless of the materials chosen, all elements should be assembled according to the manufacturer's requirement, and regular maintenance and control is needed for long term use and safety.

5.1. Playground Equipment materials

Timber



- + Timber is a natural material
- + it is not visually aggressive
- + it is cost effective
- + it can be painted if necessary
- + it needs to be protected with protective coating
- not all timber is suitable - hard timber should be selected

Stainless steel



- + Most durable material, easy to maintain
- + it doesn't heat up as painted steel
- + it can be thinner in comparison to wood elements.
- + it is more resistant to vandalism than timber
- it has a cold outlook

High pressure laminated boards



- + Sturdy material, supplement for wood
- + wide colour selection
- + widely used for thematic playground elements

Painted steel



- + Painted elements can create a certain identity of the playground
- dark colours should be avoided as they absorb heat

Plastic and plastic fibres



- + Plastic is popular in small playgrounds as they are cost-effective
- + usually in strong vibrant colours - which can be an advantage or disadvantage
- visually artificial
- less durable than steel or wood

5.2. Playground Flooring

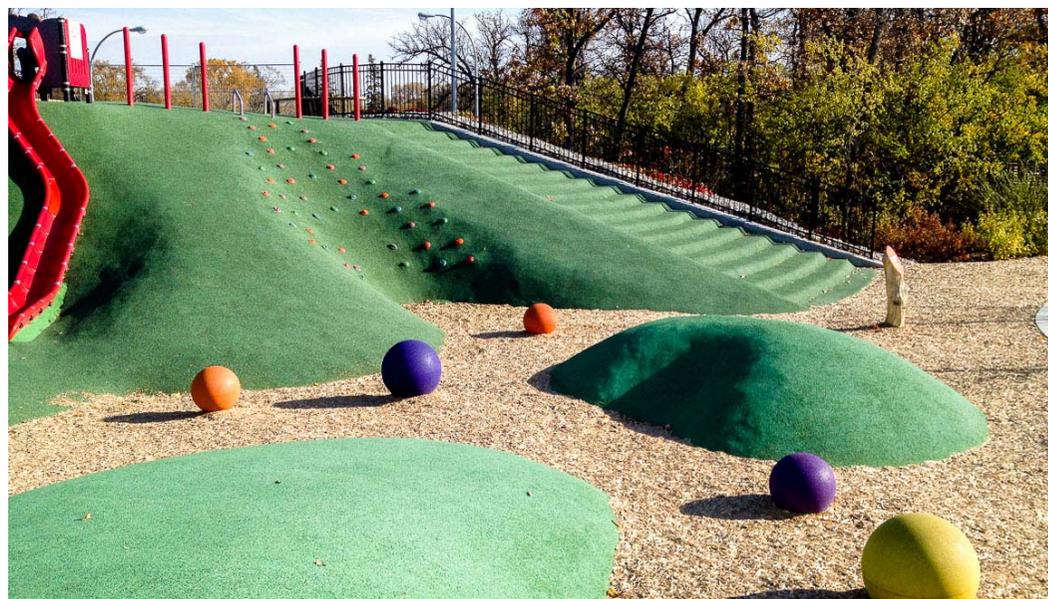
Playground flooring is a critically important part of any playground. Impact absorbing flooring should be used whenever there are elements that are 60 centimetres off the ground and there is a risk of falling. The conceptual design (natural, artificial landscape or combination) and cost efficiency of each project will guide the decision after safety considerations are taken into account.

Rubber

- + Rubber is the most commonly used surface for playground areas where there is a need for impact absorption and slip resistance.
- + rubber can be found in rubber tiles (50x50cm, 4cm thick), rubber mats (useful as an impact absorber in natural grassed playgrounds) or poured rubber that is especially suitable for irregular shapes and landscapes.
- + allows handicapped access and it is comfortable to walk on
- + works great also in combination with natural environment
- it is advised to pick one colour of rubber unless, different colours are marking different activities.

Pebbles

- + Pebbles are the next alternative to rubber surfaces as they are a natural material for natural look playgrounds
- + pebbles have impact absorption qualities - the layer of pebbles should be 30cm deep.
- + cost effective and durable solution
- + easy to install and have effective draining which prevents rain water to build up
- + animals tend to leave pebbles alone
- small children could swallow the smaller stones
- doesn't allow handicapped access
- regular inspections are needed
- is not good for high-height playground equipment



Playgrounds should have combinations of natural and artificial flooring as each has certain qualities and supports certain activities © aquaseallc.com

Sand

- + Sand is cost effective material
- + easy to install material
- can be spread outside the designated areas
- doesn't allow handicapped access
- not all sands are healthy to use
- animals like sand – sanitary safety concerns

Wood particles

- + Wood particles are cost effective
- + natural look of the playground
- + prevents grass from growing
- + low maintenance
- + reduces mud and dust
- particles need to be renewed every couple years
- doesn't allow handicapped access

Grass

- + Natural look, fits perfectly in natural environment
- + has better impact absorption than hard flooring and concrete, yet worse than sand or rubber
- doesn't grow on frequently used areas
- needs maintenance (lawn-mowing, watering in some climates)
- not the best for handicapped access.

Synthetic Turf

- + Looks similar to natural grass
- + allows handicapped access
- + anti-microbial material, no allergens associated with natural grass
- + has a cooler surface temperature than many unitary surface types
- + never requires watering or mowing
- + drains quickly
- needs maintenance and cleaning
- is not natural material
- health concerns if it is made from recycled tires.

Concrete and Asphalt

- + The advantages of concrete and asphalt are its sturdiness and surface that allows several games to take place or activities like skating, bike riding, roller blading and similar
- + allow for easy handicapped access
- + several shapes can be created from concrete and asphalt
- + can be painted
- has no impact absorption and it is not suitable for most playground elements except certain games and sports
- heats up the playground in summer as it accumulates heat of the sun.

5.3. Safety Recommendations

Safety of the children is of the utmost importance, still some activities demand more risky behaviour as children gather experiences and test their skills and boundaries as a part of growing-up. To ensure safety, it is important to follow some rules:

- Playground elements should be built and used in accordance with manufacturer's instructions
- Playground inspections should be done regularly.
- High play equipment and equipment where there is a risk of children falling should be located on surfaces that can reduce harm in case of potential impact
- Safety distance between the elements should be taken into consideration
- Areas where children run should not be of different height levels
- Avoid sharp elements, edges should be round
- Playground elements should be age-appropriate (for example, avoid using pebbles for babies and toddlers as there is a risk of choking).

Bibliography

- Kotnik, Jure (2011), *New Kindergarten Architecture*, Links International, Barcelona
- Kotnik, Jure (2014), *Preschool Interior Design Guide for Architects and Educators*, World Bank Document, Washington DC
- Kotnik, Jure (2018), *Designing Spaces for Early Childhood Development: Sparking Learning & Creativity*, Images, Melbourne.
- Shmis, Tigran, Kotnik, Jure, Ustinova, Maria (August 25, 2014), *Creating New Learning Environments: Challenges for Early Childhood Development Architecture and Pedagogy in Russia*, Early Childhood Care and Education International Conference, Volume 146, pp 40–46,
<http://www.sciencedirect.com/science/article/pii/S1877042814047387?np>
- <http://maker.good.is/myla2050/projects/KidsPlayatPS.html>
- <http://www.wehrfritz.de>
- <http://www.lappset.fi>

Photos and schemes

All schemes and photos by Jure Kotnik unless stated otherwise.

Cover: Open Timeshare Kindergarten Šmartno © Janez Marolt

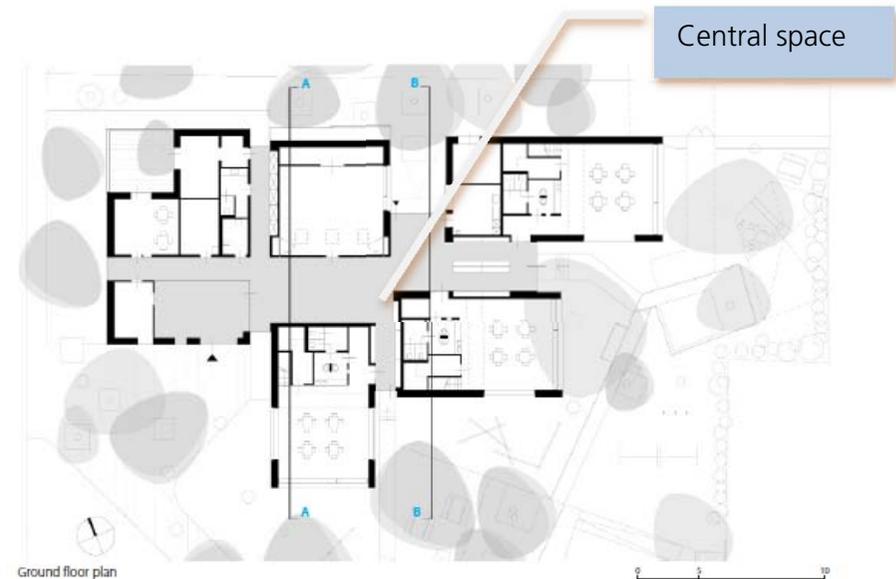
P. 6 – 3 kids © skynesher

ANNEX: CASE STUDIES SELECTION

Nine plan designs of early childhood education centres were selected to show different size and design approaches, of mostly compact buildings with a multi-use central space and playrooms around it. Examples are presented in a table with a short analysis, plans and source for additional examination. These case studies can be used for training purposes, with architects and potential tender evaluation committees, to assess strengths and weaknesses of different proposals.

Type **Compact with central space**

Size	4 playrooms
Analysis	+ central space with direct connections to playrooms + natural light + orientation towards nature + fairly compact building – surface of the façade
Source	http://www.archdaily.com/156232/kindergarten-guntramsdorf-goya

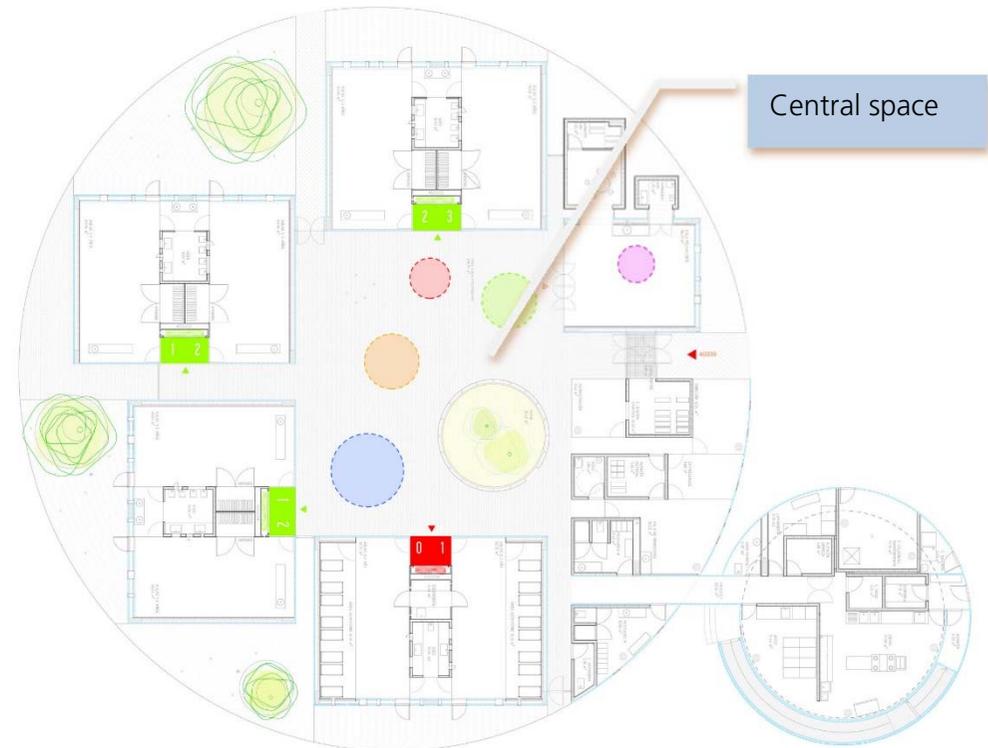


Type Round and semi round

Size 2 000 m²

- Analysis
- + can be used on various types of plot shapes
 - + can easily be rotated towards right orientation
 - + has a central space and direct access from playrooms
 - + can be built on two or three levels
 - round and organic shapes are usually slightly more costly than orthogonal

Source <http://www.archdaily.com/359678/infant-school-student-in-vereda-rueda-pizarro-arquitectos>



Type Hexagonal shape with central space

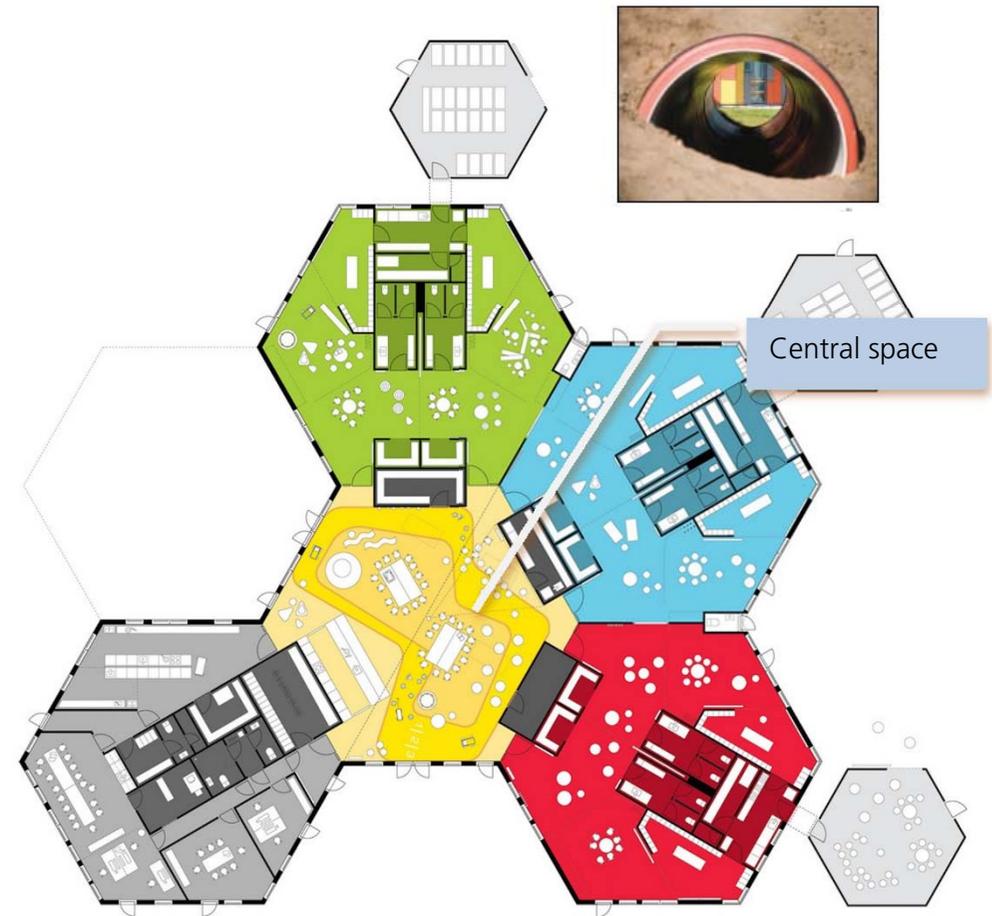
Size 1 200 m²

Analysis + modular design

+ central multi-use space

+ two playrooms sharing toilets

Source <http://www.archdaily.com/46255/lucinahaven-toulov-childcare-cebra>

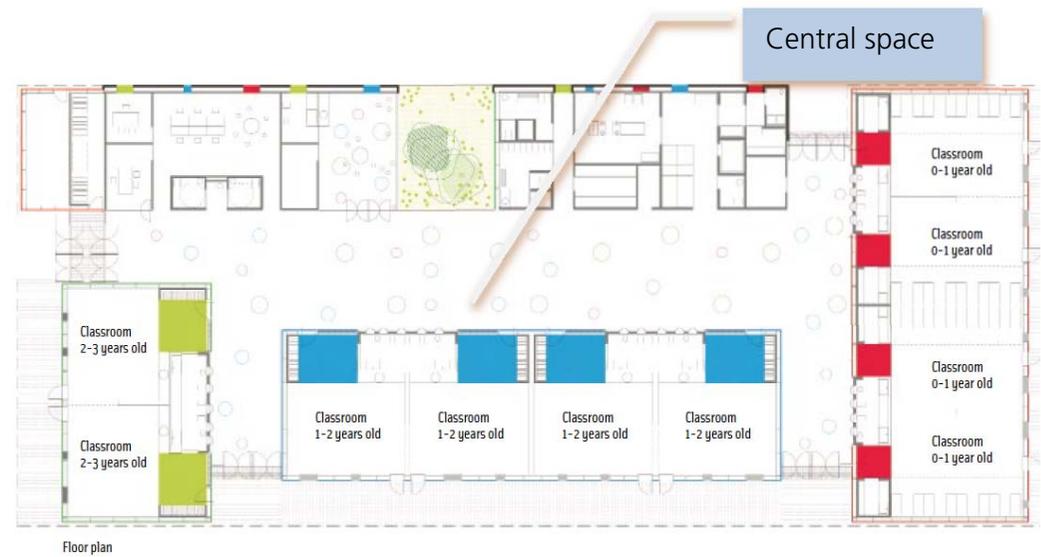


Type Orthogonal with clear wing division

Size 1 500 m²

- Analysis
- + good for space limited locations
 - + cost effective orthogonal construction
 - + age and program division around the central space

Source <http://www.archdaily.com/438561/pablo-neruda-nursery-school-rueda-pizarro>



Type Star shaped kindergarten

Size 3 500 m² – single floor – 4 playrooms

Analysis + good for square locations

+ no corridors

+ natural light into central square

+ star shaped building creates smaller playground bays

– larger façade surfaces are costly but can sometimes add some visual value to the building

Source <http://www.archdaily.com/227499/nido-caribimbi-zpz-partners>

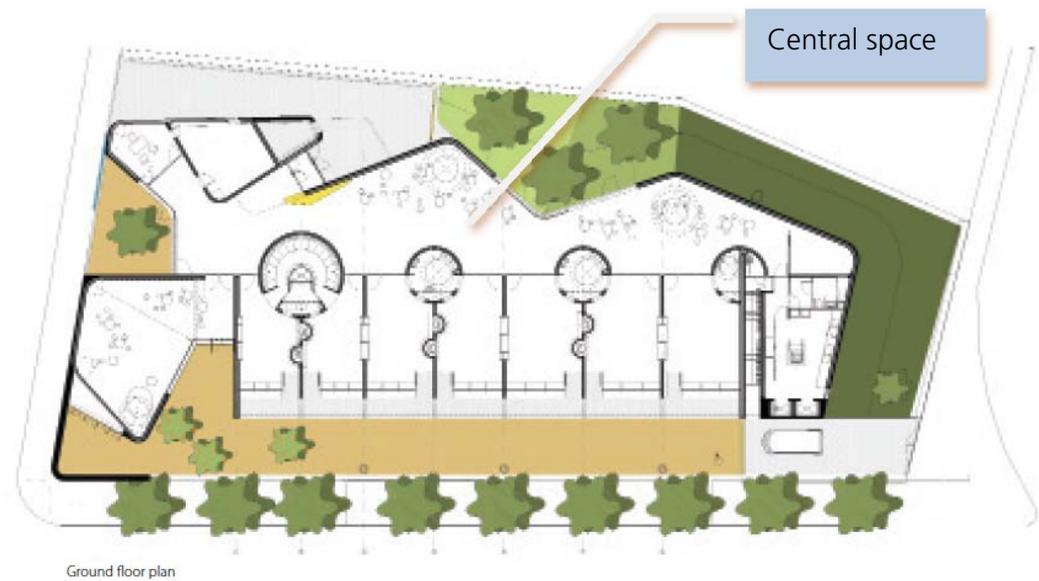


Type **Linear kindergarten with central space extension**

Size 970 m² –7 playrooms

Analysis + good for narrow long locations
 + direct access from playgrounds into central area
 + combination of plain and dynamic façade

Source <http://www.av62arquitectos.com/en/projects/kidergarden-cerdanyola-del-valls-barcelona-1-107-0>



Type **Large introverted kindergarten with semi private inner court**

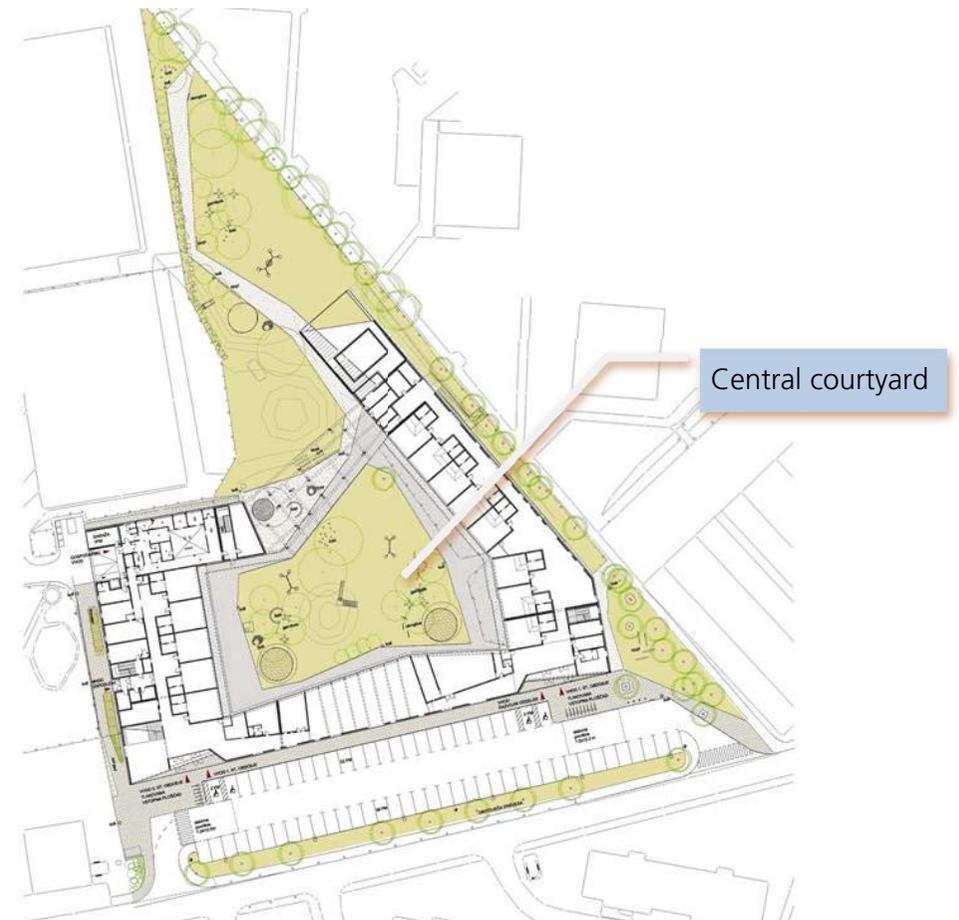
Size 3 990 m² – 16 playrooms – two floors with usable roof

Analysis + can be used in irregular shape plots

 + creates safe and more private inner court

 + has two playgrounds (dynamic outside the building and calmer inside)

Source <http://www.archdaily.com/548379/kindergarten-mavrica-bb-arhitekti-studio-360>

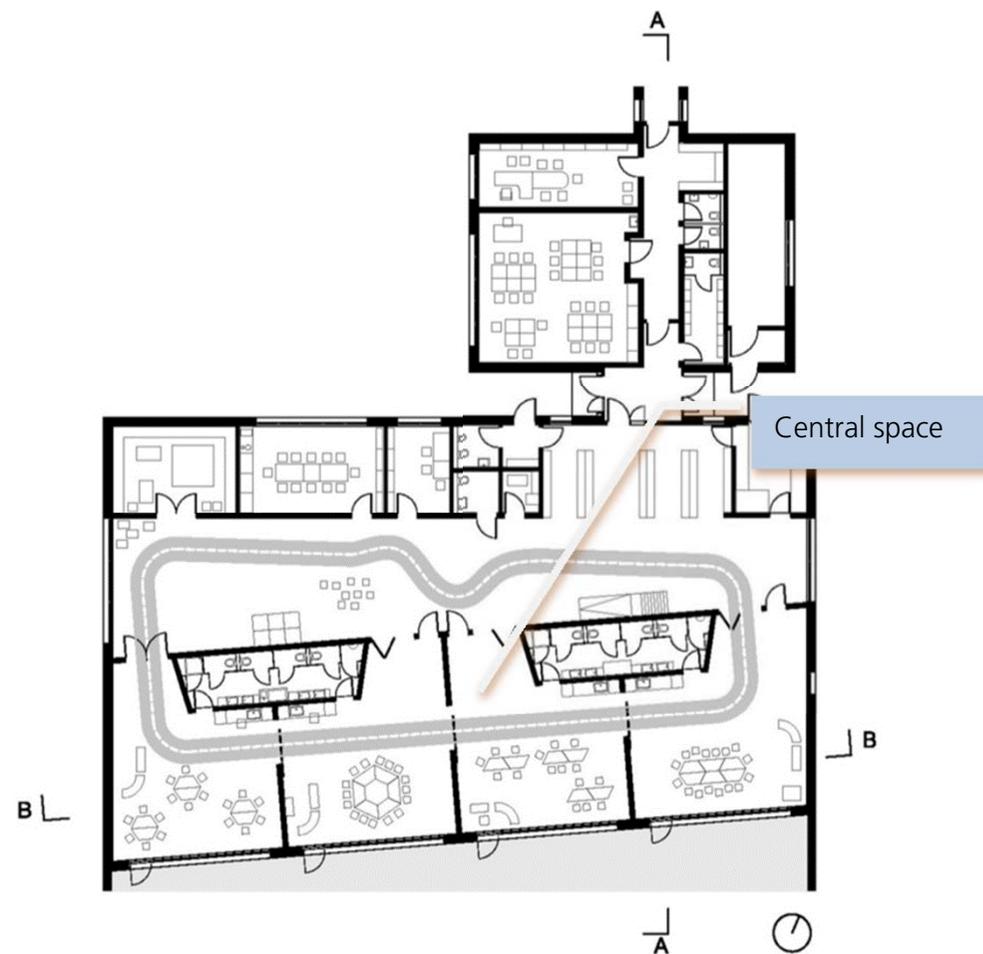


Type Compact orthogonal with semi-open plan

Size 600 m² – 4 playrooms – ground floor

- Analysis
- + simple construction
 - + connection among the playrooms
 - + central multi-use space
 - + reduction of services, offices and communication areas

Source <http://edfacilitiesinvestment-db.org/facilities/283>



Type **Dynamic shape with linear central space**

Size 1 200 m² – ground floor

Analysis + orthogonal with rounded details
 + creates visual dynamic with fairly cheap construction
 + dynamic central multi-use space

Source <http://cebraarchitecture.dk/project/paletten/>





55, avenue Kléber
F-75116 PARIS, France
Tel: +33 (0)1 47 55 55 00
Fax: +33 (0)1 47 55 03 38
SWIFT: CEFPRPP

www.coebank.org