

# Scientific Journal of Applied Social and Clinical Science

## THE INFLUENCE OF ARCHITECTURAL SPACE ON THE LEARNING AND WELL-BEING OF CHILDREN AT THE REGINA ROCCO UNIFIED EDUCATIONAL CENTER IN SÃO BERNARDO DO CAMPO, SP

---

*Isabella Jara Mathias*

GDPI Mackenzie

*Maria Pronin*

GDPI Mackenzie

All content in this magazine is licensed under a Creative Commons Attribution License. Attribution-Non-Commercial-Non-Derivatives 4.0 International (CC BY-NC-ND 4.0).



**Abstract:** The research aims to investigate the relationship between the school architectural environment and its influence on the learning, behavior and well-being of children in early childhood education, which includes children aged 4 to 6, with the Municipal School of Basic Education as its object of study. Regina Rocco House I, close to Vila São Pedro, in the municipality of São Bernardo do Campo, SP. In the theoretical framework, concepts about the importance of the physical environment, especially the educational environment, in early childhood education are deepened. Historical aspects of Unified Education Centers (CEUs) and their impact on the communities in which they are established are also covered. Furthermore, the evaluation criteria for the educational spaces in question are presented, based on concepts from Environmental Psychology and Neuroarchitecture. Next, the results obtained during the visit to EMEB Regina Rocco House I are presented, according to the “Walkthrough Tour” methodology, evaluating the environments according to the following criteria: shape and size of the environments, natural lighting, natural ventilation, materials, colors, furniture, playfulness, integration with nature and accessibility. In the final considerations, the positive and negative points of the evaluated educational environments are commented on, considering their impacts on children’s learning and well-being and the methodology adopted, and finally addressing possible improvements.

**Keywords:** Unified Educational Center, Infancy, Neuroarchitecture.

## INTRODUCTION

According to article 26 of the Universal Declaration of Human Rights (UN, 1948), the right to education for the full development of a person and to achieve a better level of well-being throughout their life is a human right that must be guaranteed to everyone.

In Brazil, this right is guaranteed by article 53 of the Child and Adolescent Statute (ECA, 2021, p. 43 and 44), which states: “children and adolescents have the right to education, aiming at the full development of their person, preparation for the exercise of citizenship and qualification for work”, with conditions guaranteed by the State for access and permanence at a free public school, close to their residence.

According to Sonia Kramer (2004), early childhood education in Brazil has been evolving since the end of the 1970s due to the creation of several laws aimed at this stage of education. Some factors that influenced this evolution can be mentioned: the recognition of the right to early childhood education in the 1988 Constitution, the creation of the Child and Adolescent Statute (1990) and the recognition of early childhood education as the first stage of basic education by the National Education Guidelines and Base Law (LDB, 1996).

In addition to the factors previously mentioned, it can be said that the expansion of the network of schools focused on early childhood education also occurred due to greater autonomy and the need for women to enter the job market (Hasswani, 2018).

It is worth mentioning that, according to the 2009 Constitutional amendment, early childhood education, in addition to being a right for children between 0 and 6 years of age, also becomes mandatory for children from 4 years of age, which corresponds to the beginning of preschool. As it is the State’s duty to guarantee free access to daycare centers and

preschools, it is the family's option to enroll their children in daycare centers (Kramer, 2004).

According to Campos (1997) apud Kramer (2004), the evolution and, as a consequence, the facilitation of access to early childhood education is a positive point for Brazilian society, as this stage of education, in addition to favoring children's academic performance, in the following stages, it is also one of the areas that most repays society for the resources invested in it, and it is advantageous to invest in public and social policies aimed at the education of children aged 0 to 6 years.

According to Antônio Batista and Maurício Érnica (2011), territories of high social vulnerability often have a reduced supply of public facilities, such as schools and, as a consequence, inequality in relation to access to education deepens.

Furthermore, children living in socially vulnerable territories commonly present characteristics such as: tiredness, cold, fear and poor diet, which directly affect their learning (Kowaltowski, 2011 apud Hasswani, 2018).

In cases where there is a school in these territories, it becomes a major public reference facility and an instrument for improving the quality of life of children and families, thus meeting the social demands of the local community (Batista and Érnica, 2011).

Unified Education Centers (CEUs) are one of the main examples of schools located in territories of high social vulnerability. Its insertion in these places aims to reverse the process of social exclusion of this part of the community, through the formation of a social identity in the place and the provision of cultural, educational and sporting bases, through its needs program. It is worth pointing out that the creation of CEUs was inspired by the "Park Schools" of educator Anísio Teixeira, which proposed to renew and

improve Brazilian education, making schools an instrument to combat social inequalities (Carvalho, 2009).

The research study school is part of CEU Regina Rocco, located in the municipality of São Bernardo do Campo, SP, which was built in 2012, close to Vila São Pedro, considered the largest area of social vulnerability in the municipality. This equipment, in addition to serving more than 1,000 children between 0 and 10 years of age, enrolled in the Early Childhood Education Center (CEI), Municipal School of Early Childhood Education (EMEI) and Municipal School of Elementary Education (EMEF), also requalified the surrounding community by facilitating access to education, sport and culture.

The research aims to answer the following question: how is the school's physical space capable of influencing the learning, behavior and well-being of children between 4 and 5 years and 11 months of age who study at CEU Regina Rocco's EMEI?

According to the Scientific Committee of the Science for Childhood Center, the first years of a child's life correspond to a crucial period for learning. This occurs because between 0 and 6 years of age, brain structures and circuits are developed and fundamental capabilities are acquired that will allow the improvement of more complex future skills (NCPI, 2014).

Furthermore, during this period of childhood, learning is strongly influenced by the architectural environment where the child finds himself and with which he interacts. Thus, long-term physical spaces, such as schools, directly affect children's learning and development (NCPI, 2014).

The objective of this research is to evaluate the impact of school architectural space on the learning and psychological comfort of children aged 4 to 5 years and 11 months, based on the concepts of Neuroarchitecture.

## THEORETICAL FRAMEWORK

Early Childhood, according to the Scientific Committee of the Science for Childhood Center (2014), corresponds to the phase from 0 to 6 years old and is a period of extreme importance for learning. This phase is characterized by being a period of greater cognitive development, in which synapses occur at greater speed.

Furthermore, throughout these first years of life the brain shows greater plasticity, that is, it can still change in response to experience and the stimuli to which it is exposed. Therefore, in this growth phase, the brain structure is highly receptive, but it is also vulnerable to the absence of stimuli or the occurrence of negative stimuli, which can leave lasting marks, which are cumulative throughout life (NCPI, 2014).

According to studies by doctor and educator Maria Montessori, a child's mind during early childhood can be defined as an "absorbent mind", as the child absorbs all the stimuli from the environment in which they are inserted in the same way that a sponge does. As a result, the long-term spaces used in this phase, such as daycare centers and early childhood schools, play a significant role in the children's learning and development process (Montessori, 1949 apud Migliani, 2021).

It is worth mentioning that the environment in which the child is inserted is one of the main factors influencing learning, but healthy integral development during this period of childhood is also extremely important. Factors such as: "adequate nutrition and health care, an affectionate, safe and stimulating family environment, stable and encouraging relationships, in addition to the provision of quality education" (NCPI, 2014, p. 5) are crucial for this development.

Children who show healthy integral development during early childhood are more likely to adapt to different environments

and acquire new knowledge, achieving good academic performance in the future (NCPI, 2014).

According to Mara Campos-de-Carvalho (1998), human development and child behavior are influenced by both social aspects and physical and environmental aspects, provided by adults. However, children also actively participate in their own development by exploring and discovering the environment around them.

Based on what was said above, it can be said that the architectural space in which the child finds himself is crucial to his learning and healthy development. Thus, the study of concepts from Environmental Psychology and Neuroarchitecture can help to better understand how these spaces affect children's learning and psychological comfort.

Environmental Psychology is a branch of Psychology, which studies the bidirectional relationship between people and the environment, focusing on the physical aspects of the environment that act directly on human behavior (Campos-de-Carvalho, 1998).

The term "Neuroarchitecture" was inaugurated in 2003, by neuroscientist Dr. Fred Gage and neuroscientist and architect John Paul Eberhard, at the founding of ANFA, Academy of Neuroscience for Architecture, located in San Diego, California. This term refers to the interdisciplinary field that consists of applying neuroscience concepts to built spaces, aiming to understand the impact of these environments on the brain and human behaviors (Mena, 2019).

In fact, architectural professionals and scholars have long been aware of the influence of buildings on people. The application of neuroscience in this area adds efforts to better characterize, understand and, mainly, measure these effects (Villarouco; Ferrer, et al, 2021, p. 17).

According to architect Audrey Migliani (2021), it is evident that users' behavior and emotions are directly influenced by occupied environments. She also states that a person spends around 90% of their life in indoor spaces, so it is essential that they positively stimulate the brain, especially in the case of children whose brain is still developing.

According to architect Andréa de Paiva (2020), the effects that the physical environment can have on human behavior are different between adults and children. This occurs because children's brains are still in the process of development, which is not uniform and occurs in "development windows", in which the brain presents greater plasticity (Hensch, 2004 apud Paiva, 2020).

Thus, for children, the perception of the environment is different from that of an adult, as vulnerability to stimuli from the space around them changes in different periods of childhood.

As an example of this difference in spatial perception, children have difficulty navigating and moving in unfamiliar locations, because the part of the brain dedicated to spatial orientation and navigation strategies is fully developed and refined only around the age of 12.

Environments that are complexes, such as schools, are designed with the aim of providing a feeling of security and allowing children to explore space with a certain independence, thus stimulating the development of their navigation skills (Paiva, 2020).

The educator can and must also plan and reorganize the school environment according to their educational objectives, as the space is never neutral due to the presence or absence of elements and its organization always communicates a message. It is worth mentioning that the smaller the child, the greater their sensitivity in relation to the spatial organization around them, with babies and young children using physical references

in the environment, such as textures, colors, shapes, barriers, sounds, to communicate with each other. orient themselves in space and determine the safety of the place (OLDS, 1987 apud Campos-de-Carvalho, 1998).

Long-term environments focused on childhood, such as school, must be rich in stimuli, which contribute to healthy development and the creation of a sense of identity. The creation of these sensorially enriched spaces also contributes to the formation of an individual's basic memory bank, which will influence their behavior throughout life. Another important point is that architecture stimulates not only the brain, but also the child's body, being fundamental for children's mental and physical health (Paiva, 2020).

Neuroarchitecture states that the main factors existing in the school environment, which enrich it sensorially, instigate curiosity, increase student concentration and bring a feeling of psychological comfort are: natural lighting, natural ventilation, presence of nature, color, textures and furniture properly designed for the child's scale (Silva, 2020).

Natural lighting plays a fundamental role in the quality of student learning and is essential for their physiological and psychological comfort when staying indoors for long periods. Lighting in classrooms must combine natural and artificial light for the environment to have sufficient, quality light (Kowaltovski, 2011).

The presence of natural light is almost always associated with a visual connection between indoor environments and the outdoors. The variation in natural light at different times of the day, weather conditions and seasons is important to define people's biological and psychological rhythms. As natural light is important for health, it can influence the ability and willingness to learn (Robbins, 1986 apud Bertolotti, 2007, p. 3).

Furthermore, the psychological effects of sunlight include the stimulation of feelings such as joy and optimism (Haller, 2022).

The presence of natural ventilation is essential to provide a healthier school environment, preventing the formation of fungi or mold and reducing the amount of toxins in the air, which can cause respiratory problems.

Lack of adequate ventilation can result in classrooms with extreme temperatures and excessive humidity, causing apathy and disinterest on the part of students (Kowaltovski, 2011).

Outdoor spaces are essential today, where children have few opportunities to play in natural environments outside of daycare centers and preschools. Furthermore, contact with nature stimulates the child's development in several aspects, such as:

Contact with nature contributes to the development of interest and concern for the environment, an essential step towards environmental education; It also contributes to physical and mental alertness, to the development of autonomy, offering opportunities for learning and playing richer and more complex than in traditional playgrounds, stimulating the child's curiosity (OLDS, et al, 1987 apud Campos-de-Carvalho, 1998, p. 187).

According to Karen Haller (2022), specialist in Psychology Applied to Colors and Design, colors are linked to emotions and directly influence thoughts and behaviors, being "the simplest tool we have at our disposal to intensify positive emotions and increase well-being" (2022, p. 13).

Color is nothing more than light, and objects do not have their own color, but rather absorb part of the light incident on the environment and reflect the other particle, the part of the light reflected by the object reaches our eyes, and is converted into electrical impulses, which are processed by the same

part of the brain, which is responsible for emotions (Haller, 2022).

The behavioral changes and emotional stimuli generated by colors are related to a combination of factors, such as: the properties of colors, namely hue, tone (chroma) and intensity (brightness), the environment and the person's context that receives visual information (Rodrigues, 2022).

Furthermore, colors are not perceived by vision separately, but rather as a composition of some or more colors, thus influencing the resulting psychological effects (Haller, 2022).

The chromatic intensity of a given color, or its saturation, directly influences the psychological effects generated by it. In general, extremely saturated colors tend to be stimulating, while colors with low saturation tend to be relaxing (Haller, 2022).

Color processing occurs in a specific part of the brain called the color center or V4, located in the occipital lobe and close to the brain's other vision centers. However, its processing is more complex, as it also involves other areas, which are responsible for emotions and memories (Paiva, 2019).

In playful environments, such as toy libraries and playgrounds, it is interesting to use a variety of colors and a predominance of warm colors to stimulate children. As a countermeasure in classrooms, which require greater attention from students, light and neutral colors are chosen (NEUROINLAB, 2022).

The existence of furniture designed for the child's scale and items of interest accessible to the eyes and hands generates a sense of belonging in relation to the school environment, resulting in numerous advantages for the child's learning and well-being. Among these advantages, we can mention the strengthening of self-esteem, learning to occur more quickly and increased motivation and concentration (Migliani, 2021).

The spatial accessibility of early childhood education buildings is another important factor for school inclusion, with inclusive and diverse schooling being a right provided for by the Statute of Persons with Disabilities, in Article 27 of Law, number: 13146, of July 2015, the which states:

Education is the right of people with disabilities, ensuring an inclusive educational system at all levels and lifelong learning, in order to achieve the maximum possible development of their physical, sensory, intellectual and social talents and abilities, according to their characteristics, interests and learning needs (BRAZIL, 2015, Article 27).

Accessibility in the school environment is related to the following factors: displacement, use, communication and spatial orientation, whether the space provides safe and comfortable horizontal and vertical movement, access to spaces and the activities carried out in them, communication between individuals and the identification and understanding of spaces, their accessibility will be guaranteed (Dias, 2016).

An inadequate school environment, characterized by architectural barriers, can compromise the cognitive development of children with disabilities, as well as result in their physical and social isolation (Benvegnú, 2009 apud Dias, 2016).

## METHODOLOGY

This research is qualitative in nature and was developed in stages. The first is the review and deepening of texts of the theoretical framework, which cover topics such as: early childhood education, neuroarchitecture, environmental psychology and the impact of the school space on the child's learning and well-being.

In the second stage, contact with the school and the organization of the necessary material for the subsequent visit took place, with the EMEB plan and the implementation of the CEU being surveyed in this stage. A visit itinerary was also prepared showing the places for evaluation.

In the third stage, a visit was made to CEU Regina Rocco, on R. Tiradentes, Vila do Tanque, 1845 - Vila São Pedro, São Bernardo do Campo, SP. The spaces most commonly used by children in early childhood education were chosen for the evaluation, namely: main entrance, central corridor, side corridors, bathrooms, classrooms, internal courtyard, cafeteria, playgrounds, library and multipurpose room.

The evaluation criteria were based on the studied concepts from which they were selected: shape and size of the environments, natural lighting, natural ventilation, materials, colors, furniture, playfulness, integration with nature and accessibility.

The survey and evaluation of the spaces, according to their own perceptions, were carried out using the walkthrough method, which consists of planning a route through the place of visit, covering the environments that were intended to be evaluated, documented by pictures and sketches and observing the state of conservation and uses thereof (Rheingantz, 2009).

Furthermore, equipment was not used to measure temperature, sound and lighting, which would characterize an assessment of a quantitative and technical nature. The record of the visit was documented through photographs, with a Canon camera model EOS Rebel T6i, and notes on their own perceptions.

In the fourth stage, the information obtained during the visit to CEU Regina Rocco was analyzed and the results were discussed.

In a fifth stage, the text of the final report was written.

## RESULT AND DISCUSSION

The Municipal School of Early Childhood Education (EMEI) Regina Rocco, in March 2018 had a change in its name, becoming the Municipal School of Basic Education (EMEB) Regina Rocco, which is divided into two houses, with house I include Nursery and Early Childhood Education, while House II houses Elementary Education. The Regina Rocco complex, in addition to having the EMEBs, also has a theater, a sports complex, made up of multi-sports courts and athletics, artistic gymnastics, wrestling and handball centers.

The visits to evaluate the spaces at EMEB Regina Rocco House I, were carried out on the 23rd, 26th and 27th of February 2023, during the period from 7:00 am to 7:30 am and on the 4th of March, from 8:00 am to 12:00 pm, without the presence of children. And access to EMEB on visiting days was via the internal Via Complexo Esportivo, where the main access is located on the 1st floor. However, there is also the possibility of access via a parallel street, where school vans disembark, through the ground floor.



Figure 2: Facade of EMEB Regina Rocco House I

Source: Photo by Isabella Jara Mathias

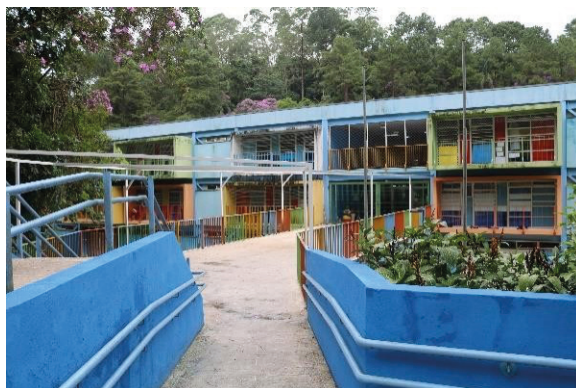


Figure 3: Main access

Source: Photo by Isabella Jara Mathias

The evaluated building has three floors, with the 1st and 2nd floors being used for Early Childhood Education, the object of study, and on the ground floor there is a Day Care Center. Its shape resembles a rectangular prism, with detachments on the facade, corresponding to the classroom balconies.

The building's facades have large openings, which contributes to natural lighting and natural ventilation of the internal environments. Its predominant colors are vibrant shades of blue, green, yellow and orange, which are repeated in other elements of the school, such as the railings, thus contributing to the playfulness of the school both outside and inside. The apparent structure of metallic profiles painted in blue can also be seen on the facade (Figure 2).

The EMEB Regina Rocco House I, as well as the entire Regina Rocco complex, are close to an environmental preservation area of the Atlantic Forest. This proximity and great contact with nature is a beneficial factor for the physical and psychological well-being of both students and the local community.

The school entrance has good accessibility, with the main access being easily identified and via a staircase or ramp, both made of concrete and blue, which give access to a metal walkway and the 1st floor (Figure 3).





Figure 1: Implementation of the Regina Rocco Complex.

Source: Satellite Image: Google Maps, 2023; Edited by: Isabella Jara Mathias, 2023.

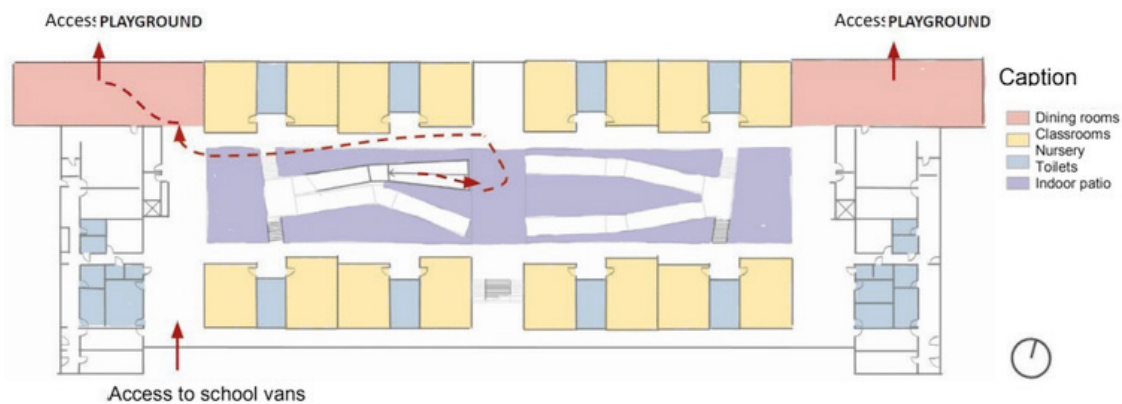


Figure 4: Ground Floor Plan EMEB Regina Rocco House I highlighting the evaluated environments and the route taken.

Source: Isabella Jara Mathias, 2023

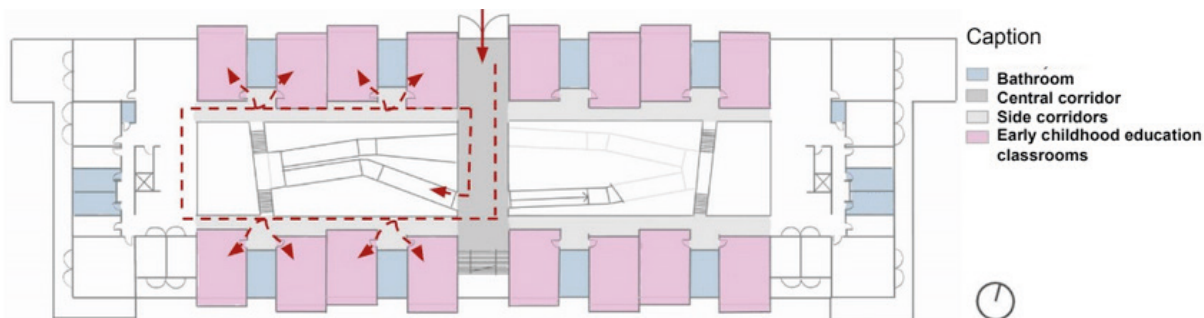


Figure 5: Plan of the 1st Floor EMEB Regina Rocco House I highlighting the environments evaluated and the route taken.

Source: Isabella Jara Mathias, 2023

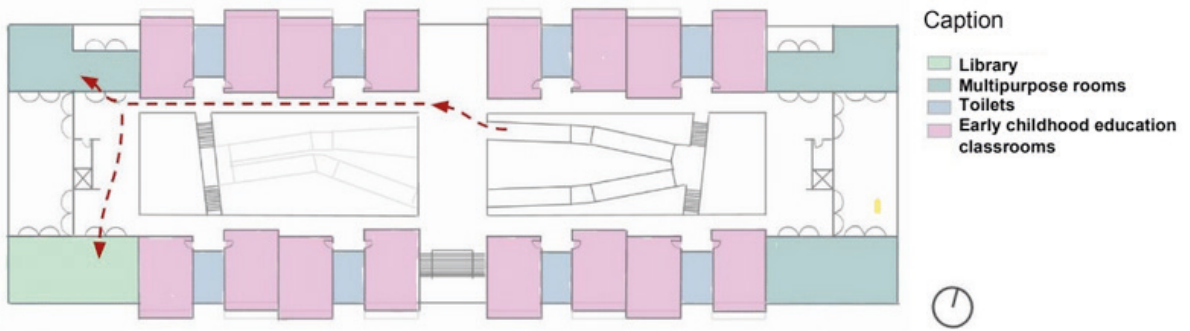


Figure 6: Plan of the 2nd Floor EMEB Regina Rocco House I highlighting the evaluated environments and the route taken.

Source: Isabella Jara Mathias, 2023



Figure 7: Entrance door to EMEB R. Rocco  
Source: Photo by Isabella Jara Mathias



Figure 8: Central corridor of the school.  
Source: Photo by Isabella Jara Mathias

light. Its masonry walls are painted with blue acrylic paint and the exposed metal structure with light gray enamel.

There are two colorful benches on site for parents to wait at children's arrival and departure times, as well as an opening to contact the office. An aluminum gate is also installed, which gives access to the central corridor on the 1st floor and the student use areas.

The central corridor is 3.3 m wide and gives access to both the central vertical circulation, carried out by ramps and stairs, and the side corridors. Like the main entrance, the central corridor also has good natural lighting. Furthermore, it has colored metal railings, predominantly in blue, green, yellow and orange, which contrasts with the white vinyl flooring and the apparent light gray metal structure (Figure 8).

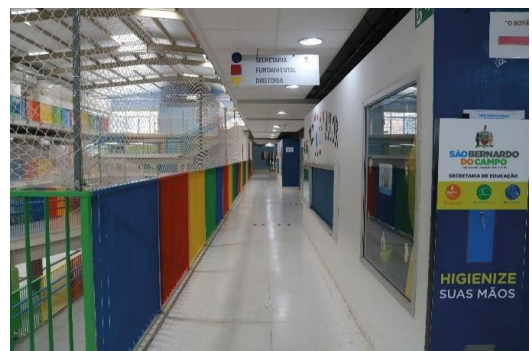


Figure 9: Side corridors of the school.  
Source: Photo by Isabella Jara Mathias

The main entrance to EMEB (Figure 7) is characterized by being a covered space measuring 3.2 m x 4.3 m. It has good lighting, due to having a glazed opening facing the Northwest facade, which receives the greatest amount of sunlight during most of the day, in addition to artificial lighting, through tubular LED lamps and the light color of the floor and ceiling, which reflect a greater amount of



Figure 10: Side corridors of the school.

Source: Photo by Isabella Jara Mathias



Figure 12: Sanitary 02

Source: Photo by Isabella Jara Mathias

The side corridors vary in width from 0.9 m to 1.3 m, due to the prominence of the classrooms on the facade, which are also reflected in the internal environment. Its natural lighting is provided through zenithal openings in the metal structure roof, and there is the presence of artificial lighting, through the lowered ceiling. The masonry walls are predominantly white, but also have colorful figurative designs and phrases, which vary for each room. In addition, it also has two openings with glass of different sizes, which allow greater visual permeability between the interior space of the room and the exterior, as well as displays of different colors, which make it possible to display the activities, paintings and collages carried out in each class (Figure 9 and 10).

The side corridors give access to 16 classrooms and 8 bathrooms. For every 2 classrooms there is a toilet adapted to the size of the children. The toilets are 3 m x 1.8 m in size and have 4 cabins. They have good natural ventilation, due to the openings and location close to the facades. The walls are covered in white and orange or blue tiles, and the floor is made of white vinyl, similar to the corridors. Due to the proximity of the classrooms, the autonomy of children who reach older ages to use the toilets independently is encouraged (Figures 11 and 12). There are also accessible toilets at the end of the corridors, close to the teachers' and coordination rooms.

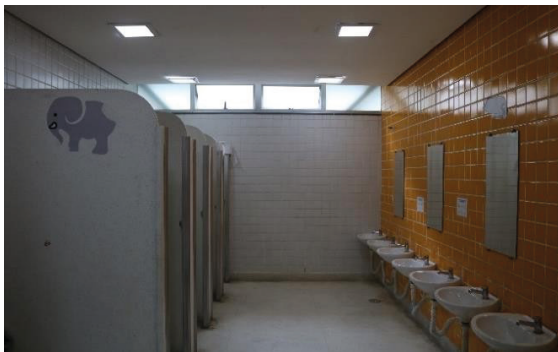


Figure 11: Toilet 01

Source: Photo by Isabella Jara Mathias



Figure 13: Classroom 01

Source: Photo by Isabella Jara Mathias

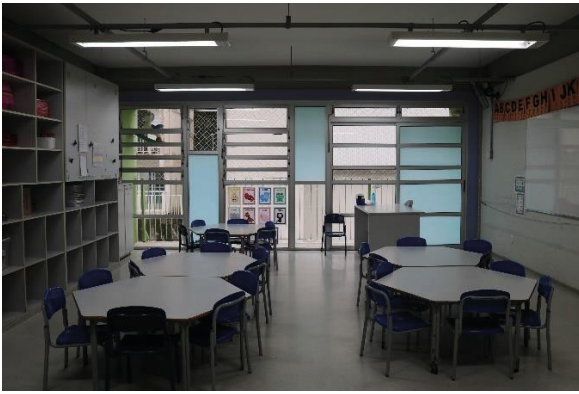


Figure 14: Classroom 02

Source: Photo by Isabella Jara Mathias



Figure 15: School ramps.

Source: Photo by Isabella Jara Mathias

The classrooms are rectangular with dimensions of 3.2 m x 4.3 m, each of which accommodates approximately 30 students and 1 teacher per shift. All rooms have balconies, of varying sizes, which students have access to, ensuring access to natural lighting and ventilation.

However, the facades of the classrooms face the Northwest or Southeast, with the latter receiving less sunlight, corresponding to the room in Figure 14, in addition to the proximity to the fight center building, which provides shade and makes it impossible to see nature. Thus, the rooms facing the Southeast are characterized by being darker rooms, despite the large number of tubular lamps, which promote artificial lighting.

The masonry walls and vinyl flooring in the rooms are white, which helps reflect light. Each classroom has white tables and blue chairs, which can be rearranged depending on the teacher and the proposed activity, thus creating freedom in the organization of the space.

The classrooms facing the Northwest have balconies that function as breezes that protect against the most intense heat, especially in summer, and overlook the playground area, where there are trees. The view of a natural environment interferes with children's psychological well-being (Figure 13).



Figure 16: School elevator.

Source: Photo by Isabella Jara Mathias

The building's internal vertical circulation occurs through three forms: 2 elevators, located at the ends of the building, 3 stairs and 4 ramps, which are accessed through the central corridor. The existence of ramps in the building, in addition to meeting accessibility standards, also encourages active design in the school environment and the possibility for children to explore the building autonomously and safely. The different colors of the railing also create a playful environment (Figure 15).



Figure 17: Internal Court yard

Source: Photo by Isabella Jara Mathias



Figure 18: Cafeteria

Source: Photo by Isabella Jara Mathias

natural lighting and ventilation, as they face the Northwest facade and have large windows and glass doors, which give access to the playground area. It is possible to observe that the artificial lighting in this environment is similar to the side corridors, where the ceiling is lowered.

The walls of the cafeteria are two colors: orange, up to a height of 1.1 m, and the rest white, with the playful presence of food paintings. The furniture present in the environment consists of white rectangular tables and orange chairs, both adapted to the scale of children aged 4 to 6 years (Figure 18).



Figure 19: Play ground

Source: Photo by Isabella Jara Mathias

The internal courtyard is a large space, which allows great mobility for children, and, despite being in the central area of the building and on the ground floor, it has natural lighting, which enters through overhead openings in the roof, associated with the gray tone. Light from the apparent metallic structure and the light tone of the vinyl floor, colors that reflect a greater amount of light. Its furniture follows the characteristic colors of the facades and railings, thus stimulating the playfulness of the environment (Figure 17).

On the ground floor there are two cafeterias, one for daycare (on the right in the plan in Figure 4), and the other for Early Childhood Education (on the left in the plan in Figure 4). Both dining rooms, rectangular in shape and measuring 12 mx 4 m, are provided with



Figure 20: Play ground

Source: Photo by Isabella Jara Mathias

The playground is characterized by being an outdoor environment with great contact with nature, due to its proximity to a remaining area of the Atlantic Forest and the fact that the floor is mostly grass, with some paths made of

concrete. This contact with nature creates an environment that stimulates the physical and psychological well-being of children, who are encouraged to explore the space and thus learn more about environmental education (Figures 19 and 20).

Its furniture made of wooden toys follows the vibrant color language of the building's facade, with the main colors used: blue, green, yellow and red. Although access is accessible and easy through the cafeterias on the ground floor, they do not have any toys adapted for children in wheelchairs or with limited mobility.



Figure 21: Library

Source: Photo by Isabella Jara Mathias



Figure 22: Multipurpose Room

Source: Photo by Isabella Jara Mathias

The library is located on the 2nd floor of EMEB and is a rectangular space measuring 8 mx 4 m. Despite facing the Southeast facade, it has natural lighting, due to the presence

of windows facing a balcony (on the right in figure 21). The furniture is similar to that in the cafeteria, with white rectangular tables and orange chairs adapted to the children's scale, as well as wooden book shelves, arranged close to the walls, so that students can easily reach their books (Figure 21).

There are 3 multipurpose rooms on the 2nd floor, which can accommodate different uses such as theater, painting room, multimedia room, among others. They are characterized by their spacious environment, with access to balconies and adapted furniture depending on the activity proposed on the day (Figure 22).

## FINAL CONSIDERATIONS

Considering the methodology adopted, it was found that the positive points of EMEB Regina Rocco House I are the presence of natural lighting in most internal environments, which is enhanced by the light colors of the floor and ceiling, which reflect a greater amount of light. Natural light in school environments helps with the learning process and greater attention from students in the classroom.

The vibrant colors present on the facades, railings and furniture are another positive factor, due to the playfulness that these colors provide to the environments. It is worth mentioning that the colorful guardrails present in the corridors and ramps encourage children to explore the environment independently.

Furthermore, it was noted that there is accessibility in most of the school's spaces, with the exception of the internal courtyard and the playground, which do not have adapted toys for children in wheelchairs or with mobility difficulties.

Another point considered negative is the lack of contact with the nature of the windows in the classrooms facing the Southeast (Figure 14), where a nearby building casts a shadow on the windows, which could interfere with

the well-being of the children, if compared to classrooms facing northwest that allow views of green areas.

Finally, as a recommendation to improve the school environment, it is possible to

propose greater contact with nature in rooms facing the Southeast, through potted plants on the balconies, as well as investing in accessible toys, both for the internal courtyard, as for the playground.

## REFERENCES

BATISTA, Antônio A. G.; ÉRNICA, Maurício. Educação em territórios de alta vulnerabilidade social na metrópole: um caso na periferia de São Paulo. CENPEC, 2011. Disponível em: [https://www.cenpec.org.br/wp-content/uploads/2015/08/Informe\\_de\\_Pesquisa3a.pdf](https://www.cenpec.org.br/wp-content/uploads/2015/08/Informe_de_Pesquisa3a.pdf). Acesso em: 29 mar. 2023.

BRASIL. Estatuto da Criança e do Adolescente. Brasil, 2021. Disponível em: [https://www.gov.br/mdh/pt-br/assuntos/noticias/2021/julho/trinta-e-um-anos-do-estatuto-da-crianca-e-do-adolescente-confira-as-novas-acoes-para-fortalecer-oeca/ECA2021\\_Digital.pdf](https://www.gov.br/mdh/pt-br/assuntos/noticias/2021/julho/trinta-e-um-anos-do-estatuto-da-crianca-e-do-adolescente-confira-as-novas-acoes-para-fortalecer-oeca/ECA2021_Digital.pdf). Acesso em: 20 jul. 2023.

BRASIL. Lei 13146, de 6 de julho de 2015. Institui a Lei Brasileira de Inclusão da Pessoa com Deficiência (Estatuto da Pessoa com Deficiência). DF: Congresso Nacional, [2007]. Disponível em: <https://www.jusbrasil.com.br/legislacao/205855325/lei-13146-15>. Acesso em: 18 ago. 2023.

BERTOLOTI, Dimas. Iluminação natural em projetos de escolas: uma proposta de metodologia para melhorar a qualidade da iluminação e conservar energia. 2007. Dissertação (Mestrado em Tecnologia da Arquitetura) - Faculdade de Arquitetura e Urbanismo, Universidade de São Paulo, São Paulo, 2007. Disponível em: <https://www.teses.usp.br/teses/disponiveis/16/16132/tde-19092007-141031/pt-br.php>. Acesso em: 18 ago. 2023)

CAMPOS-DE-CARVALHO, Mara. Psicologia Ambiental. Entendendo as relações do homem com seu ambiente. Editora Alínea, Campinas, SP, 2019.

CARVALHO, Guilherme Falsarella de. Centro de Educação Unificado Parque Figueira Grande. 2009. Monografia (Graduação em Arquitetura e Urbanismo) – Universidade Presbiteriana Mackenzie, São Paulo, 2009.

COMITÊ CIENTÍFICO DO NÚCLEO CIÊNCIA PELA INFÂNCIA (BRASIL). Estudo no1: O impacto do desenvolvimento na primeira infância sobre a aprendizagem. Brasil, 2014. Disponível em: [https://www.mds.gov.br/webarquivos/arquivo/crianca\\_feliz/Treinamento\\_Multiplicadores\\_Coordenadores/IMPACTO\\_DESENVOLVIMENTO\\_PRIMEIRA%20INFANCIA\\_SOBRE\\_APRENDIZAGEM.pdf](https://www.mds.gov.br/webarquivos/arquivo/crianca_feliz/Treinamento_Multiplicadores_Coordenadores/IMPACTO_DESENVOLVIMENTO_PRIMEIRA%20INFANCIA_SOBRE_APRENDIZAGEM.pdf). Acesso em: 23 mar. 2023.

DIAS, Edmilson. Acessibilidade espacial e inclusão em escolas municipais de educação infantil. Dissertação de Mestrado em Arquitetura e Urbanismo na UNESP. Bauru, 2016. Disponível em: <https://repositorio.unesp.br/handle/11449/138026>. Acesso em: 18 ago. 2023.

HALLER, Karen. O pequeno livro das cores. Como aplicar a psicologia das cores em sua vida. Olhares, São Paulo, 2022.

HASSWANI, Miriã Dias Carvalho. Leitura do espaço pré-escolar em territórios vulneráveis: o caso jardim Lapenna. 2018. 230 f. Dissertação (Mestrado em Arquitetura e Urbanismo) – Universidade Presbiteriana Mackenzie, São Paulo, 2018.

KOWALTOVSKI, Dóris C. C. Arquitetura escolar. O projeto do ambiente de ensino. São Paulo, Oficina de Textos, 2011.

KRAMER, SONIA. As crianças de 0 a 6 anos nas políticas educacionais no Brasil: educação infantil e é fundamental. Scielo, 2004. Disponível em: <https://www.scielo.br/j/es/a/Vc4sdh6KwCDyQPvGGY8Tkmn/?lang=pt#>. Acesso em: 29 jul. 2023.

MENA, Isabela. O que é Neuroarquitetura. Brasil, 2019. Disponível em: <https://www.projtodraft.com/verbete-draft-o-que-e-neuroarquitetura/>. Acesso em: 17 mar. 2023.

MIGLIANI, Audrey. Neuroarquitetura aplicada a projetos para crianças. ArchDaily. Brasil, 2021. Disponível em: <https://www.archdaily.com.br/br/941959/neuroarquitetura-aplicada-a-arquiteturas-para-criancas>. Acesso em: 21 mar. 2023.

NEUROINLAB. A influência das cores no comportamento das pessoas. A combinação de cores, tons e luz traz sensações que melhoram a experiência de clientes. Neuro in Lab, 2022. Disponível em: <https://neuroinlab.com.br/a-influencia-das-cores-no-comportamento-das-pessoas/>. Acesso em: 7 fev. 2023.

PAIVA, Andréa. Ambientes para Crianças: o que a NeuroArquitetura pode nos ensinar. Neuroau, 2020. Disponível em: <https://www.neuroau.com/post/ambientes-para-criancas-e-a-neuroarquitetura>. Acesso em: 17 mar. 2023.

PAIVA, Andréa. Efeitos da cor: insights da neuroarquitetura. Neuroau, 2019. Disponível em: <https://www.neuroau.com/post/efeitos-da-cor-insights-da-neuroarquitetura>. Acesso em: 7 fev. 2023.

RHEINGANTZ, Paulo Afonso. Observando a qualidade do lugar. Procedimentos para a avaliação pós-ocupação. Rio de Janeiro, Proarq, 2009.

RODRIGUES, Fabiano de Abreu. Neuroanatomia das Cores – Color Neuroanatomy. Brazilian Journal of Development, 2022. Disponível em: <https://ojs.brazilianjournals.com.br/ojs/index.php/BRJD/article/view/42579>. Acesso em: 7 fev. 2023.

SILVA, Omara Therézio da. Proposta de projeto para escola de ensino infantil sob o enfoque da neuroarquitetura. 2020. Monografia (Graduação em Arquitetura e Urbanismo) – Centro Universitário Curitiba, Curitiba, 2020. Disponível em: <https://repositorio.animaeducacao.com.br/handle/ANIMA/14116>. Acesso em: 07 jul. 2023.

UNICEF. Declaração Universal dos Direitos Humanos. Disponível em: <https://www.unicef.org/brazil/declaracao-universal-dos-direitos-humanos>. Acesso em: 21 jul. 2023.

VILLAROUCO, Vilma; FERRER, Nicole; et al. Neuroarquitetura: A neurociência no ambiente construído. Rio Books, 2021.